

**Neuropsychedelica. The Revival of Hallucinogen Research since the Decade
of the Brain**

by

Nicolas David Langlitz

Magister (Free University of Berlin, 2004)

Arzt (Free University of Berlin, 2004)

Doktor (Free University of Berlin, 2004)

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Committee in charge:

Professor Paul Rabinow, Chair

Professor Philippe Bourgois

Professor Lawrence Cohen

Professor Hubert Dreyfus

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Abstract

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This thesis examines the rearticulation of the drug-induced “psychedelic experience” in the age of cognitive neuroscience. It provides a historical and social scientific analysis of the social and cultural conditions of the most recent transformation of this historically singular form of limit experience along three axes: types of understanding, forms of normativity, and modes of relation to oneself and to others (Foucault). The implication of these social conditions in subjective experience takes a particular form in the case of hallucinogen ingestion: The psychopharmacological effects of these drugs are thought to be highly dependent on a subject’s internal state and expectations and the environment, in which the drugs are taken. The environment ethnographically described in this study is the meticulously regulated space of two neuropsychopharmacology laboratories in Zurich and San Diego that have played central roles in the so-called revival of hallucinogen research since around 1990. The thesis examines the “external conditions” (Weber) of this

renaissance in the “Decade of the Brain” after political, regulatory, and scientific developments had led to the termination of most research on psychedelics in the course of the 1960s. The use of hallucinogen action as a model of psychosis is analyzed. With respect to hallucinogen-based animal models of schizophrenia the thesis discusses how humanness is dissolved and demarcated in biological psychiatry. In the Zurich lab, neuroscientists also attempted to “operationalize” and solve certain problems drawn from debates over the nature of consciousness in the philosophy of mind by turning them into experiments. Studying the transplantation of philosophy into the lab from a social scientific viewpoint raises a number of interesting questions concerning the social life of philosophical ideas and the neuroscientific suffusion of a problem space previously occupied by the humanities. Finally, this study investigates the “internal conditions” (Weber) of hallucinogen research today: the scientific ethos underlying the work of a new generation of researchers fascinated by the psychedelic experience and their highly original strategies of integrating these experiences into their conduct of life. The inquiry uniquely highlights a number of anthropological implications of psychopharmacology, especially the connection between the human brain and subjective experience.

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CONTENTS

I. INTRODUCTION.....	1
1. The Hallucinogen Experience in the Decade of the Brain	1
The Problem of Experience in the Age of Cognitive Neuroscience.....	1
Emergence of the “Psychedelic Experience”	7
(Counter-) Modernity and Contingency of the Psychedelic Experience ..	16
Life, Science, Experience	21
Hallucinogens in 1960s and 1970s Anthropology	30
Standing Back from Experience: Problematization and Second-order Observation	34
II. IS THERE A REVIVAL OF HALLUCINOGEN RESEARCH?	46
Hofmann’s 100 th Birthday.....	46
2. The Previous Life of Hallucinogen Research.....	50
Researching and Regulating Hallucinogenic Sacraments	50
Policing Food and Drugs.....	53
Political Neurotheology	62
The Breakdown of Hallucinogen Research.....	70
Vivid Afterlife	76
3. Rebirth of Hallucinogen Research in Contemporary Neuropsychopharmacology	84
A New Beginning: Rick Strassman’s Quest for the Spirit Molecule.....	84
The Heffter Research Institute	90
The Swiss Advantage of Location.....	94
Swiss Drug Policy since the 1990s	111
The Global Assemblage of Hallucinogen Research.....	118
Is there a Revival?	130
III. WONDER DRUGS IN THE LABORATORY.....	141
4. Disenchantment and Spiritualization.....	141
Field Trip.....	141
Mystical Experiences and Illusionary Triangles	144
Vollenweider: Looking Beyond from a Solid Standpoint	160
Dittrich’s Psychometry of Ecstasy.....	163
Investigating the Neural Correlates of Altered States Consciousness ..	167
Peace of Mind and Clash of Worldviews	181
Disenchantment and Spiritualization of the Brain	192

5. Modeling Psychosis I: What Kind of Model?	210
A Theatrical PET Scan	210
Beringer's Experiential Model of Psychosis	215
From the Experiential to a Descriptive and on to an Explanatory Model of Psychosis	222
The Interruption of Model Psychosis Research	228
The Current Renaissance of Model Psychosis Research	232
A Generative Model	241
6. Modeling Psychosis II: Animalization of the Mind	250
Psychiatric Drug Discovery: From Self-Experimentation to Animal Research	250
The Geyer Lab	252
Ethics: The "Iron Cage" of Animal Research	255
Ethos: Care and Method	264
Set and Setting	275
Identification: The Logic of Animal Models	286
Anthropological Difference: The Crisis of Animal Models	293
IV. FROM SPIRITUAL CRISIS TO PSYCHEDELIC MEDITATIONS	302
Preliminary Framework: Lifeworld and Crises	302
7. Self-Experimentation	306
In the Footsteps of John Lilly	307
The Paradox of Methodico-meditative Self-experimentation	321
Disenchanted Mysticism	329
Self-experimentation Today	335
8. Psychedelic Photography	344
Neuro-Aesthetics	345
A Contemporary Form of Visionary Art	347
Two Types of Images, Two Types of Self-fashioning	354
9. Neurophilosophy in Practice	359
"Operationalizing" Philosophical Questions	360
Neurophilosophy and the Renaissance of Consciousness Research	365
<i>Cultura animi</i> in the Light of Cognitive Neuroscience	372
10. Limit-experience and Self-formation	379
Refractions of Experience	379
Making up Neurochemical Doubles	385
Toxic Meditations	389
Beyond the Tranquility of the Lifeworld	397

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I. INTRODUCTION

1. The Hallucinogen Experience in the Decade of the Brain

The Problem of Experience in the Age of Cognitive Neuroscience

The 1990s were announced as the “Decade of the Brain.” They were also a period in which the neuroscientific exploration of the “neural correlates of consciousness” and other mental phenomena gained momentum.¹ In this context, there has been a quiet and modest resurgence of research on and with supposedly consciousness-expanding hallucinogenic drugs—after work with substances such as lysergic acid diethylamide (LSD) and psilocybin had broken down in the wake of scandals and scientific impasses in the late 1960s. The Swiss neuropsychopharmacologist Franz Vollenweider, for example, presents hallucinogens as “remarkable molecular probes” to be used in combination with functional brain imaging techniques and pharmacological methodologies to investigate the biological correlate of altered states of consciousness (ASC) and the mind at large.² As the cognitive neurosciences are transforming our conception of the human hallucinogens are assigned a key role in refashioning ourselves as conscious beings—conceptually and practically. As Vollenweider’s American colleague David Nichols writes:

¹ The term “neural correlates of consciousness” (NCC) was first used in print by Francis Crick and Christof Koch, “Towards a neurobiological theory of consciousness,” *Seminars in the Neurosciences* 2 (1990). Cf. Thomas Metzinger, “Introduction: Consciousness Research at the End of the Twentieth Century,” in *Neural Correlates of Consciousness. Empirical and Conceptual Questions*, ed. Thomas Metzinger (Cambridge (Mass.): MIT Press, 2000), 4.

² Franz Vollenweider, “Recent Advances and Concepts in the Search for Biological Correlates of Hallucinogen-induced Altered States of Consciousness,” *The Heffter Review of Psychedelic Research* 1 (1998): 21.

Very clearly, the substrates in the brain that are affected by hallucinogenic drugs play crucial roles for us as conscious beings in constructing our reality and in defining exactly who we are in relationship to the rest of the world. [...] The philosopher in each of us yearns for greater understanding of who we are and why we are here. Irrational fear of inquiries into the nature of consciousness and conscious experience must be put aside, and hallucinogens should be recognized for what they are: tools that will ultimately help us to understand ourselves. The answers lie in further research for somewhere in the complexity of the brain exists the source of answers to all questions about ourselves.³

A historical and social scientific critique of this philosophical anthropology implicit in contemporary hallucinogen research is the subject matter of this book.

The key to long-standing philosophical and anthropological questions such as the mind-body problem has been sought from neuroscience since the nineteenth century. Starting with Franz Joseph Gall's phrenology, various attempts have been made to map features of our inner life on the central nervous system.⁴ In the 1990s, this naturalization of the human mind was rearticulated with functional neuroimaging technologies and neuropsychological tests and rating scales. The field of cognitive neuroscience has focused on the neural substrates of mental processes and their behavioral manifestations. But the scientific exploration of subjectivity as a biological phenomenon has constituted a peculiar epistemic object at odds with the traditional perspective of the natural sciences. The German philosopher of mind Thomas Metzinger put it this way: "How can biosystems in an environment that objectively lacks perspective

³ David Nichols, "Hallucinogens," *Pharmacology & Therapeutics*, no. 101 (2004): 168.

⁴ Michael Hagner, *Der Geist bei der Arbeit. Historische Untersuchungen zur Hirnforschung* (Göttingen: Wallstein, 2006), 164-194. Michael Hagner, *Homo cereбрalis. Der Wandel vom Seelenorgan zum Gehirn* (Frankfurt/M.: Insel, 2000).

generate a representation of the world that is essentially perspectival? How can brains [...] produce a centered consciousness—a consciousness which is constructed around a phenomenal focus?”⁵ To study the neural mechanisms bringing these mental phenomena about the latter must be grasped in the first place. But the inner life of the subject is not accessible from the outside—neither with the naked eye nor by physical instruments. Therefore, knowledge about conscious experience gained by way of introspection and knowledge about the brain derived from dissection, neuroimaging technologies, measurement of electric currents, etc. seem incommensurable. In 1983, the American philosopher Joseph Levine argued that there was an “explanatory gap” between physiology and experience: Even if we knew everything about the biology of pain, for instance, we would not be able to explain why pain feels the way it does.⁶ This qualitative discrepancy between descriptions of conscious mental content and its neural basis is what has come to be known as “the hard problem of consciousness” (as opposed to the supposedly easy problems of finding mechanistic explanations for phenomena situated entirely in the physical realm).⁷ It is still subject of debate among neuroscientists and philosophers of mind whether this conundrum can be solved by the means of customary brain research.

⁵ Thomas Metzinger, *Subjekt und Selbstmodell. Die Perspektivität phänomenalen Bewußtseins vor dem Hintergrund einer naturalistischen Theorie mentaler Repräsentationen* (Paderborn: mentis Verlag, 1999), 25 (my translation—NL).

⁶ Joseph Levine, “Materialism and Qualia: The Explanatory Gap,” *Pacific Philosophical Quarterly* 64 (1983).

⁷ David Chalmers, *The Conscious Mind. In Search of a Fundamental Theory* (New York: Oxford University Press, 1996).

According to Francis Crick there were two major unsolved questions in twentieth century biology. Crick and James Watson's discovery of the molecular structure of DNA in 1953 and the subsequent cracking of the genetic code were of enormous importance to find an answer to the first one: how molecules make the transition from the non-living to the living. The second major problem still pending is how the brain makes a conscious mind.⁸ However, what Crick perceived as the last frontier of scientific progress in the life sciences has been vigorously defended by others (sometimes dismissed as the "New Mysterians") as the only remaining bulwark against the total disenchantment of human life. In this context, the neurosciences have recently sparked off a heated discussion about the status of experience. Their quest for the neural correlates of what is perceived as mental phenomena—from free will to love and from moral judgment to mystical revelations—has been understood as challenging the certainty and self-evidence of our inner life. The vehemence of the arguments over the neuroscientific disenchantment of the human mind indicates a growing disquiet about the possibly illusory character of subjective experience. In his preface to a collection of texts representative of the German debate about recent advances in brain research, a journalist from Germany's most important conservative newspaper *Frankfurter Allgemeine Zeitung* articulated this unease eloquently:

Our life is an illusion. This is the succinct conclusion with which neuroscientists clobber the scene. They say: You think that you're thinking, but in fact, you only think that you're thinking. In reality, nobody thinks, but the brain plays its neuronal game, in which the self doesn't have a say. So much the worse, they

⁸ Francis Crick, *What Mad Pursuit. A Personal View of Scientific Discovery* (New York: Basic Books, 1990), 17.

say, that the self is even taken in by the illusions, which the play of neurons constantly produces. Among these illusions are the self and its whole way of experiencing the lifeworld.⁹

This statement is polemic. Its unfounded generalization is part of a trench war over territorial claims between representatives of the humanities and a small group of neuroscientists gone public intellectuals. In fact, there is neither a unified account of conscious experience or the self in contemporary neuroscience nor in its philosophical interpretations. And their scandalized depiction as mere illusions is certainly not restricted to brain research either: In the history of thought, variations of this conception have been put forward time and again, from ancient Buddhism to French poststructuralism. The current controversy only points to the latest episode of an ongoing problematization of experience.

With respect to the pharmacology of hallucinogens, the gap between objectively measurable neurophysiological and neuropsychological effects and subjective experience is particularly wide. When under the influence of hallucinogenic drugs many people report, for example, that their sensory perceptions become richer and more acute, that they become more creative, and that the world appears deeply meaningful. Alan Hartman and Leo Hollister followed this cue in the early 1960s and studied the color experience of healthy test subjects under the influence of mescaline, LSD, and psilocybin. The participants' introspective reports were in accord with the impressions of most

⁹ Christian Geyer, "Vorwort," in *Hirnforschung und Willensfreiheit. Zur Deutung der neuesten Experimente*, ed. Christian Geyer (Frankfurt/M.: Suhrkamp, 2004), 9 (my translation—NL).

hallucinogen users that the drugs enhanced their perceptual sensitivity. But these subjective accounts could not be validated through objective measurements: "All three psychotomimetic drugs increased color experiences elicited from a variety of stimuli. [...] It is curious that a test which does not call for introspective reports, such as hue discrimination, showed some deterioration under the drugs."¹⁰ Analogously, when the Swiss psychiatrist Kaspar Weber administered psilocybin to musicians in 1966 he found that they experienced music as much more intense and faceted than usual. But when tested their discriminatory faculties as well as their perceptions of the gestalt of a whole piece of music turned out to be impaired.¹¹ Similarly, in an experiment I observed and participated in during my fieldwork at Franz Vollenweider's laboratory in Zurich the effect of psilocybin on "meaningful perceptions" was examined. Even though many people experience the world as full of meaning when under the influence of hallucinogens it turned out that test subjects were significantly less perceptive of meaningful stimuli under the active agent than under placebo.

Do these experiments indicate that subjects' drug experiences are illusory (as could be expected from a class of substances referred to as a "hallucinogens")? Or does their lack of success to account for these experiences

¹⁰ Alan Hartman and Leo Hollister, "Effect of Mescaline, Lysergic Acid Diethylamide and Psilocybin on Color Perception," *Psychopharmacologia* 4 (1963): 449. Julian Silverman, on the other hand, claimed that the intensification of sensory experience through hallucinogens could also be demonstrated through neurophysiological measurements. Julian Silverman, "Research with Psychedelics. Some Biopsychological Concepts and Clinical Applications," *Archives of General Psychiatry* 25 (1971). See also Lester Grinspoon and James Bakalar, *Psychedelic Drugs Reconsidered* (New York: Basic Books, 1979), 124.

¹¹ Claudio Vannini and Maurizio Venturini, *Halluzinogene. Entwicklung der Forschung, 1938 bis in die Gegenwart. Schwerpunkt Schweiz* (Berlin: VWB – Verlag für Wissenschaft und Bildung, 1999), 375-380.

point to a shortcoming of the laboratory conditions and the methods and instruments of contemporary neuroscience failing to bridge the “explanatory gap” (after all, there must be some neural substance to these experiences)? Which truths—if any—lie hidden behind the drug-induced visions induced by hallucinogens?

Although these questions seem most interesting to me I refrain from answering them. From the perspective I chose they serve as a case in point of the current problematization of experience in cognitive neuroscience and neuropsychopharmacology. This is the subject matter of my thesis based on nine months of fieldwork in two laboratories in Zurich and San Diego studying hallucinogenic drugs. The work in hand is an “anthropology of the contemporary” in Paul Rabinow’s sense: It focuses on the “near future and the recent past,”¹² or, closer to my subject matter, on the so-called revival of hallucinogen research (expected) since approximately 1990.

Emergence of the “Psychedelic Experience”

With respect to the problematization of experience, hallucinogens are a particularly interesting class of psychotropic drugs. Their effects on the human mind do not set in gradually and subtly like those of antidepressants, for example. Nor do they produce a strictly circumscribed, almost stereotypical set of sudden and pronounced psychic alterations as stimulants do.¹³ Instead they can

¹² Paul Rabinow, *Anthropos Today. Reflections on Modern Equipment* (Princeton: Princeton University Press, 2003), 55.

¹³ “In experiments, most drugs make all subjects feel more alike; LSD actually tends to accentuate any difference in mood that exist among subjects at the start,” wrote

provoke a broad range of immediate and extremely powerful experiences. The psychiatrist Lester Grinspoon and his colleague James Bakalar from Harvard Medical School remarked:

The array of psychedelic experiences is vast almost beyond belief. Trying to describe and classify them is somewhat like trying to describe and classify all experience: it is hard for analysis to get a grasp. The street language of head trips, body trips, ego trips, heavy trips, bum trips, mystical trips, and so on suggests the variety in a crude way. [Aldous] Huxley called mescaline “a voyage to the mind’s Antipodes”; sometimes it is like the discovery of the New World, or a visit to the celestial spheres, and yet it can also be like sitting in an airport all day waiting for the plane to take off.¹⁴

In the 1920s, the German psychiatrist Kurt Beringer tried to identify a stable core of symptoms induced by the hallucinogen mescaline. He regarded the recurrent perceptual disorders (illusions, hallucinations, synesthesias), changes in temporal perception (time rushing or standing still), and alterations in thought and mood as sufficiently resembling the clinical picture of schizophrenia to serve as a model of psychosis.¹⁵ The investigation of hallucinogen models of psychosis has been one of the central threads of hallucinogen research ever since and has also come to play an important role in the current revival of interest in this class of substances.

However, the view of hallucinogens as “psychotomimetics”—as drugs which mimic psychoses—was soon called into question. Addressing a meeting of the New York Academy of Sciences in 1957, the British psychiatrist Humphry

Grinspoon and Bakalar, *Psychedelic Drugs Reconsidered*, 90.

¹⁴ Ibid., 89.

¹⁵ Kurt Beringer, *Der Meskalinrausch. Seine Geschichte und Erscheinungsweise* (Berlin: Julius Springer, 1927).

Osmond who was working with LSD and mescaline at Weyburn Hospital in Saskatchewan, Canada, argued that the hallucinogens' capacity to mimic psychoses was "not their only, nor even, perhaps, their most important quality." Although Osmond admitted that these drugs did impede the brain's performance he insisted that the experiences they gave rise to had been of greatest value to him.

For myself, my experiences with these substances have been the most strange, most awesome, and among the most beautiful things in a varied and fortunate life. These are not escapes from but enlargements, burgeonings of reality. In so far as I can judge they occur in violation of Hughling Jackson's principle [that neuronal disorders dissolve the complex interactions of nerve functions isolating the more primitive elements of brain function], because the brain, although its functioning is impaired, acts more subtly and complexly than when it is normal. Yet surely, when poisoned, the brain's actions should be less complex, rather than more so? I cannot argue about this because one must undergo the experience himself. Those who have had these experiences know, and those who have not had them cannot know and, what is more, the latter are in no position to offer a useful explanation.¹⁶

To do justice to these drugs Osmond was looking for a more inclusive term than "hallucinogens" or "psychotomimetics," a term which did not reduce their effects to mere pathology. The number of names that had already been proposed or used are evidence of the difficulties in pigeonholing this class of substances: phantastica, eidetics, delirients, schizogens, psychotica, psychotogens, psychodysleptics, elixirs, etc. Osmond added a few more suggestions eventually settling for the designation "psychedelics":

¹⁶ Humphry Osmond, "A Review of the Clinical Effects of Psychotomimetic Agents," *Annals of the New York Academy of Sciences* 66, no. 3 (1957): 428.

I have tried to find an appropriate name for the agents under discussion: a name that will include the concepts of enriching the mind and enlarging the vision. Some possibilities are: psychephoric, mind-moving; psychehormic, mind-rousing; and psyche-plastic, mind-molding. Psychezymic, mind-fermenting, is indeed appropriate. Psycherhexic, mind bursting forth, though difficult, is memorable. Psychelytic, mind-releasing, is satisfactory. My choice, because it is clear, euphonious, and uncontaminated by other associations, is psychedelic, mind-manifesting.¹⁷

Osmond's break with the concept of psychotomimetics and the language of pathology was not just about a more inclusive terminology but implied a wholly different anthropology. The term "psychedelics" had been coined in the correspondence between Osmond and the California-based British writer Aldous Huxley.¹⁸ Osmond had introduced Huxley to mescaline in 1953 supervising the author's first self-experiment with the drug which Huxley reported in his essay *The Doors of Perception*. Even though Huxley knew that hallucinogens were supposed to provoke a psychosis-like state of mind he already expected that mescaline would grant him access to the inner world described by mystical poets such as William Blake. He followed the French philosopher Henri Bergson's theory that the brain primarily served to eliminate sensory input "to protect us from being overwhelmed and confused by this mass of largely useless and irrelevant knowledge" for the sake of our biological survival. Huxley believed that mescaline inhibited the production of enzymes providing the brain with the glucose it needed to function properly. Thereby disturbing the cerebral "reducing

¹⁷ Ibid.: 429. As an anthropologist taking the natives' point of view as my point of departure, I will mostly speak of "hallucinogens" as it is the most widely used term in contemporary neuropsychopharmacology.

¹⁸ Aldous Huxley, *Moksha. Writings on Psychedelics and the Visionary Experience 1931-1963* (London: Chatto & Windus, 1980).

valve” the drug would make us aware of dimensions of reality not of immediate value in the fight for survival, but beneficial to our spiritual well-being. Under the influence of mescaline, a subject’s “perception is not limited to what is biologically or socially useful. A little of the knowledge belonging to Mind at Large oozes past the reducing valve of brain and ego, into his consciousness. It is a knowledge of the intrinsic significance of everything existent.”¹⁹ According to Huxley, impeding the brain’s filter function was the common psychophysiological goal of spiritual practices of all religions, which enable human beings to see a higher reality beyond our creaturely needs. Hallucinogenic drugs could serve as a shortcut to such mystical experiences. This is what Osmond meant when telling his psychiatric colleagues that his drug experiences were “not escapes from but enlargements [...] of reality.” But the image of man as a being whose biological makeup normally blinds him to the true nature of the universe which the concept of psychedelics implicated did not lead Osmond and Huxley to deny a nexus between hallucinogenic drug action and psychosis. “The schizophrenic is like a man permanently under the influence of mescaline, and therefore unable to shut off the experience of a reality which he is not holy enough to live with,” Huxley contended. On the other hand, most people taking the drug only experienced the “heavenly part of schizophrenia” catching a glimpse of the “Paradise of cleansed perception, of pure one-sided contemplation” for usually bearable eight to ten hours.²⁰ This reconfiguration of *anthropos* as spiritual animal continues to subject

¹⁹ Aldous Huxley, *The Doors of Perception* (London: Chatto & Windus, 1954).

²⁰ Ibid.

human beings to the logic of the normal and the pathological.²¹ But in a deeply meaningful cosmos the experiences induced by hallucinogens and mental illness are simultaneously dysfunctional and revelatory disclosing the world as it really is: exhilarating and overwhelming, awe-inspiring and terrifying. As psychedelics these drugs are understood to uncloak “the burning brightness of unmitigated Reality.”²²

Interpreted against the background of this worldview the subjective effects of “psychedelic drugs” came to be conceptualized as “the psychedelic experience.” As more and more people came to try out hallucinogens from the late 1950s onwards, Huxley’s texts provided a vocabulary and an interpretive structure shaping the drug experiences of many of his readers in the decades to come. In turn, these experiences informed a whole subculture associated with hallucinogenic drugs, which came to be known as “psychedelia.” The so-called psychedelic era of the 1960s—characterized by the drug-saturated lifestyle of the counterculture, its political activism, and a certain aesthetics (“psychedelic art”)—coincided and blended with a period of spiritual reorientation in American life, a strengthening of unchurched or alternative forms of spirituality emphasizing the role of experience. Alongside Eastern religious practices the instant mysticism granted by psychedelic drugs came to play an important role in this movement.²³ It arose in opposition to the predominant Protestant faith in the Scriptures and

²¹ Georges Canguilhem, *The Normal and the Pathological* (New York: Zone Books, 1989).

²² Huxley, *The Doors of Perception*.

²³ Robert Fuller, *Stairways to Heaven. Drugs in American Religious History* (Boulder (CO): Westview Press, 2000), 84-89.

corresponding disapproval of visionary experiences, but in accord with Protestantism's appeal to lived experience as opposed to dead received doctrine most vividly expressed in born-again conversions. In the American "culture of experience," many consumers of psychedelic drugs fashioned their first high after the model of evangelical radicalism as a decisive turning point in their lives.²⁴

However, reaching such an epiphany required careful preparation. Texts such as Huxley's *Doors of Perception* or Timothy Leary's trip manual *The Psychedelic Experience* shaped their readers' expectations and taught them how to attain the "expanded consciousness" they promised by guiding them through a series of stages of their drug experience as spiritual voyage. The purpose of such psychedelic travelogues was "to enable a person to understand the new realities of the expanded consciousness, to serve as road maps for new interior territories which modern science has made accessible."²⁵ The normativity underlying such directions comes to the fore in a book like Robert Masters and Jean Houston's *The Varieties of Psychedelic Experience*. They divide the hallucinogen experience into four hierarchically organized levels: the sensory (or merely aesthetic), the recollective-analytic (advancing self-exploration by intensifying emotions and unearthing long forgotten memories), the symbolic (situating the subject in evolutionary and historic processes, myths, or legends), and, finally, the integral stage, the deepest level of the psychedelic drug-state

²⁴ Cf. Martin Jay, *Songs of Experience. Modern American and European Variations on a Universal Theme* (Berkeley: University of California Press, 2005), 265-272. John McDermott, *The Culture of Experience. Philosophical Essays in the American Grain* (New York: New York University Press, 1976).

²⁵ Timothy Leary, Ralph Metzner, and Richard Alpert, *The Psychedelic Experience. A Manual Based on the Tibetan Book of the Dead* (New Hyde Park (NY): University Books, 1964), 11.

amounting to a religious and mystical experience.²⁶ The goal is to transcend the transitional stages in order to reach a spiritual epiphany as the *telos* of the psychedelic experience. But getting there took more than drugs. The purpose of guidebooks like Leary's *The Psychedelic Experience* (based on *The Tibetan Book of the Dead*) was "to provide 'special training' for the 'special experience' provided by psychedelic materials." They served as tools in a process of preparation for the ultimate trip. Many experience reports written subsequently contain traces of these exemplary accounts. Here, we encounter what Ian Hacking called a "looping effect" on the level of ephemeral states of consciousness instead of individual traits: Descriptions of drug experiences changed future experiences, but the changed experiences would ultimately cause descriptions themselves to be amended.²⁷

Despite the professed learnability of hallucinogen-induced mystical revelations, Huston Smith, a historian of religion who had been introduced to the world of psychedelia by Leary, cautioned in his 1964 essay *Do Drugs Have Religious Import?*:

Drugs appear to be able to induce religious experiences; it is less evident that they induce religious lives. It follows that religion is more than a string of experiences. This is hardly news, but it may be a useful reminder, especially to

²⁶ Robert Masters and Jean Houston, *The Varieties of Psychedelic Experience. The Classic Guide to the Effects of LSD on the Human Psyche* (2000 [1966]: Park Street Press, 2000 [1966]). Similar hierarchical and teleological gradations of hallucinogen-induced experiences culminating in mystical states were articulated in: Stanislav Grof, *Realms of the Human Unconscious. Observations from LSD Research* (New York: Viking Press, 1975). Leary, Metzner, and Alpert, *The Psychedelic Experience*.

²⁷ Ian Hacking, "The Looping Effects of Human Kinds," in *Causal Cognition: An Multidisciplinary Debate*, ed. Dan Sperber, David Premack, and Ann Premack (Oxford: Oxford University Press, 1995).

those who incline toward “the religion of religious experience.” [...] The conclusion to which the evidence seems currently to point is that it is indeed possible for chemicals to enhance religious life, but only when they are set within the context of faith (conviction that what they disclose is true) and discipline (exercise of the will toward fulfilling what the disclosures ask of us).²⁸

In line with Smith’s qualification and contrary to the widespread rhetoric of conversion, Masters and Houston pointed out that actually few people taking hallucinogens underwent profound transformations. Psychedelic drugs could provide fruitful openings, but a lasting remodeling of the self presupposed a sustained effort: “Most subjects, however [...], seem not to be significantly changed in any way that would alter the overt patterns of behavior. Positive behavioral changes may ensue in time; but this usually requires that the subject keep working with the data of his session.”²⁹

Despite these caveats the “psychedelic era” of the 1950s and the 1960s was a time of great optimism and messianic hopes. These utopian visions of the future assigning an important role to psychedelic drugs (often inspired by Huxley’s novel *Island*³⁰) were shattered when hallucinogens were prohibited in the late 1960s. By the early 1970s, most research on this class of substances had come to an end. Henceforth, large parts of the psychedelic community maintained the image of a lost opportunity and much untapped potential. Masters and Houston concluded: “For we doubt that extensive work in this area can fail to

²⁸ Huston Smith, “Do Drugs Have Religious Import?,” *The Journal of Philosophy* 61, no. 18 (1964): 528-530.

²⁹ Masters and Houston, *The Varieties of Psychedelic Experience. The Classic Guide to the Effects of LSD on the Human Psyche*, 34.

³⁰ Aldous Huxley, *Island* (New York: Harper & Row, 1962).

result in pushing human consciousness beyond its present limitations and on towards capacities not yet realized and perhaps undreamed of.”³¹

(Counter-) Modernity and Contingency of the Psychedelic Experience

Which forms human consciousness would take after the transgression of its current limits also remained an open question because of the contingency of hallucinogen-induced experiences. Their interpretation as mystical revelations must be regarded as strongly determined by the circumstances. Since the 1950s, the marked dependence of hallucinogen effects on the conditions under which the drugs were consumed was debated. To describe this peculiar pharmacological property Harvard psychologist Timothy Leary and his colleagues coined the terms “set” and “setting” in 1963.³² Set was defined as “the preparation of the individual, including his personality structure and his mood at the time [of drug ingestion]” while setting was “physical—the weather, the room’s atmosphere; social—feelings of persons present towards one another; and cultural—prevailing views as to what is real.” Whether a mystical state ensued was determined by these factors. “Of course, the drug does not produce the transcendent experience,” Leary wrote. “It merely acts as a chemical key—it opens the mind, frees the nervous system of its ordinary patterns and structures. The nature of the experience depends almost entirely on set and setting.”³³ With

³¹ Masters and Houston, *The Varieties of Psychedelic Experience. The Classic Guide to the Effects of LSD on the Human Psyche*, 316.

³² Timothy Leary, George Litwin, and Ralph Metzner, “Reactions to Psilocybin Administered in a Supportive Environment,” *Journal of Nervous and Mental Disease* 137, no. 6 (1963).

³³ Leary, Metzner, and Alpert, *The Psychedelic Experience*, 11.

these two determinants the experience occasioned by hallucinogens and the significance attributed to it differ historically and culturally, from individual to individual and even in a single individual from drug experience to drug experience.

Hence, not everybody who took psychedelics had a religious epiphany. When Leary gave psilocybin to the inmates of an American prison, for example, they did not conceive of their experience as spiritual.³⁴ Drug experiences, especially those occasioned by hallucinogens, the particular sensibility they presuppose, and the enjoyment of these bizarre states of mind do not come naturally. They cannot be reduced to a drug's pharmacological effects, but need to be learned. "The taste for such an experience is a socially acquired one, not different in kind from acquired tastes for oysters or dry martinis," the American sociologist Howard Becker argued in the early 1960s with respect to cannabis use.³⁵ Maybe this is why two of the first Westerners taking the mescaline-containing peyote cactus in the late nineteenth century did not report effects similar to the "psychedelic experience" of the 1950s and 1960s. The American physician John Raleigh Briggs suffered from an alarming increase in heart rate and respiration with a brief loss of consciousness and a subsequent depression while the Norwegian amateur anthropologist Carl Lumholtz felt refreshed and stimulated. But none of their accounts pointed toward the kind of deep spiritual insights cultivated by Huxley and Leary. The psychedelic experience emerging in

³⁴ Fuller, *Stairways to Heaven*, 64.

³⁵ Howard Becker, *Outsiders. Studies in the Sociology of Deviance* (London: The Free Press of Glencoe, 1963), 53.

the 1950s and 1960s can be regarded as what the French philosopher and historian Michel Foucault called a “historically singular form of experience.”³⁶

In his cultural history of hallucinogenic mushrooms, Andy Letcher rebuts universalist narratives suggesting that hallucinogens have been used all over the world since the dawn of time. The American physician Andrew Weil, for example, claimed in 1972 that the desire to alter consciousness periodically through drugs and other means was “an innate, normal drive analogous to hunger or the sexual drive.”³⁷ Letcher regards such stories as responses to the illegalization of hallucinogens in the late sixties: They serve to legitimate the illicit consumption of these drugs by drawing on the “moral authority of nature.”³⁸ He points to the fact that only in a very few places—two areas in Siberia and Mexico among them—has there been a genuinely old tradition of “magic mushroom” ingestion. In the West, Letcher contends, deliberate intoxications with psychoactive mushrooms only date to the 1950s.³⁹ Consequently, he argues that the development of our taste for the hallucinogens they contain is a decidedly modern story

intertwined with and inseparable from the social, cultural, scientific and technological changes that have occurred since the industrial revolution, the forces that have wrought the modern Western world. Because of this entanglement, the story of the magic mushroom says something rather revealing about ourselves, about the ideas, hopes, fears, and aspirations and desires that

³⁶ Michel Foucault, “Preface to The History of Sexuality, Volume Two,” in *Essential Works of Michel Foucault, vol. 1, Ethics: Subjectivity and Truth*, ed. Paul Rabinow (New York: The New Press, 1997), 199.

³⁷ Andrew Weil, *The Natural Mind. An Investigation of Drugs and the Higher Consciousness* (Boston: Houghton Mifflin Company, 1972).

³⁸ Cf. Lorraine Daston and Fernando Vidal, eds., *The Moral Authority of Nature* (Chicago: University of Chicago Press, 2004).

³⁹ Andy Letcher, *Shroom. A Cultural History of the Magic Mushroom* (London: Faber and Faber, 2006), 13, 23.

shape our time: not least about the yearning for enchantment in a barren scientific world stripped of magic and meaning. That we in the West have found value in those remarkable mushroom experiences, where almost all others before us have regarded them as worthless, means that in a very real sense we could claim to be living in the Mushroom Age. We are the Mushroom People. The story of the magic mushroom therefore provides us with a window, albeit from a quite unexpected viewpoint, upon the modern condition itself.⁴⁰

Letcher's account is based on Max Weber's characterization of modernity as a process of increasing intellectualization and rationalization of life through science and bureaucracy. Science, Weber argued in 1917, led to a disenchantment of the world. By disenchantment he meant the "belief that if one but wished one *could* learn [the general knowledge of the conditions under which one lives] at any time. Hence, it means that there are no mysterious incalculable forces that come into play, but rather that one can, in principle, master all things by calculation."⁴¹ In many inhabitants of the modern world this "disenchantment of the world and its transformation into a causal mechanism" has left a deeply rooted dissatisfaction, an unaccountable feeling of loss. Those disappointed by the demystified perspective of science but unable to return to traditional religion are forced to seek re-enchantment elsewhere—for example, in the wonderland opened up by magic mushrooms and other hallucinogenic drugs. As Letcher puts it: "For whether [psychoactive fungi] sweep back the veil to reveal the world as it really is, as enthusiasts maintain, or push one dangerously close to the edge of

⁴⁰ Ibid., 5.

⁴¹ Max Weber, "Science as a Vocation," in *From Max Weber: Essays in Sociology*, ed. H. H. Gerth and C. Wright Mills (New York: Oxford University Press, 1958), 139. See also Max Weber, "Religious Rejections of the World and Their Directions," in *From Max Weber: Essays in Sociology*, ed. H. H. Gerth and C. Wright Mills (New York: Oxford University Press, 1958), 350.

madness, as society ripostes, they indisputable occasion experiences that nowadays only happen in movies or stories, and with an immediacy that makes them seem, to all intents, real. One small cup of mushroom tea can assuage the most ardent craving for enchantment.”⁴²

Of course, even within the population taken to such experiences the goals and norms have been manifold. Not everybody aspires to states of mystical transcendence. From the days of the hippies to contemporary rave culture many of those consuming hallucinogens as “recreational drugs” have sought and cultivated not a spiritual, but an aesthetic experience, a hallucinatory spectacle of garish colors, warped forms, distorted sounds, and unfamiliar bodily sensations, which they perceive as exciting and—for the most part—pleasurable. Psychoanalytically oriented users ingest hallucinogenic drugs for the purpose of self-exploration and psychiatrists to acquire firsthand familiarity with some of their patients’ symptoms. Or they administer them to healthy test subjects to model psychosis in a laboratory setting. These latter tendencies were more pronounced in Europe than in the United States.⁴³ The spiritual seekers, on the other hand, regard the pathologization of the psychedelic experience through model psychosis research almost as a sacrilege. In their eyes, those hedonists and artists only interested in its sensory dimension and the psychoanalysts primarily concerned with manifestations of the individual unconscious are confined to the

⁴² Letcher, *Shroom*, 295-296.

⁴³ Hanscarl Leuner, *Die experimentelle Psychose. Ihre Psychopharmakologie, Phänomenologie und Dynamik in Beziehung zur Person* (Berlin: Springer, 1962). Hanscarl Leuner, *Halluzinogene. Psychische Grenzzustände in Forschung und Psychotherapie* (Bern: Huber, 1981). See also Lester Grinspoon and James Bakalar, eds., *Psychedelic Reflections* (New York: Human Sciences Press, 1983), 132-142.

lowest levels of the psychedelic experience. Conversely, the less spiritually inclined users of hallucinogens tend to view their more devout counterparts as esoterics, occultists, and airy escapists. Together these aficionados of hallucinogenic drugs, secular and spiritual alike, stand in opposition to those who regard such agents as dangerous and the experiences they bring about as worthless, if not outright harmful. Undoubtedly, hallucinogens have not only occasioned transcendental and mundane peak experiences, but also a distinct clash of worldviews informing the interpretation and evaluation of their effects.

Life, Science, Experience

The world of psychedelia is shaped by powerful resentments against modernity as a process of rationalization and disenchantment. However, having become an element of countertendencies which have accompanied this development from the very beginning hallucinogens and the experiences they give rise to could not escape their demagification through science. Dave Nichols notes that

[t]he tools of today's neuroscience, including in vivo brain imaging technologies, have put a modern face on the hallucinogens. Scientists can no longer see them as "magic" drugs but rather as 5-HT_{2A} receptor-specific molecules that affect membrane potentials, neuronal firing frequencies, and neurotransmitter release in particular areas of the brain. One can now begin to speculate in reasonable ways about how these cellular changes transform our perceptions of reality and produce ASC.⁴⁴

The continuing domestication of psychedelic drugs by science and bureaucracy will be described in the following chapters—with special emphasis on the tense

⁴⁴ Nichols, "Hallucinogens," 168.

relationship between methodical research, the conduct of life, and experience. How has this nexus become a problem?

In the grand narrative of modernity, the birth of modern science is closely associated with the advent of method. The principle of method aims at the integration of a potentially infinite number of subjects doing research in different contexts over time. In this process, their individual lives and their personal desire for truth are irrelevant.⁴⁵ What counts is scientific progress at large. The agent of this enterprise is the deathless community of scientific researchers. It is the transgenerational and insatiably curious subject of methodical inquiry decoupled from the contingent subject of individual happiness or salvation. Enmeshed in an infinite process of accumulation of knowledge it will never reach saturation, maturity, or the serenity of wisdom. Modern science has also been presented as the victory of experience over an antiquated scholastic rationalism and religious dogmatism. Of course, this newly emerging empiricism did not bring experience onto the scene, but it went along with a reconfiguration of the relationship between self, knowledge, and experience. The goal of scientific activity qua methodical research is not experience for the sake of the subject struggling to master the task of living, but highly specialized knowledge of the external world from which the individual scientist cannot hope to profit in a direct manner. He provides small pieces of a puzzle too limited in scope to make a difference to his own life. In this large-scale endeavor, experience has acquired an ambivalent status. On the one hand, it serves as the basis of knowledge generated by way

⁴⁵ Hans Blumenberg, *Die Legitimität der Neuzeit* (Frankfurt/M.: Suhrkamp, 1988), 370.

of observation and experimentation. On the other hand, personal experience is deeply distrusted as subjective, i.e., too dependent on the observer. And not everybody's experiences were deemed equal. At the outset of modernity, the credibility of a scientific observation presupposed a particular way of life: In seventeenth-century England, for example, only gentlemen's experiences were considered trustworthy.⁴⁶ In René Descartes' *Meditations* from 1641, the principle of method was presented in response to a growing suspicion of subjective experience. Eventually, Descartes still managed to ground certainty in the abstract notion of a universal subject decoupling the access to truth from the vagaries of subject formation.⁴⁷ Eventually, modern science came to rely more and more on objective measurements relocating experience to instruments and numbers.⁴⁸

This development has also determined the history of drug research. In the nineteenth and twentieth century, the gradual disqualification of personal experience was most clearly reflected in the decline of self-experimentation and introspection as royal roads to the exploration of drug action. Especially in the case of hallucinogens, firsthand experience has even come to be seen as corrupting the self-experimenter's powers of judgment. The fact that a small, but vocal minority of hallucinogen researchers—Timothy Leary being their most

⁴⁶ Steven Shapin, *A Social History of Truth. Civility and Science in Seventeenth Century England* (Chicago: University of Chicago Press, 1994).

⁴⁷ Cf. Michel Foucault, *The Hermeneutics of the Subject. Lectures at the Collège de France, 1981-1982* (New York: Palgrave Macmillan, 2005), 43-64.

⁴⁸ Lorraine Daston, "Objectivity and the Escape from Perspective," *Social Studies of Science* 22 (1992). See also Giorgio Agamben, *Infancy and History. Essays on the Destruction of Experience* (New York: Verso, 1993). Jay, *Songs of Experience*, 29-30, 40-41. Weber, "Science as a Vocation."

prominent representative—had attributed their conversions from respectable academics to countercultural drug enthusiasts to experiences with the substances they studied has fueled a deep-seated mistrust of those who ostentatiously admit that they “are experienced.” By doing so they risk their reputation as sober witnesses of the facts of nature. But, at the same time, especially within the small community of hallucinogen researchers, lack of personal experience can be equally discrediting. Once again, the question is which subjects are judged reliable enough to report their experiences truthfully. The New York banker and amateur ethnobotanist Gordon Wasson summarized the ensuing dilemma astutely with respect to hallucinogenic fungi: “We are divided into two classes: Those who ate the mushroom and who are disqualified by their subjective experience and those who did not eat the mushroom and who are disqualified by their total ignorance of the subject matter.”⁴⁹

But subjectivity has not been eliminated altogether. In contemporary hallucinogen research, first of all, experience appears as a practical problem. Using hallucinogens to study the neurobiology of consciousness and its alterations they struggle with the correlation of brain states and states of mind. Consequently, contrary to a number of accounts of cognitive neuroscience in the history and anthropology of science, the subjective experience of test subjects has come to play a very important part again. Brushing aside the perplexing discrepancies between neurophysiological measurements and introspective accounts indicated above, Bernard Baars, a research fellow at The

⁴⁹ Timothy Leary, *Politik der Ekstase* (Hamburg: Christian Wegner Verlag, 1970 [1968]), 134 (my re-translation—NL).

Neurosciences Institute in San Diego, even proclaims a neo-Jamesian renaissance of late nineteenth-century consciousness research. In his article "How Brain Reveals Mind. Neural Studies Support the Fundamental Role of Conscious Experience," he writes: "In the past, evidence based on subjective reports was often neglected [...]. It is still true that brain evidence has greater credibility than subjective reports, no matter how reliable. What is new is increasing convergence between subjective experiences and brain observations. [...] In the last decade, careful studies of the living brain have opened the way for human consciousness to return to the heights it held before the behavioristic coup of 1913."⁵⁰ In the quest for the neural correlates of (altered states of) consciousness their mental counterpart is currently refashioned as an epistemic object. Test subjects' experiences need to be converted into data, which can be processed alongside data from physical measurements. The subjective has to be rendered quantifiable through psychological rating scales. The life of the mind is cut up into computable dimensions, parameters, and functions. The wild and colorful experiences induced by hallucinogenic drugs, the impression of meaningfulness and spiritual depth of these altered states is leveled to match the data generated by the latest neuroimaging technologies.

On the side of the researchers, closer ethnographic inspection also reveals that personal drug experiences continue to play a crucial role in the

⁵⁰ Bernard Baars, "How Brain Reveals Mind. Neural Studies Support the Fundamental Role of Conscious Experience," *Journal of Consciousness Studies* 10, no. 9-10 (2003): 100. In 1913, John Watson delivered his behaviorist manifesto "Psychology as the Behaviorist Views It." See Bernard Baars, "The Double Life of B.F. Skinner. Inner Conflict, Dissociation and the Scientific Taboo against Consciousness," *Journal of Consciousness Studies* 10, no. 1 (2003).

laboratory life of neuropsychopharmacological hallucinogen research today. The scientists often draw on firsthand knowledge of the compounds they study when designing experiments, deliberating ensuing ethical problems, looking after drugged test subjects, interpreting the outcome of an experiment, etc. Intimate familiarity with the effects of the administered substances gives rise to a kind of *phronesis* or practical wisdom that is not communicated in scientific publications or official presentations even though it serves as a key element in the generation of experimental findings.

But the researchers' drug experiences do not only engender a kind of tacit knowledge which is key to their strictly methodical investigations. In many cases, these experiences also connect the scientists' professional activities and interests to their conduct of life. Although this junction is not always free of tension it indicates a profound entanglement of life and science in this curious niche of the life sciences. In the context of contemporary neuroscience, traditional anthropological interest in "the life of the natives" gains a particular significance. Not because its description might satisfy a certain voyeurism increasingly served by the personalizing accounts of scientific developments in the New Science Journalism,⁵¹ but because the relationship between life, life

⁵¹ Heribert Seifert, "Wissen kann kaum schaden. Mediale Konjunktur der Naturwissenschaft," *Neue Zürcher Zeitung*, 28 January 2005. On 30 November 2005, Seifert also gave a talk on the subject matter at the University of Zurich, which I attended with Felix Hasler, a pharmacologist from the Vollenweider laboratory who also works as a science journalist. Seifert characterizes the so-called New Science Journalism by its emancipation from science. In its choice of topics and perspectives, it has replaced scientific by journalistic criteria. It focuses on what a broad audience is interested in instead of what scientists think is important. According to Seifert, this form of "infotainment" is going along with a tendency toward an increased use of glossy imagery, popularization, scientific explorations of everyday life, dramatization and

processes, and lived experienced, between our biological existence (*zoé*) and our conduct of life (*bíos*) is what is currently questioned and transformed by the life sciences in general and the neurosciences and psychopharmacology in particular. Rabinow writes: "Life, today, is more *zoé* than *bíos*; or, perhaps more accurately, many people are perfectly willing to attempt to reshape their *bíos* in terms of *zoé*. The obsession with health, fitness, pre-natal diagnosis, life-sustaining systems, living wills, plastic surgery, evolutionary moralism—altruism—aggression, male bonding, gay genes, female relational capacities, Prozac, the child within, child abuse, cloning, diet, nutrition, etc., etc., etc., are indicators of this shift."⁵²

To describe the extension of this somaticization to the human mind Nikolas Rose spoke of our becoming "neurochemical selves": "While our desires, moods, and discontents might previously have been mapped onto a psychological space, they are now mapped upon the body itself, or one particular organ of the body—the brain. [...] In significant ways, I suggest, we have become 'neurochemical selves.'"⁵³ Note that this pervasive internalization of a new psychiatric style of thought (partly driven by the spreading use of psychopharmaceuticals) is not tantamount to the reductionist exclusion of all but neurobiological factors, but has brought about a reconfiguration of bodily, psychic, and social elements under the umbrella of molecularization:

overplaying of conflicts as well as a personalization of science (portraits of the scientist at home, etc.).

⁵² Paul Rabinow, "French Enlightenment: truth and life," *Economy and Society* 27, no. 2&3 (1998): 200.

⁵³ Nikolas Rose, *The Politics of Life Itself. Biomedicine, Power, and Subjectivity in the Twenty-First Century* (Princeton: Princeton University Press, 2007), 188.

In this way of thinking, all explanations of mental pathology must 'pass through' the brain and its neurochemistry—neurons, synapses, membranes, receptors, ion channels, neurotransmitters, enzymes, etcetera. [...] Not that biographical effects are ruled out, but biography—family stress, sexual abuse—has effects through its impact on the brain. Environment plays its part, but unemployment, poverty, and the like have their effects only through impacting upon this brain. And experiences play their part—substance abuse or trauma, for example—but once again, through their impact on this neurochemical brain.⁵⁴

And, conversely, the brain occasions new experiences—for example, in response to psychopharmacological agents. In the case of hallucinogens, these manipulations of neural activity are thought to magnify the impact of the organism's condition and expectations and its environment on the drug experience (to underline the way in which these drugs intensify an organism's experiential relationships to its environment Richard Doyle suggested calling them "ecodelics").⁵⁵ Hallucinogen researchers spend much time pondering over these entanglements. Their personal acquaintance with the drugs, the experience that a neurochemical intervention can have such profound effects on the life of the psyche and the reception of one's surroundings reinforces the self-image of neurochemical selfhood. At the same time, the rich texture of these altered states serves as a powerful reminder of the deep interior psychological space flattened out in molecularized accounts of the mind.⁵⁶ This complexity of hallucinogen experiences is mirrored by the syncretic amalgamation of heterogeneous self-conceptions and worldviews to be found in the field of academic hallucinogen research ranging from disenchanting materialism to

⁵⁴ Ibid., 220.

⁵⁵ Richard Doyle, "Hyberbolic: Divining Ayahuasca," *Discourse* 27, no. 1 (2005).

⁵⁶ Rose, *The Politics of Life Itself*, 192.

mysticism and from psychoanalysis to Buddhism and neo-shamanistic ideas. This assemblage can aptly be called “neuropsychedelica.”

Many hallucinogen researchers entered the field after having come to experience the mind-blowing effects of one of these drugs first-hand. This common pattern points to another deviation from the overall trend of modern science. The historian of science Lorraine Daston pointed to a revaluation and restructuring of the “cognitive passions” animating scientific research in the eighteenth century. Beforehand, wonder—according to Aristotle the origin of philosophical reflection—served as the prototypical starting point of scientific inquiry secondarily engendering curiosity and the kind of sustained attention necessary for systematic research. Then the sequence was reversed. Now disciplined attention and curiosity toward ordinary phenomena came first. Only diligent scientific work could eventually turn these inconspicuous things and occurrences into objects of wonder.⁵⁷ Against this background, hallucinogen research seems to have maintained a premodern affective structure at odds with modern science. More often than not, it is still the wonder felt vis-à-vis their extraordinary and dazzling drug experiences that leads people to more sustained methodical investigation in an academic context legitimating their interest in these illicit substances. They set out to reach a better understanding of what had caused these impressive, almost magical states of mind. However, the

⁵⁷ Lorraine Daston, “Die kognitiven Leidenschaften: Staunen und Neugier im Europa der frühen Neuzeit,” in *Wunder, Beweise und Tatsachen. Zur Geschichte der Rationalität* (Frankfurt/M.: Fischer, 2001). Lorraine Daston, *Eine kurze Geschichte der wissenschaftlichen Aufmerksamkeit* (München: Carl Friedrich von Siemens Stiftung, 2000).

professional life awaiting them is rationalized through and through. The uses of hallucinogens are subject to strict bureaucratic regulations and closely monitored by institutional review boards. Additionally, the disenchantment of hallucinogen effects by scientific research is based on meticulous methodical work, which usually produces dry technical answers to questions of a carefully limited scope. Science cannot compete with the flamboyant psychedelic experiences fueling the interest. Due to the central role of personal experience the discontents of modern science make themselves even more felt in the field of hallucinogen research than in other corners of the life sciences.⁵⁸ Interestingly, a surprising number of researchers respond to the resulting dissatisfaction by creatively pursuing a broad range of non-scientific activities related to altered states of consciousness ranging from meditation and participation in shamanistic rituals in South America to philosophy and fine arts photography reflecting psychedelic experiences. Often, these activities echo the potpourri of worldviews and self-conceptions mentioned above bridging life, science, and experience in contemporary neuropsychedelica.

Hallucinogens in 1960s and 1970s Anthropology

The work in hand is not the first piece of anthropological scholarship dealing with the uses of hallucinogenic drugs. In the late 1960s and early 1970s, this subject matter attracted a significant amount of scholarly attention in US cultural

⁵⁸ Cf. Weber, "Science as a Vocation." For a contemporary perspective on the problem as it appears today, see Rabinow, *Anthropos Today*, 91-106.

anthropology.⁵⁹ The emergence of academic interest in drug use was a consequence of and a response to the spread of drug consumption and experimentation in the American population at the time. Hallucinogens were especially popular among white and educated members of the middle class from which most academics were recruited. Their effects were perceived as equally fascinating and worrisome. As hallucinogens became more fashionable an increasing number of drug-related accidents occurred. Some of them were scandalized by the media bringing hallucinogens into disrepute. At the same time, it was obvious that many of those entranced by their own experiences would give their preoccupation with these substances a socially acceptable form by making them the subject matter of scientific inquiry. The fact that more people in the field of anthropology began to experience the intriguing effects of hallucinogens firsthand shifted their perspective from an interest in the more formal features of rituals involving psychoactive agents to the experiential

⁵⁹ Carlos Castaneda, *A Separate Reality: Further Conversations with Don Juan* (New York: Simon and Schuster, 1971). Carlos Castaneda, *Journey to Ixtlan* (New York: Simon and Schuster, 1972). Carlos Castaneda, *The Teachings of Don Juan. A Yaqui Way of Knowledge* (Berkeley: University of California Press, 1968). Marlene Dobkin de Rios, "Man, Culture, and Hallucinogens: An Overview," in *Cannabis and Culture*, ed. Vera Rubin (The Hague: Mouton Publishers, 1975). Marlene Dobkin de Rios, "The Anthropology of Drug-induced Altered States of Consciousness. Some Theoretical Considerations," *Sociologus* 1, no. 21 (1972). Marlene Dobkin de Rios, *Visionary Vine. Hallucinogenic Healing in the Peruvian Amazon* (San Francisco: Chandler Publishing, 1972). William Emboden, *Narcotic Plants* (New York: Macmillan, 1972). James Fernandez, "Tabernanthe iboga. Narcotic Ecstasy and the Work of the Ancestors," in *Flesh of the Gods. The Ritual Use of Hallucinogens*, ed. Peter Furst (New York: Praeger, 1972). Peter Furst, *Flesh of the Gods. The Ritual Use of Hallucinogens* (New York: Praeger, 1972). Peter Furst, *Hallucinogens and Culture* (San Francisco: Chandler & Sharp, 1976). Michael Harner, "The Sound of Rushing Water," in *Hallucinogens and Shamanism*, ed. Michael Harner (London: Oxford University Press, 1973). Michael Harner, ed., *Hallucinogens and Shamanism* (Oxford: Oxford University Press, 1973). Barbara Myerhoff, *Peyote Hunt. The Sacred Journey of the Huichol Indians* (Ithaca: Cornell University Press, 1974). Vera Rubin, ed., *Cannabis and Culture* (The Hague: Mouton Publishers, 1975).

dimension of ritual drug use. Michael Harner went so far as to claim that one could not properly understand Jivaro shamanism, his object of study, unless one had passed through the chemical door to the otherwise invisible world traveled by the shaman.

When I first undertook research among the Jivaro in 1956-57, I did not fully appreciate the psychological impact of the Banisteriopsis drink upon the native view of reality, but in 1961 I had occasion to drink the hallucinogen in the course of fieldwork with another Upper Amazon Basin tribe. For several hours after drinking the brew, I found myself, although awake, in a world literally beyond my wildest dreams. I met bird-headed people, as well as dragon-like creatures who explained that they were the true gods of this world. I enlisted the services of other spirit helpers in attempting to fly through the far reaches of the Galaxy. Transported into a trance where the supernatural seemed natural, I realized that anthropologists, including myself, had profoundly underestimated the importance of the drug in affecting native ideology.⁶⁰

In Harner's eyes, personal acquaintance with the drugs used in the practices he observed ethnographically was methodologically crucial: "Undoubtedly one of the major reasons that anthropologists for so long underestimated the importance of hallucinogenic substances in shamanism and religious experience was that very few had partaken themselves of the native psychotropic materials (other than peyote) or had undergone the resulting subjective experiences so critical, perhaps paradoxically, to an empirical understanding of their meaning to the peoples they studied."⁶¹

⁶⁰ Harner, "The Sound of Rushing Water," 16-17.

⁶¹ Michael Harner, "Preface," in *Hallucinogens and Shamanism*, ed. Michael Harner (Oxford: Oxford University Press, 1973), vii.

Harner's case also demonstrates graphically the danger going along with such unreserved immersion in ethnographic fieldwork. Eventually, he decided to give up the remaining distance implied by his subject position as participant observer to become a shaman himself. After his farewell to academic life he founded the Foundation for Shamanic Studies becoming one of the key figures of neoshamanism in the Western world.⁶²

However, against the background of the prevailing anthropological diagnosis of the 1960s drug epidemic, Harner's decision was consistent. Many of those studying the use of hallucinogens in so-called traditional cultures felt that the embedment of the drugs in a ritual context and a cosmological worldview prevented the disruptive effects they seemed to have on American and European youth.⁶³ Elsewhere, it seemed, hallucinogens even served to stabilize the social order. Peter Furst pointed to

a basic function of the psychedelic experience in non-Western cultures—to facilitate the integration of the individual into the total society and the values by which it lives, as opposed to the association of hallucinogens in Western cultures with alienation and rejection of the corrupted values of the parental generation. [...] [T]he Indian, by taking the hallucinogen, experiences first death and then rebirth "in a state of wisdom"—i.e., as a full-fledged member of his tribe. Having seen and experienced the super-naturals and the mythological events of tribal tradition with his own eyes and other senses in yaje trance, "he is convinced of the truth of his religious system."⁶⁴

⁶² Letcher, *Shroom*, 212-215.

⁶³ See, for example, Barbara Myerhoff, "Peyote and Huichol Worldview: The Structure of a Mystic Vision," in *Cannabis and Culture*, ed. Vera Rubin (The Hague: Mouton Publishers, 1975), 432.

⁶⁴ Peter Furst, "Introduction," in *Flesh of the Gods. The Ritual Use of Hallucinogens*, ed. Peter Furst (New York: Praeger Publishers, 1972), xiii.

From this perspective, studying drug use in other cultures seemed to be a reasonable reaction to the aggravating “drug problem” Western governments were facing. Somewhere far from home anthropologists might learn from other peoples how to integrate hallucinogens into their own societies (rendering America’s costly and futile “War on Drugs” superfluous). Hence, Harner’s attempt at transplanting the exotic practice of shamanic rituals into a Euro-American context appears to be a logical, even though ultimately inconsequential response to the dark side of the psychedelic era.

Standing Back from Experience: Problematization and Second-order Observation

Like the indicated body of anthropological literature produced since the late 1960s, my thesis also treats uses of hallucinogenic drugs and thematizes the corresponding range of experiences. But it departs from a different problematic, follows a different trajectory, and develops a different response. Today, hallucinogens are not a cause of major concern anymore. Even in the neopsychedelic techno and rave scene emerging in the 1990s the drug of choice was Ecstasy (MDMA) while LSD and magic mushrooms remained rather peripheral.⁶⁵ At present, uppers such as cocaine and Speed (methamphetamine) are on the rise. Despite media reports in the early 1990s claiming a comeback of LSD the consumption of hallucinogens has been stagnating or declining since the mid 1970s and the US Drug Enforcement Agency has recently announced that “LSD trafficking and abuse have decreased sharply since 2000, and a

⁶⁵ Simon Reynolds, *Generation Ecstasy. Into the World of Techno and Rave Culture* (New York: Routledge, 1999).

resurgence does not appear likely in the near term.”⁶⁶ The use of hallucinogens has become a “marginal practice” in the sense of Hubert Dreyfus and Paul Rabinow: a practice that was central to past epochs, but which has now become rare and not what one normally does. As such it might offer a fresh angle on the current problematization of subjective experience.⁶⁷ The problem that serves as the point of departure of my inquiry is not epidemiological, but philosophical and anthropological: the spreading unease experienced vis-à-vis the deterministic and disenchanted image of the human attributed to neuroscience, the anger and resentment elicited by the ostensible unmasking of subjective experience as a mere illusion generated by a neural puppet theater. The difficulties and conflicts accompanying the latest wave of the neurobiologization of our inner lives manifest distinctly in contemporary hallucinogen research. Hallucinogen-induced experiences are both extraordinarily powerful as well as highly questionable and contested as regards their truth value. Not only radical neuro-determinists conceive of the contents of these altered states of consciousness as illusory. Confined and domesticated in the psychopharmacological laboratory these seemingly transcendental experiences are studied as an immanent, if erratic part of nature. But what is their status? Do they reveal a deeper truth or are they nothing but hallucinations and delusions? Are they merely a dazzling

⁶⁶ Drug Enforcement Agency, *LSD* (2006 [cited 13 December 2006]); available from <http://www.dea.gov/concern/lsd.html>. Leigh Henderson, "LSD Use and LSD Users. Questions and Answers About LSD," in *LSD. Still With Us After All These Years*, ed. Leigh Henderson and William Glass (San Francisco: Jossey-Bass Publishers, 1994), 1-2.

⁶⁷ Hubert Dreyfus and Paul Rabinow, *Michel Foucault. Beyond Structuralism and Hermeneutics* (Chicago: The University of Chicago Press, 1982), 262-263. See also Hubert Dreyfus, *Being-in-the-World. A Commentary on Heidegger's Being in the World, Division I* (Cambridge (Mass.): The MIT Press, 1991), 329, 331.

phantasmagoria without consequences, or do the neural correlates of consciousness expansion make a difference changing the subject for better or worse?

When I took LSD for the first time at age eighteen such questions suggested themselves. At the time, in 1993, the neurosciences were on the rise. After finishing school in Germany, I wanted to go into brain research myself. I was trying to make sense of my deeply troubling, but also enthralling and exhilarating LSD experience by reading Huxley's by then classical *Doors of Perception* alongside popular science books on neuropsychopharmacology such as Solomon Snyder's *Drugs and the Brain*.⁶⁸ Today, fourteen years later, I return to my youthful obsession with hallucinogenic drugs addressing it by way of anthropological and historical inquiry. As interested as I am in the problem of experience I decided not to add another first person account to the myriads of trip reports (other than the description of my participation in a psilocybin experiment highlighting the tense relationship between "subjective" experience, "objective" neurophysiological measurements, and the socio-cultural context of this artificially induced "altered state of consciousness"). This book does not provide one more answer to the question what tripping is really all about. It does not aim at a phenomenological exploration of the hallucinogen experience. Anthropology serves to stand back from one's own experience—to pause, deliberate, and rethink a problem from different perspectives. Hence, the predominant (although not the only) mode of observation employed is what Niklas Luhmann called

⁶⁸ Solomon Snyder, *Drugs and the Brain* (New York: Scientific American Books, 1986).

second-order observations: observations of other observers' observations of the world.⁶⁹ These other, so-called "first-order" observers are primarily neuropsychopharmacologists studying the effects of hallucinogenic drugs (as well as government officials regulating their research, private donors funding it, etc.). Being the product of sustained "deep hanging out" (James Clifford's apt characterization of ethnographic fieldwork⁷⁰) among these people this book is undoubtedly soothed with a certain kind of personal and professional experience and, occasionally, the reader will be reminded that my authorial perspective is no "view from nowhere." But the focus of my interest is the multiplicity of the "natives' points of view." They will be given much space in the form of interview excerpts, quotations, and reported speech. Their perspectives are neither meant to serve as mere illustrations of a preset theory nor are these experts' first-order accounts presented as the last word on the subject matter. Not because I knew better, but because I look elsewhere: not at hallucinogens and the experiences they provoke, but at the problematization of these experiences within the field of hallucinogen research.

The problematization of experience occurs on two levels: within the field of the cognitive neurosciences at large and hallucinogen research in particular and on the level of social scientific analysis and philosophical reflection on the discordances the present biologization of the mind and mentalization of the brain

⁶⁹ Niklas Luhmann, *Observations on Modernity* (Stanford: Stanford University Press, 1998).

⁷⁰ James Clifford, *Routes. Travel and Translation in the Late Twentieth Century* (Cambridge (Mass.): Harvard University Press, 1997), 56. See also Clifford Geertz, *Available Light. Anthropological Reflections on Philosophical Topics* (Princeton: Princeton University Press, 2000), 107-118.

entail. A problematization—a term coined by Foucault and further elaborated by Rabinow—emerges in response to an event introducing uncertainty and a loss of familiarity.⁷¹ Rabinow points to the specific temporality the concept implicates. A problematization is neither eternal as the supposedly timeless problems of the philosophical tradition nor as transient as the changing responses to it. “Problematizations emerge out of a cauldron of convergent factors (economic, discursive, political, environmental, and the like). Such an emergence is an event. For example, the Greek problematization of pleasure and freedom or the modern problematization of life and governmentality lasted for centuries. Hence their emergence and articulation is an event of long duration, one that sets events of different scale in motion.”⁷²

When and where did the problematization of experience begin and how has it developed since? Of course, it has not begun with the neuroscience hype of the 1990s. In his book *Songs of Experience*, Martin Jay draws an impressive map of modern American and European variations of the “universal theme” of experience—presupposing an albeit limited degree of coherence tying together a multitude of often contradictory perspectives on his object of analysis from the Greeks to the American pragmatists and French poststructuralists.⁷³ Above, I mentioned Descartes’ *Meditations* as an admittedly not very original and certainly arbitrary beginning of the—in my eyes—historically contingent problematization

⁷¹ Rabinow, *Anthropos Today*, 18.

⁷² *Ibid.*, 55.

⁷³ Jay, *Songs of Experience*.

of experience.⁷⁴ In Descartes' account, the brain already entered into the problematization of experience as interface between the mind (*res cogitans*) and the physical world (*res extensa*). Another early modern candidate is Copernicus' discovery that despite our daily perception of the sun rising and setting the earth actually revolves around the sun and not vice versa. In the philosophy of science, from Francis Bacon to Gaston Bachelard, it was regarded as exemplary of the incommensurability of scientific and everyday experience.⁷⁵ Taking such counterintuitive findings as paradigmatic Bachelard stated: "A *scientific experience* is [...] an experience, which contradicts ordinary experience."⁷⁶ This *topos* of an "epistemic break" between science and everyday life has been reiterated in the most recent episode of the problematization of experience. In the context of the cognitive neurosciences, the event usually said to have introduced that "loss of familiarity" constitutive of every problematization is Benjamin Libet's experiment on free will. The brain researcher demonstrated that the first awareness of conscious will to press a button in a laboratory setting is preceded by mounting unconscious neural activity (called readiness potential) by 300 milliseconds. Although Libet himself gave a different interpretation to his findings, many neuroscientists and philosophers read this study as refuting or jeopardizing the supposedly commonsensical intuition of free will.⁷⁷ At first glance, it does not

⁷⁴ But, of course, my emphasis on its contingency is as contingent as Jay's universalism.

⁷⁵ Michael Hampe and Maria-Sibylla Lotter, "Einleitung: Enttäuschende Erfahrungen," in *'Die Erfahrungen, die wir machen, sprechen gegen die Erfahrungen, die wir haben': über Formen der Erfahrung in den Wissenschaften*, ed. Michael Hampe and Maria-Sibylla Lotter (Berlin: Duncker und Humblot, 2000), 11.

⁷⁶ Gaston Bachelard, *Die Bildung des wissenschaftlichen Geistes* (Frankfurt/M.: Suhrkamp, 1984), 44.

⁷⁷ Benjamin Libet, *Mind Time. The Temporal Factor in Consciousness* (Boston: Harvard

seem surprising that such a profound questioning of a widespread image of man as a free and therefore morally answerable actor has given rise to sustained reflection on the relationship between conscious experience and the brain. However, what is perplexing about this heated debate as such is the fact that it is taking place now—more than twenty years after Libet's 1982 experiment. When hallucinogen researchers such as Alan Hartman and Leo Hollister or Kaspar Weber pointed to the discrepancy between subjective experience and objective neurophysiological measurements in the 1960s the public was much more concerned about the youth's consumption of hallucinogenic drugs than about these scientists questioning the truthfulness of trippers' introspective accounts.

In the feuilleton of German-language newspapers, the ongoing discussion about the status of subjective experience has been particularly agitated. Many big names from philosophy and brain research—most prominently Jürgen Habermas and Wolf Singer—got involved questioning or defending “our whole way of experiencing the lifeworld” against the challenge of the cognitive neurosciences—or contesting that such a challenge has emerged in the first place.⁷⁸ To a significant extent, this morally charged controversy over the

University Press, 2004). Benjamin Libet, E. W. Wright, and C. A. Gleason, "Readiness-potentials preceding unrestricted 'spontaneous' vs. pre-planned voluntary acts," *Electroencephalography and Clinical Neurophysiology* 54, no. 3 (1982).

⁷⁸ For an overview of the debate in the German-speaking world, see Christian Geyer, ed., *Hirnforschung und Willensfreiheit. Zur Deutung der neuesten Experimente* (Frankfurt/M.: Suhrkamp, 2004). Some of Habermas' contributions can be found in Jürgen Habermas, *Zwischen Naturalismus und Religion. Philosophische Aufsätze* (Frankfurt/M.: Suhrkamp, 2005), 154-185. Amidst this turmoil, Michael Pauen maintains that the findings of brain research are perfectly commensurable with the “substantial contents” of “our” image of man, which has hardly changed since the ancient Egyptians. Michael Pauen, *Was ist der Mensch? Die Entdeckung der Natur des Geistes* (München: Deutsche Verlags-Anstalt, 2007), 33-39.

demystification of human consciousness mirrors the dissension over the demystification of its alterations through hallucinogenic drugs. Typically, problematizations are characterized by such a multiplicity of agonistic reactions. As Foucault noted: "To the same set of difficulties several responses can be given. And most times, diverse responses are proposed." However, our analysis must not stop at recording the cacophony of "natives' points of view." "That which one needs to understand is that which makes these diverse responses simultaneously possible," Foucault added. "This elaboration of a given situation into a question, this transformation of a set of difficulties and troubles into problems to which diverse solutions are proposed as responses, is the point of problematization, the specific work of thought."⁷⁹

Here, Foucault's problematization conjoins Luhmann's second-order observation. Focusing on the observational practices of other observers instead of paying attention to their objects of observation, examining *how* others observe the world as opposed to looking at *what* they observe, such second-order observations can detect and reflect on the blind spots of first-order observations. In anatomy, the blind spot is the point of entry of the optic nerve on the retina, which is insensitive to light. In this area, a person's view is obstructed, but it also connects the eye to the brain enabling visual perception in the first place. The blind spot makes observation possible while remaining unobservable to the observer herself. Observation, in Luhmann's sense, means "any kind of operation that makes a distinction so as to designate one (but not the other)

⁷⁹ Quoted in: Rabinow, *Anthropos Today*, 47.

side.”⁸⁰ In the current renaissance of scientific interest in consciousness and its altered states among neuroscientists and philosophers of mind, the leading distinction is the one between so-called first and third person accounts, between subjective experience on the one hand and objective measurements and behavioral observations on the other hand. These are the terms in which experience is problematized in contemporary cognitive neuroscience, which some accuse of a radical devaluation and neglect of experience while others praise its reintegration of subjectivity (depending on which side is marked—to use Luhmann’s vocabulary). Anthropologist of science Andreas Roepstorff’s second-order observations of neuroimagers reveals what enables, but is obviously being ignored by the distinction between first and third person perspective: social interactions on the level of the second person.

Should [brain mapping] be understood from a first-person or a third person perspective? Linguistically, we are used to thinking of three categories of persons. The first-person experiencing *I*, the third-person objectified *he*, *she*, or *it*, and the second-person interacting *you*. The actual process of getting people into the scanner and convincing them to respond to strange stimuli seems impossible to understand without deliberate interaction of persons requiring a second-person perspective. This exchange between two concrete persons, the subject and the experimenter, is a necessary prerequisite for setting up the paradigm that allows both for the generation of the objective facts and the generation of subjective experience. This element of interacting minds, which are “second persons” relative to each other, is hardly discussed within cognitive brain mapping. It also seems to fall outside the philosopher’s hard question. However, it appears to be a necessary prerequisite for setting up most brain mapping

⁸⁰ Luhmann, *Observations on Modernity*, 47.

experiments. For the anthropologist visiting a brain imaging laboratory, the interacting minds around him present the very first problem.⁸¹

That which makes the diverse responses to the current problematization of experience simultaneously possible are such social and practical conditions of cognitive neuroscience research, but also its wider economic, cultural, intellectual, and conceptual framework. My work contributes to a critique of this problematization in the cognitive neurosciences by way of ethnographic fieldwork on an admittedly rather unusual subfield of neuropsychopharmacology. By critique I do not mean denunciation (of the hallucinogen researchers' disregard of subjectivity or their irresponsible revaluation of a precarious class of substances, for example). Countering the ostensible biologism of neuroscientists with an equally reductionist sociologism is no alternative. The goal is not, speaking with Luhmann again, to "unmask the ideas of the actor as an artful illusory world, as a mere embellishment of base motives, but as an incomplete selection,"⁸² as a particular perspective enabled, but not caused by a dense fabric of immanent conditions of possibility. Studying the problematization of experience, of hallucinogen-induced experiences in particular is not equivalent to studying experience itself. The problematization occurs within a historically contingent network of heterogeneous elements (scientific, philosophical, and moral discourses, concepts, technologies, institutions, laws, policy decisions, sources

⁸¹ Andreas Roepstorff, "Mapping Brain Mappers: An Ethnographic Coda," in *Human Brain Function*, ed. Richard Frackowiak, et al. (San Diego: Elsevier, 2004), 1114. See also Andreas Roepstorff, "Brains in scanners: An Umwelt of cognitive neuroscience," *Semiotica* 134, no. 1/4 (2001).

⁸² Niklas Luhmann, "Soziologische Aufklärung," in *Soziologische Aufklärung. Aufsätze zur Theorie sozialer Systeme* (Opladen: Westdeutscher Verlag, 1970), 71 (my translation—NL).

of funding, etc.) external to, but constitutive of the subjects' experiences. To study the conditions under which a certain experience becomes possible and problematic Michel Foucault suggested attending to three axes: types of understanding, forms of normativity, and modes of relation to oneself and to others.⁸³ Accordingly, I will analyze the production of neuropsychopharmacological knowledge on altered states of consciousness, its legal and administrative regulation, as well as the actors' ethical involvement in research on the neural correlates of hallucinogen experiences.

I regard this work as a "fieldwork in philosophy," i.e., a form of empirical work on questions of philosophic import.⁸⁴ Its rationale is to ground otherwise abstract philosophical deliberation in observations of phenomena of social life. To be precise: aspects of social life that require thought since they have lost their self-evidence. The philosophical fieldworker is no detached theoretician, but positioned in the problematic situation he comes to examine. Nevertheless, his perspective differs from that of other observers and actors in that he keeps his own views on the problem in the background. His analysis does not serve to advance a particular agenda or to propose a practical solution, but to permit a certain distance from what one usually does and how one experiences the world by presenting and contextualizing a multiplicity of perspectives. The aim is to

⁸³ Foucault, "Preface to The History of Sexuality," 199. See also Jay, *Songs of Experience*, 390-400.

⁸⁴ I take the term "fieldwork in philosophy" from Pierre Bourdieu and Paul Rabinow who borrowed it from the British philosopher John Austin. John Austin, "A Plea for Excuses," in *Philosophical Papers*, ed. J. O. Urmson and G. J. Warnock (Oxford: Oxford University Press, 1970), 183. Pierre Bourdieu, "'Fieldwork in Philosophy,'" in *In Other Words. Essays Towards a Reflexive Sociology* (Stanford: Stanford University Press, 1990), 28. Rabinow, *Anthropos Today*, 85. Paul Rabinow, *French Modern. Norms and Forms of the Social Environment* (Chicago: The University of Chicago Press, 1989), 16.

“free up” possibilities and to provide the orientation and clarity necessary to choose among them and act responsibly. Hopefully, the following inquiry will help readers to find their own answers to the question of how to live well—with a science based on method as the royal road to truth, with the knowledge that all experience passes through the nervous system, and with hallucinogens as a class of drugs so profoundly calling into question the relationship between the brain, the world around it, and the experiences world and brain engender.

II. IS THERE A REVIVAL OF HALLUCINOGEN RESEARCH?

Hofmann's 100th Birthday

January 13th, 2006. Guided by security personnel, Albert Hofmann, the father of LSD, slightly bent over and now hardly reaching five feet, slowly goes on the stage. He is supported by crutches. Almost two thousand people rise from their chairs in the Basel Convention Center, Switzerland. Thunderous applause. Dozens of photographers and cameramen—professional and hippie—are jostling in front of the centenarian birthday boy. Fragile, but quite sprightly for his age, probably the only person in the hall wearing a tie, he briefly raises his hand to greet the crowd before sitting down with Lucius Werthmüller, one of the organizers of the LSD Symposium taking place in honor of Hofmann's one hundredth birthday. Werthmüller is a lively and stout middle-aged man with a full voice, president of the Psi Society Basel, a specialist for spiritual healing, and involved in organizing trade fairs for esoterics. He asks Hofmann to tell one more time how he discovered his "problem child and wonder drug" LSD. Hardly a newspaper article or TV program preceding or following this spectacular celebration that did not begin its report with this almost mythological origin story.

As a research chemist at the Swiss pharmaceutical company Sandoz Hofmann worked on ergot alkaloids. Ergot is produced by the lower fungus *Claviceps purpurea* growing parasitically on rye. In the Middle Ages it sometimes produced mass poisonings leading to convulsions or gangrene, i.e. localized death and decomposition of body tissue resulting from obstructed circulation

(then known as Saint Anthony's Fire). However, ergot was also employed medically by midwives who used its effects on blood vessels to stop bleeding after childbirth. Hofmann developed a number of derivatives from lysergic acid, the molecular core of ergot. One of them, Methergine®, has been widely used in obstetrics until today. In 1938, Hofmann synthesized the twenty-fifth substance in this series of lysergic acid derivatives: lysergic acid diethylamide, abbreviated LSD-25 (after the German *Lysergsäurediäthylamid*). The substance was tested on animals. They became restless and a strong effect on the uterus was established, but as neither the physicians nor the pharmacologists of Sandoz were particularly interested in the substance these preclinical trials were discontinued. However, five years later—by now the rest of Europe was engulfed in war—Hofmann followed what he called “a peculiar presentiment” [*eine merkwürdige Ahnung*], a hunch “that this substance could possess properties other than those established in the first investigations.” He noted that “[t]his was quite unusual; experimental substances, as a rule, were definitely stricken from the research program if once found to be lacking in pharmacological interest.” To make a long story short: Hofmann must have contaminated himself with a small amount of this highly potent substance and experienced an “uninterrupted stream of fantastic pictures, extraordinary shapes with intense, kaleidoscopic play of colors.”¹ Three days later, he conducted a self-experiment ingesting what he (falsely) believed to be a small dose experiencing the first full-blown LSD trip in human history. The reason why this story is recounted over and over again is not so much because of Hofmann's heroic self-experiment—this was not uncommon

¹ Albert Hofmann, *LSD. My Problem Child* (New York: McGraw-Hill, 1980).

in pharmacology at the time—but because of Hofmann’s claim to have followed a “peculiar presentiment” when taking the seemingly insignificant compound from the shelf again. He discovered its mind-blowing effects accidentally because of a little sloppiness in his usually meticulous chemical bench work.² This led Hofmann to conclude that he did not find LSD, but that it was LSD, which found him. It must have been divine providence, not mere scientific research, admitting us to the enchanted world behind the Doors of Perception.

However, Hofmann who had his first mystical experience as a boy walking in the forest insists that one does not need LSD anymore once the gateway has been opened in one way or another. His greatest hope is that one day state-controlled meditation centers will provide LSD to facilitate the spiritual development of those seeking access to this experiential plane. But, he adds, he does not want to be a guru telling others what to do. Lucius Werthmüller closes the opening ceremony by saying: “Dear Albert, you’re certainly the very best example to show that what you discovered is no infernal stuff!” He presents an enormous bunch of red roses to Hofmann who expresses his thanks by saying that he is particularly grateful for the flowers as our “co-creatureliness” [*Mitgeschöpflichkeit*] with other life forms, including plants, has become more and more important to him in recent years. “The feeling of co-creatureliness with all things alive should enter our consciousness more fully and counterbalance the materialistic and nonsensical technological development in order to enable us to

² See, for example, David Nichols, “The Molecule That Changed the World,” *Gaia Media News* (2006). On the importance of the “principle of measured sloppiness” for experimental systems, see Hans-Jörg Rheinberger, *Toward a History of Epistemic Things: Synthesizing Proteins in the Test Tube* (Stanford: Stanford University Press, 1997), 78.

return to the roses, to the flowers, to nature where we belong.” Tumultuous applause again.

Many of the media reports on Hofmann, his problem child, and the three-day conference with its abundance of lectures, discussion panels, workshops, and stalls proclaimed a comeback of hallucinogen research. After its discovery in 1943, the story goes, LSD soon escaped the walls of the laboratory. In the 1960s, its propagation by irresponsible scientists like Timothy Leary and its widespread abuse by the hippies eventually led to the illegalization of LSD and other hallucinogens. After scientific research on this class of drugs had subsequently been repressed for more than thirty years a more pragmatic attitude has finally gained the upper hand now giving rise to a revival of hallucinogen research. Many of the proponents and key actors of this ostensible renaissance had now gathered at the LSD Symposium on the occasion of Hofmann’s hundredth birthday using it to demonstrate the restored vitality of their field. Many of the clinical and preclinical studies conducted in recent years were for the first time presented to a broad audience receiving a significant amount of media attention. But what had happened to make this “revival” possible? And has there been a revival at all?

2. The Previous Life of Hallucinogen Research

Researching and Regulating Hallucinogenic Sacraments

Even though it is true that the psychiatric and psychopharmacological investigation of hallucinogenic drugs only became a major scientific endeavor in the wake of Hofmann's discovery of the effects of LSD, research on this class of substances had already begun before Hofmann was born and in a very different corner of the world. At the end of the nineteenth century, the US government interned Native American tribes in reservations. Their forced cohabitation led to the diffusion of certain customs, among them the ingestion of the hallucinogenic peyote cactus *Lophophora williamsii* in religious rituals. Originally, the peyote and mescal bean cults had only been practiced by tribes in the native habitat of the plant in northern Mexico and southern Texas. But between 1890 and 1920, the ritual use of peyote was taken up by another 30 tribes in the United States.³ In 1886, shortly after it had begun to spread, the Texas physician John Raleigh Briggs bought some peyote buttons from a Mexican smuggler who provided the cactus to Texas Indians. Briggs conducted a self-experiment as well as several experiments on dogs, the results of which he published in a medical journal.⁴ In 1892, the Norwegian amateur anthropologist Carl Lumholtz became acquainted with peyote while living with the Huichol in northwest Mexico. Interestingly, neither Briggs nor Lumholtz described the psychic effects as anything resembling what later on came to be known as "the psychedelic experience." Briggs complained of a racing pulse and hyperventilation, which made him pass out

³ Omer Stewart, *Peyote Religion. A History* (Norman: University of Oklahoma Press, 1987).

⁴ John Raleigh Briggs, "'Muscale Buttons'—Physiological Effects—Personal Experience," *The Medical Register. A Weekly Journal of Medicine and Surgery* 1 (1887).

temporarily.. Whereas Lumholtz felt energized Briggs experienced a transient depression in the aftermath of the experiment. The American anthropologist James Mooney, however, who was the first non-Indian to attend a peyote ceremony in 1891, reported to have been “lifted out of the body and floating about in the air like a freed spirit. The fire takes on glorious shapes, the sacred mescal upon the crescent mound becomes alive and moves and talks and you talk to it and it answers.”⁵ These early reports on the effects of peyote aroused further scientific interest among physicians and chemists. After more self-experimentation and a small clinical study with healthy volunteers by Daniel Prentiss and F. P. Morgan in Washington, D.C., the German chemist Arthur Heffter isolated the alkaloid mescaline as the psychoactive ingredient of dried peyote buttons, which had been sent to him from the United States in 1897.⁶

No sooner had hallucinogenic drugs come onto the scene than regulatory regimes were established. In fact, the first attempts to repress the use of peyote in the original population of Mexico date back to 1620. The Spanish Inquisition denounced it as diabolic.⁷ However, the syncretic peyote cults emerging in North American reservations at the end of the nineteenth century incorporated Christian elements themselves. At the time, intensified efforts to Christianize and assimilate Native Americans to Euro-American values, beliefs, and ways of life

⁵ Quoted in: Daniel Perrine, "Visions of the Night. Western Medicine Meets Peyote, 1887-1899," *The Heffter Review of Psychedelic Research* 2 (2001): 21. For the accounts of peyote ceremonies by Mooney and Lumholtz, see also Stewart, *Peyote Religion*, 30-42.

⁶ To determine which of the fractions was psychoactive Heffter ingested each one in separate self-experiments comparing their effects to those of the whole plant. Perrine, "Visions of the Night," 42-46.

⁷ Huston Smith and Reuben Snake, *One Nation Under God. The Triumph of the Native American Church* (Santa Fe: Clear Light Publishers, 1996), 168-169.

were under way. For them, peyote provided a more experiential access to the otherwise rather alien contents of the Scriptures. As one Omaha Indian explained: "This religious use of peyote is on the same line as the white people's use of the Bible. What we learn from the Bible is true in Peyote."⁸ However, the mixing of Christian and pagan elements was not taken well by Christian sects and missionaries did their best to eradicate peyotism.

In addition to this religious opposition, there were also political and public health concerns. Politically, the emerging peyote cult was associated with the formation of Native American identity politics in the reservations. Instead of assimilating into white, middle-class culture, the once separate tribes now came to understand themselves as belonging together and the newly invented peyote ceremonies also served as celebrations of pan-Indian solidarity.

From 1888 onwards, many Indian reservations prohibited the religious use of peyote and mescal beans based on concerns that it might impair "both the health, and mental faculties of the Indians and will soon greatly decimate them, if this is not checked."⁹ Even though the peyote cult discouraged alcohol consumption, in the eyes of the Bureau of Indian Affairs, the ceremonial ingestion of peyote was closely associated with the problem of alcoholism in the reservations (many of those actively engaged in the suppression of peyotism were also members of the Anti-Saloon League of America or other teetotalist movements). In 1899, the first state law to control peyote was passed in Oklahoma and, in the 1910s, anti-peyotists began to call for a federal law to ban

⁸ Quoted in: Stewart, *Peyote Religion*, 216.

⁹ Quoted in: *Ibid.*, 128.

peyote altogether. However, the Native American followers of the peyote cult fought back citing the First Amendment of the Constitution guaranteeing their free exercise of religion. The case was temporarily settled legislatively in the Senate in 1918 and 1937. Based on the principle of freedom of religion and testimonies from peyotists and anthropologists (James Mooney, Franz Boas, and Alfred Kroeber among them) it was decided to grant the Indians the right to worship God as they see fit using the hallucinogenic cactus in their religious rituals. In response to the anti-peyotist campaigns, the practitioners of the peyote cult got together in 1918 to form the Native American Church, which uses peyote buttons (instead of bread and wine as in more traditional Christian denominations) as its sacrament until today.¹⁰

Policing Food and Drugs

One of the expert witnesses making a case against peyotism in the 1918 hearings was Harvey Wiley, head of the Bureau of Chemistry at the US Department of Agriculture. He had been involved in the creation of America's first government regulatory agency, the Food and Drug Administration (FDA), in 1906.¹¹ Before the "Crusading Chemist" and others' relentless campaigning for federal legislation against food adulteration the American state had shown little interest in what its citizens ingested apart from such control measures as banning alcohol and peyote consumption in Indian reservations. Food was often contaminated and much of the medicine sold was worthless—vital components

¹⁰ Ibid., 128-147, 213-238. Fuller, *Stairways to Heaven*, 45-46, 177-190.

¹¹ Philip Hilts, *Protecting America's Health: The FDA, Business, and One Hundred Years of Regulation* (New York: Alfred A. Knopf, 2003).

had been diluted with other substances, faked, or mixed with dangerous ingredients. National rules about hygiene, purity, or honesty in labeling foods and drugs did not exist yet. Consumers could buy whatever drugs they chose without prescriptions.¹² In 1905, several journals called public attention to the unsanitary conditions in the meatpacking industry and to the fact that many widely advertised patent medicines were either ineffective or even put their consumers at risk. In 1906, the American Medical Association, which had just begun to collect statistical data on drugs, attributed a number of deaths to acetanilide, which was included in “soothing syrups” for infants as well as in a “headache powder.” The public outrage and the crisis of trust in the food and drug market and its products triggered by these reports prompted Congress to pass the Pure Food and Drugs Act that same year. Due to the fierce opposition of industry and liberals who sought to prevent state interventions into the functioning of the market, these regulations turned out to be rather vague and weak. They mostly concerned advertising, labeling, and purity of food and drugs without requiring product testing for safety and therapeutic efficacy. Nevertheless the Food and Drugs Act represented a fundamental change in policy.¹³ It established that the federal government was to guarantee certain, however minimal standards concerning the nutrition and medication, which American citizens ingested in order to protect the population from dangerous products. The “bio-politics of the population,” which—as in Germany, France, and elsewhere—was also on the

¹² Ibid., xi.

¹³ Ibid., 45-55.

advance in the United States, required governing the economy in the name of health and security.¹⁴

Biopolitics, as Michel Foucault has demonstrated in the case of France, operates by means of “policy,” i.e. an ensemble of political knowledge and technology enabling the state to make good use of its forces, to further the welfare of its subjects, and to guarantee the maintenance of order and discipline.¹⁵ In order to become effective policy needs to work on different levels. The Food and Drugs Act, for example, manifested a highly abstract agenda of welfare and security. To be put into practice this new law needed to be translated into an institutional framework capable of enforcing it. For this reason, the state set up the FDA as a regulatory agency which, at least in theory, was meant to function independently of political patronage in order to give neutrality and stability to government policymaking. Although this principle was subverted in a number of ways the decisions of the FDA were supposed to be based on expertise, not political interests. As a centralized federal agency it implemented regulations, which have been authorized, but not laid down by the government in the more dispersed world of science and economy.

With each scandal, the power of the FDA grew. When 107 people died in 1937 after taking an improperly prepared antibiotic the FDA was authorized to

¹⁴ Michel Foucault, *The History of Sexuality. Vol. I, An Introduction*, trans. Robert Hurley (New York: Vintage Books, 1978), 139. Of course, the reorganization of the economy according to those values was far from comprehensive. After all, the primary economic incentive is the maximization of profits. But the political conditions of business have changed significantly and in more than one way since the nineteenth century.

¹⁵ Michel Foucault, “Security, Terror, and Population,” in *Ethics. Subjectivity and Truth. Essential Works of Foucault, 1954-1984*, ed. Paul Rabinow (New York: The New Press, 1997), 70.

demand from companies premarketing safety testing.¹⁶ In 1962, the regulatory regime of the FDA was consolidated further as a consequence of the thalidomide disaster. The German pharmaceuticals company Chemie Grünenthal had begun marketing thalidomide (under the brand name of Contergan) in Germany in a barely regulated environment from 1957 onward. It was freely available as an over-the-counter sedative to bring calm and sleep and to reduce nausea in early pregnancy. Despite a range of reports on side effects affecting the nervous system, the drug was soon produced and sold in the United States as well. The fact that the premarketing safety-testing data Grünenthal provided was incomplete according to the newly established FDA standards only meant that treatment with the drug had to be labeled “experimental.” Physicians were permitted to test any new chemical on their patients without having to inform them about the experimental nature of their treatment. However, neither doctors nor companies were obliged to account for the drugs they were distributing or to keep records on the outcome of their experimental administration. Hence, the drug was given to 20,000 patients, but no data was collected. Many people taking thalidomide suffered—sometimes for the rest of their lives—from peripheral neuropathy. Additionally, its teratogenic qualities caused 8000 children to be born with gross anatomical malformations while another several thousand infants died of their deformities before birth. The American government responded to this highly publicized calamity in 1962 by enacting the Kefauver-Harris amendments to the Federal Food, Drug, and Cosmetic Act. Among other

¹⁶ Hiltz, *Protecting America's Health: The FDA, Business, and One Hundred Years of Regulation*, 89-94.

things, it enabled the FDA to force the withdrawal of a drug from the marketplace if it was deemed unsafe or ineffective. The burden to prove safety and effectiveness was now on the pharmaceutical manufacturer seeking product-marketing approval. Furthermore, the bill demanded “adequate and well-controlled investigations” to evaluate a new drug. Guidelines for drug testing that would generate acceptable data for the drug-approval process were specified. The personalized authority of the expert (physician, pharmacologist, etc.) was subordinated to the process of investigation and the empirical evidence it produced according to a given set of rules of method.¹⁷

Before 1962, hallucinogens had hardly been affected by the tightening of drug regulations in the United States. The Pure Food and Drugs Act of 1906 required a special labeling of medications containing so-called narcotic drugs such as morphine, heroin, cocaine, or cannabis, but no hallucinogenic drugs were included in this list. The criminalization of the importation of opium for non-medical uses in 1909 and the massive taxation of non-medical uses of marijuana in 1937 did not affect hallucinogens either. The attempts to outlaw the religious use of peyote in 1918 and 1937 failed. Only the 1938 amendments to the Pure Food and Drug Act added peyote and mescaline to a list of narcotic and hypnotic substances that had to be sold with a label warning against the risk of habit formation.¹⁸

¹⁷ Ibid., 144-165.

¹⁸ Richard Doblin, "Regulation of the Medical Use of Psychedelics and Marijuana" (Harvard University, 2000), 5-19.

In the meanwhile, Hofmann had invented LSD, which temporarily became one of the most important research tools in biopsychiatry. Its effects were taken as a model of psychosis allowing to study a schizophrenia-like state under controlled experimental conditions. But hallucinogenic drugs were also regarded as a promising medicine to facilitate the psychotherapeutic treatment of neuroses, personality disorders, and alcohol dependence. From 1950 onwards, hallucinogens were tested in clinical trials on healthy volunteers, prisoners, alcoholics, as well as neurotic and schizophrenic patients. In 1959, LSD gained much publicity when Hollywood celebrity Cary Grant told the press that he had taken LSD over 60 times in therapy and that “young women have never before been so attracted to me.” And the *San Francisco Chronicle* reported that five LSD treatments costing one dollar per session were more effective than “the standard sessions of psychoanalysis, which often require hundreds of thousands of hours, and many thousands of dollars.”¹⁹ By the mid 1960s, approximately 30,000 to 40,000 psychiatric patients around the world had been administered LSD therapeutically and several thousand normal volunteers had received it experimentally.²⁰

Initially, there were hardly any regulations restricting these applications. However, in the late 1950s, physicians’ nonchalant dealing with drugs began to be problematized within the medical profession. Pharmaceutical research was burgeoning and companies were incessantly putting new drugs on the market.

¹⁹ Both quotations from: Steven Novak, “LSD before Leary. Sidney Cohen’s Critique of 1950s Psychedelic Drug Research,” *Isis* 88, no. 1 (1997): 103.

²⁰ Jill Jonnes, *Hep-Cats, Narcs, and Pipe-Dreams. A History of America’s Romance with Illegal Drugs* (Baltimore: Johns Hopkins University Press, 1996), 228.

Doctors had difficulties keeping up with this stream of unfamiliar medicines promoted by sales representatives and demanded by patients who had heard about them through the media or advertisements. In the case of regular medical care, American physicians were granted legal immunity and usually had insurance coverage for untoward events occurring in the course of treatment. But when administering investigational drugs no such legal protection applied. Like thalidomide, LSD had been classified as an experimental drug. Despite the medical and legal risks it posed, more and more psychiatrists were using it therapeutically under the cloak of research. Apart from LSD's potential to assist psychotherapy by facilitating access to the unconscious LSD therapy was also highly profitable. Hoping for a commercially rewarding medical application to crystallize Sandoz was providing LSD to interested parties claiming to use it for scientific purposes. That way many therapists got hold of LSD charging their patients up to \$500 per LSD session. Soon rumors concerning adverse reactions began to circulate. Panic attacks, psychotic reactions, flashbacks, even suicides were said to have occurred. In response, Sidney Cohen, a psychiatrist at the University of California, Los Angeles, conducted a study on the drug's safety in 1959 and a second one in 1962. His first tentative report concluded that the suicide rate was 0.4/1000, that side effects were "surprisingly infrequent," and that LSD and mescaline were "safe." Three years later, however, after more serious complications including suicides and other irregularities in the conduct of treatments had come to light, Cohen was significantly more concerned warning that the risks of suicide and prolonged psychotic reactions were real.²¹

²¹ Novak, "LSD before Leary."

The publication of Cohen's second article coincided with the thalidomide crisis. By now, there was public outrage and serious concern among legislators regarding the careless experimentation with investigational drugs on often unwitting test subjects. Congress immediately took action and passed the Kefauver-Harris Amendments to the Federal Food, Drug, and Cosmetic Act in 1962 giving the FDA control over all new investigational drugs. No longer could researchers mail a form to Sandoz, receive LSD or psilocybin in return, and administer the drugs without any great deal to patients. Now they had to undergo the newly created Investigational Exemption to the New Drug Application process, which meant a lot of paperwork. Henceforth, the FDA had to give prior approval for all testing of experimental drugs. Additionally, Sandoz had grown concerned about its reputation restricting the provision of LSD in the United States to researchers associated with the National Institute of Mental Health (NIMH), state commissioners of mental health, or Veterans Affairs hospitals. Thereby, the number of researchers who had access to LSD was reduced from several hundred to seventy, all of which were scientists working within federal or state agencies or obtaining grants or permission from such agencies.²²

Note that this drastic curtailment of hallucinogen research occurred in 1963, at a time when the term hippie had not yet been coined, the widespread use of hallucinogens outside of medical settings was only just beginning, and Timothy Leary was still in the process of metamorphosis from respectable psychology lecturer at Harvard to self-proclaimed high priest of LSD. So far the

²² Ibid.: 103-108. See also Doblin, "Regulation of the Medical Use of Psychedelics and Marijuana", 35. Jay Stevenson, *Storming Heaven. LSD and the American Dream* (New York: The Atlantic Monthly Press, 1987), 182-183.

history of the medical uses of hallucinogens has been part of a much broader history of controlling pharmaceuticals in the United States. What was at issue when scientific applications of hallucinogens were subjected to a strict regulatory regime in the early 1960s was not spiritual liberation through consciousness-expanding drugs and their association with the politics of the counterculture but medical paternalism and pharmaceutical marketing practices. After all, the distribution of thalidomide and LSD as investigational drugs primarily served to acquaint doctors with new products and to establish a lucrative therapeutic application from which Chemie Grünenthal (or Richardson-Merrell in the United States) and Sandoz could profit. The expansion of the FDA's duties and power was meant to protect American citizens from ruthless or adventurous physicians and scientists. It belonged to a profound transformation of medical decision making challenging and curbing physicians' professional dominance with an unqualified commitment to individual rights. In the 1960s, as David Rothman argues, trust in medical authority was shaken and henceforth doctors and researchers had to make their decisions about patients and test subjects, treatments and study designs alongside lawyers, judges, legislators, members of ethics committees, and FDA officers.²³ And these developments in the medical sector were part of an even more far-reaching restructuring of the government of technological change. As Ronald Brickman, Sheila Jasanoff, and Thomas Ilgen have pointed out:

²³ David Rothman, *Strangers at the Bedside. A History of How Law and Bioethics Transformed Medical Decision Making* (New York: Aldine de Gruyter, 1991).

By the end of the 1960s, worldwide concern about the harmful effects of industrialization and technological change coalesced into insistent public demands for remedial state action. The governments of advanced industrial nations responded with ambitious programs of “social regulation” to protect public health and the environment. Wide-ranging statutes were enacted granting broad regulatory powers to executive agencies. [...] In little more than a decade, these activities changed the face of regulatory policy and politics in every industrialized country.²⁴

“In no country,” the authors add, “was the banner of social regulation taken up with greater fanfare and promise” than in the United States.²⁵

Political Neurotheology

The enmeshment of hallucinogen research in the jungle of regulations was followed by the second, significantly more spectacular part of its decline. Here, Timothy Leary and the hippies did play central roles. In a 1957 article in *Life* magazine, the New York banker and amateur anthropologist and ethnobotanist Gordon Wasson reported on the rediscovery of the shamanic use of “magic mushrooms” (*Psilocybe mexicana*) in Mexico. The psychoactive principle of these mushrooms, psilocybin, was isolated and chemically analyzed by Albert Hofmann in 1958 and subsequently manufactured by Sandoz. Two years later, the personality psychologist Timothy Leary went on vacation to Mexico before taking up a new position at Harvard’s Center for Personality Research. Having heard about the sacred mushrooms from of a colleague he managed to purchase some and tried them out. “It was the classic visionary voyage and I came back a

²⁴ Ronald Brickman, Sheila Jasanoff, and Thomas Ilgen, *Controlling Chemicals. The Politics of Regulation in Europe and the United States* (Ithaca: Cornell University Press, 1985), 19.

²⁵ *Ibid.*, 20.

changed man. You are never the same after you've had that one flash glimpse down the cellular time tunnel. You're never the same after you've had the veil drawn."²⁶ After this transformative drug experience Leary decided to make the psychic effects of psilocybin the center of his research program at Harvard. The goal of the Harvard Psychedelic Project was to study whether hallucinogens could be used to accelerate behavior change.

Leary began to experiment with psilocybin and other hallucinogens on himself, colleagues, and friends and soon gained access to a scene of artists, writers, and intellectuals to whom he gave the drugs as well. This experimentation occurred under hardly controlled conditions: spontaneously, in groups, often at Leary's home, alongside drinking, and with no previous psychopathological screening of test subjects. First and foremost, Leary's psychology aimed at ecstasy, not normalcy. "Bad trips," even a suicide attempt occurred from the very beginning onwards, but Leary was not particularly concerned about such adverse reactions.²⁷ He took notes on what happened and asked test subjects to later on write experience reports and fill in questionnaires.

To demonstrate that psilocybin could not only bring people ecstasy but also educate and transform them Leary, his colleague Gunther Weil, and Leary's graduate student Ralph Metzner launched a second project: They gave psilocybin to prison inmates. In the name of a new form of egalitarian psychology, Leary and his colleagues took the drug together with convicts in the prison. Leary and his co-researchers were hoping that the prisoners' experiences

²⁶ Quoted in: Robert Greenfield, *Timothy Leary. A Biography* (Orlando: Harcourt, 2006), 113.

²⁷ *Ibid.*, 122-124, 140-141.

would be equally life changing as Leary's providing the subjects with new models about themselves and their relationship to society. The success of this enterprise would be measured in terms of the aimed at reduction of recidivism rate.²⁸ The project was inspired by an image of man as infinitely malleable fostered by both human engineering and the Human Potential Movement big at the time. The idea was that psilocybin allowed to pharmacologically undo socialization, which in the case of the prisoners had obviously gone wrong. Such a drug-induced deconditioning would enable subjects to step out of the dehumanizing "games" of society granting them access to a more authentic and profoundly good realm of spirituality within themselves. Leary claimed spectacular success rates. But when psychedelic activist Rick Doblin revisited Leary's data in 1998, it turned out that within 30 months after release 71% of Leary's test subjects had returned to jail.²⁹ At the end of the day, the psychedelic experience had been less significantly transformative than asserted.

The third and last famous experiment Leary supervised at Harvard in 1962 was indicative of the continuous shift in the interest in hallucinogens toward spiritual matters. Walter Pahnke, a physician pursuing a Ph.D. in philosophy of religion proposed a double blind experiment to test whether psilocybin could induce an authentic religious experience. Twenty divinity students were given psilocybin or a placebo while attending the Good Friday sermon in a chapel. The point was to demonstrate that in a religious setting and in people who were

²⁸ Ibid., 148-153.

²⁹ Ibid., 152-153.

already religiously inclined the drug could facilitate genuine mystical experiences indistinguishable from those reported in the mystical literature.³⁰

At the time, the situation was about to become increasingly more difficult for Leary and his allies. Leary was criticized for ignoring the medical risks associated with his nonchalant use and distribution of psilocybin. Additionally, an increasing number of graduate students in the psychology department got into drug experimentation while others began complaining about peer pressure to participate in such activities. As Leary was losing ground he started setting up the International Foundation for Internal Freedom, which was supposed to serve as a framework in which to continue experimenting with hallucinogenic drugs outside of the university. Legend has it that Leary was eventually dismissed from Harvard in 1963 when undergraduates became involved in hallucinogen experimentation as well. In fact, it was Leary who declared himself fired on a TV talk show weaving a mythology of repression and fashioning himself as rebellious countercultural hero.³¹

After Leary had decided that he was “through playing the science game”³² his dealings with hallucinogenic drugs took up a more and more religious and political character. He advocated hallucinogens as the psychopharmacological panacea for all social ills.

It seemed to us that wars, class conflicts, racial tensions, economic exploitation, religious strife, ignorance, and prejudice were all caused by narrow social conditioning. Political problems were manifestations of psychological problems,

³⁰ Ibid., 171-184.

³¹ Ibid., 195-199.

³² Quoted in: Jonnes, *Hep-Cats, Narcs, and Pipe-Dreams*, 229.

which at bottom seemed to be neurological-hormonal-chemical. If we could help people plug into the empathy circuits of the brain, then positive change could occur. It was then that we started plotting the neurological revolution, moving beyond scientific detachment to social activism.³³

At this point, Leary did away with his friend Aldous Huxley's advice to reserve access to hallucinogenic drugs for an intellectual elite that could handle these powerful agents instead adopting an "American egalitarian open-to-the-public approach." He wanted everyone to have the option of taking mind-expanding drugs. "It was the fifth freedom—the right to manage your own nervous system." Leary's militant neuropolitics aimed at overthrowing current authorities and bringing about a new regime built around the psychedelic experience. At a conference in San Francisco, Leary began his speech "The Molecular Revolution" provocatively painting the new age to come:

Within one generation we will have across the Bay in Berkeley a department of psychedelic studies. There will probably be a dean of LSD. When students come home from their vacation, Mother and Father will not ask "What book are you reading?" but "Which molecules are you using to open up which Library of Congress inside your nervous system?" And the bureaucratic requirements will still be with us. You will have to pass Marijuana 1A and 1B to qualify for an introduction to LSD 101. I'm not worried about the young and the turned-on. I am more concerned about the law-enforcement agents in this room, those whose job it is to turn us off. It is probable that there has never been a scientific, scholarly meeting in the history of our country which has had the benefit of so many law-enforcement officers present. What is the threat that attracts the police? Perhaps it is the danger of new ideas.³⁴

³³ Timothy Leary, *Flashbacks. A Personal and Cultural History of an Era. An Autobiography* (New York: G. P. Putnam's Sons, 1983), 49-50.

³⁴ Quoted in: Greenfield, *Timothy Leary*, 280-281.

However, despite its aggressive tone Leary's "politics of ecstasy" were actually almost apolitical—or rather political in promoting withdrawal from "the system." In Leary's eyes, active opposition as practiced by civil rights activists or the students protesting against the Vietnam War only led to even greater entanglement in the alienating and oppressive "games" of society: "Don't vote. Don't politic. Don't petition. You can't do anything about America politically."³⁵ For Leary, LSD meant "*Let the State Desinegrate!*" He told his audience in San Francisco: "My advice to people in America today is as follows: If you take the game of life seriously, if you take your nervous system seriously, if you take the energy process seriously, you must turn on, tune in, and drop out."³⁶

The 1960s were a period of profound reorientation in American religious history characterized by the embrace of unchurched or alternative forms of spirituality. A new appreciation for Eastern religious thought and the chemical revelations induced by hallucinogenic drugs played central roles in this process.³⁷ However, the blend of "psychotropic hedonism" and "instant mysticism" catalyzed by psychedelics, which Leary preached and many members of the counterculture practiced clashed with the "pharmacological Calvinism" predominant in the United States at the time. The term "pharmacological Calvinism" was coined by Gerald Klerman and refers to an attitude rejecting the use of drugs to achieve pleasure or enlightenment.³⁸ Both states need to be earned through hard work. "Popping a pill" was regarded as an illegitimate shortcut threatening the individual

³⁵ Quoted in: *Ibid.*, 303.

³⁶ Quoted in: *Ibid.*, 281.

³⁷ Fuller, *Stairways to Heaven*, 84-89.

³⁸ Gerald Klerman, "Psychotropic Hedonism vs. Pharmacological Calvinism," *Hastings Center Report* 2, no. 3 (1972).

as well as society at large. It undermines the more circuitous, laborious, and, hence, productive routes that the American “pursuit of happiness” is supposed to take. Pharmacological Calvinism is part of the Protestant ethic and the spirit of capitalism as described by Max Weber.³⁹

Weber distinguished between two ideal-types of religious ethic: asceticism and mysticism. At the one end of the spectrum of possible permutations opening up between these two poles, there is the asceticism of the Protestant ethic, which has played such a formative role in the United States. It aims at taming the original depravity of man through work. The striving for salvation has been transformed into a worldly business. The true believer proves himself through his divinely ordained and successful actions and transactions in this life. The contemplation or ecstasy sought for by the mystic in quest of transcendence does not contribute to this energetic and sober goal. Mysticism—in its purest form—calls for a withdrawal from the world and regards worldly activity as a threat to salvation, which is to be found beyond the bustle of everydayness and working life. Moreover, mysticism, according to Weber, is meant to cultivate a “world-denying love” [*Liebesakosmismus*] irreconcilable with the unbrotherly spirit of capitalism. Obviously, these two spiritual attitudes are conflicting. While the ascetic perceives the mystic as indulging in a form of sluggish inward pleasure, the mystic sees the ascetic as engaged in a self-righteous and godless buzz of mundane activity.⁴⁰

³⁹ Max Weber, *The Protestant Ethic and the Spirit of Capitalism* (New York: Penguin Classics, 2002).

⁴⁰ Max Weber, “Religious Rejections of the World and Their Directions,” in *From Max Weber:*

It would certainly be mistaken to present the moral landscape of the United States as an undivided block of this-worldly Protestant asceticism. The clash between the advocates of psychedelic drugs and those eventually propagating their illegalization was—among other things—coded as a fight over values with religious genealogies. One of the predominant modes of using hallucinogens in the American counterculture can be described as an ethical practice embodying a this-worldly mysticism. Richard Blum, an astute participant observer of the psychedelic movement and a reader of Max Weber, noted in 1964:

While one may think of the convinced LSD user as retreating, it is certainly not because he has failed to achieve at least some of the glories of this world, nor does he lack institutional means to secure more of these ends should he so desire. And whatever retreat does occur is not a withdrawal into a dismal emptiness or shadowy world of despair. As described, it is a retreat from competition and strife but also toward something felt to be positive: tranquility and personal or religious exaltation. The retreat, then, if that is what it is, is more along the lines of “privatism,” an antimaterialistic emphasis on a reliable inner world in the face of an unreliable outer one.⁴¹

This stoic motif was intertwined with a certain self-exploratory hermeneutics of the subject and a radical rejection of the Protestant ethic inspiring capitalism. As Jerry Rubin, one of the leading figures of the counterculture, put it: “Drug use signifies the total end of the Protestant ethic: screw work, we want to know ourselves. But of course the goal is to free oneself

Essays in Sociology, ed. H. H. Gerth and C. Wright Mills (New York: Oxford University Press, 1946). See also Robert Bellah, “Max Weber and World-Denying Love: A Look at the Historical Sociology of Religion” (Humanities Center and Burke Lectureship on Religion and Society, University of California, 30 October 1997).

⁴¹ Richard Blum, “Conclusions and Commentary,” in *Utopiates. The Use and Users of LSD-25*, ed. Richard Blum (New York: Atherton, 1964), 272.

from American society's sick notion of work, success, reward, and status and to find oneself through one's own discipline, hard work, and introspection." Hence, the struggle over hallucinogens was also a political struggle over the foundations of America's social and economic order and its spiritual foundations. Soon Leary's political neurotheology attracted enough followers for US President Richard Nixon to declare Leary "the most dangerous man in America."⁴²

The Breakdown of Hallucinogen Research

Even though Leary clearly enjoyed being depicted as corrupting American youth (comparing himself with Socrates who had been sentenced to death due to similar accusations), it is debatable whether Leary was rather cause or symptom of the 1960s upheavals. He certainly did his best to advertise hallucinogens with catchy slogans and exaggerated claims that made psychedelic drugs desirable for young people at the time. But, as already indicated above, this trend originated in the late 1950s when Leary had not yet taken any hallucinogens. The spreading experimentation with drugs among high school and college students raised a significant amount of concern, especially among their parents who were instrumental in mobilizing political support for their cause. Until the mid 1960s, illicit and recreational drugs were confined to the inner city remaining "a remote and irrelevant vice to middle-class Americans placidly pursuing the good life in the nation's leafy suburbs," as historian Jill Jones put it. "It was simply not part of growing up white and upwardly mobile, not something that parents worried about.

⁴² Richard Davenport-Hines, *The Pursuit of Oblivion. A Social History of Drugs* (London: Phoenix, 2002), 265.

But all that was about to change drastically.”⁴³ Hallucinogens primarily found favor among Wasps (even though Leary was of Irish catholic origin) dissatisfied with their social origins. Although some reports about carcinogenic and teratogenic qualities of LSD were circulating, these findings could not be consolidated and overdoses or physical decline did not occur. However, lacking toxicity in the pharmacological sense psychedelics were said to provoke psychoses and suicides. In the mid 1960s, an increase in hallucinogen-related admissions to psychiatric hospitals was noted—mostly well-educated and well-to-do young middle-class men in their early twenties who had hoped that the drug would improve their personal insight. It was estimated that two percent of those taking LSD in unsupervised settings experienced negative effects with about one third of those becoming—usually only temporarily—psychotic. In March 1966, *Time* magazine presented the occurrence of these seven cases per thousand as a severe mental health crisis.⁴⁴ “The disease is striking in beachside beatnik pads and in the dormitories of expensive prep schools; it has grown into an alarming problem at UCLA and on the UC campus at Berkeley. And everywhere the diagnosis is the same: psychotic illness resulting from the unauthorized, nonmedical use of the drug LSD-25.”⁴⁵ This new drug “epidemic” affected a rather small, but exclusive portion of the population. The media provided ample

⁴³ Jonnes, *Hep-Cats, Narcs, and Pipe-Dreams*, 232, 254-255.

⁴⁴ In supervised medical settings, the number was lower. According to a study conducted by Sidney Cohen in 1960, “[t]he rate of prolonged psychosis (48 hours or more) was 1.9 per thousand in patients and 0.8 per thousand in experimental subjects; the suicide rate was 0.4 per thousand in patients during and after therapy, and zero in experimental subjects.” Grinspoon and Bakalar, eds., *Psychedelic Reflections*, 137.

⁴⁵ Quoted in: Stevenson, *Storming Heaven*, 274.

space to spectacular stories surrounding rare, but tragic incidents and published a series of vague and sensationalist accounts of LSD-inspired violence.⁴⁶

The harm hallucinogen users were doing to themselves and to others seemed obvious and called for a resolute biopolitical intervention. A severe tightening of the regulatory regime was discussed. In the case of hallucinogens, what had started off as a debate over how to handle investigational drugs now turned into a highly politicized struggle over the medical and moral threat posed by this class of substances. In 1965, Congress passed the Drug Abuse Control Amendments, which were directed against non-medical uses of depressant and stimulant drugs as well as against drugs with “hallucinogenic effects.” The new law, which the FDA had to enforce prohibited the production and trade, although not the possession and consumption of these substances. The rigorous control of access to hallucinogens and their subsequent illegalization led to the creation of a black market. The prohibition of production and sale did not stop these activities, but relocated manufacture to underground laboratories and created an uncontrolled drug market on which contaminated and adulterated products were traded. While the FDA had become an efficient instrument to standardize fabrication and sale of food and drugs in the corporate world, which depends on licenses, seals of quality, etc., it failed when it came to controlling a black market that remained largely unaffected by the means the FDA had at its disposal. In

⁴⁶ William Braden, “LSD and the Press,” in *Psychedelics: The Uses and Implications of Hallucinogenic Drugs*, ed. Bernard Aaronson and Humphry Osmond (Garden City (NY): Anchor Books, 1970). Stevenson, *Storming Heaven*, 273-279. For a more general account of “anti-drug scares” in relation to synthetic drugs, see Philip Jenkins, *Synthetic Panics. The Symbolic Politics of Designer Drugs* (New York: New York University Press, 1999).

this respect, the tightening of regulations gave birth to a seemingly wild and unregulated zone of collective experimentation.

The prohibition of hallucinogens did not ban scientific research on these compounds. However, before long, the FDA severely restricted their further medico-scientific exploration. It is possible that the clear indication of political disapproval had an effect on the FDA's decisions although this institution was, in principle, meant to remain independent of political influence. In any case, formal regulation was not the only level on which science policy worked. The microphysics of power—approval of research projects by peer-review boards, allocation of funding, one's reputation in the scientific community, etc.—was also highly effective in curbing hallucinogen research.

Soon the Sandoz management became seriously concerned about the bad publicity their hallucinogenic product series, particularly LSD, earned them. Especially since it had become clear “that, despite the outstanding properties of this compound, or rather because of the very nature of these qualities, even though LSD was fully protected by Sandoz-owned patents since the time of its first synthesis in 1938, the usual means of practical exploitation could not be envisaged,” as the director of the Pharmaceutical Department put it in 1965. Additionally, the tightening regulatory framework made it less and less attractive for the company to continue the manufacture of LSD. Albert Hofmann recalled:

The rise of LSD in the drug scene caused our firm a nonproductive, laborious burden. National control laboratories and health authorities requested statements from us about chemical and pharmacological properties, stability and toxicity of LSD, and analytical methods for its detection in confiscated drug samples, as

well as in the human body, in blood and urine. This brought a voluminous correspondence, which expanded in connection with inquiries from all over the world about accidents, poisonings, criminal acts, and so forth, resulting from misuse of LSD. All this meant enormous, unprofitable difficulties, which the business management of Sandoz regarded with disapproval.⁴⁷

In 1966, Sandoz decided to stop the distribution of hallucinogens altogether. In 1968, President Lyndon Johnson warned Americans against “these powders and pills which threaten our nation’s health, vitality and self-respect.”⁴⁸ In the same year, the FDA and its Bureau of Drug Abuse Control had to cede its authority to prosecute the non-medical use of hallucinogens and other drugs to the newly founded Bureau of Narcotic and Dangerous Drugs under the Department of Justice, which later on turned into the Drug Enforcement Agency (DEA). A further amendment to the Food, Drug, and Cosmetic Act also criminalized the possession of LSD. In 1969, US president Nixon declared the “War on Drugs” as “our second civil war”: “To erase the grim legacy of Woodstock, we need a total war against drugs. Total war means war on all fronts against an enemy with many faces.”⁴⁹ In the following year, Congress passed the Controlled Substances Act to regulate both the medical and the non-medical uses of drugs. Hallucinogens were assigned to the most restrictive Schedule I as they were considered to have a “high abuse potential,” “no currently accepted medical use in treatment,” and a “lack of accepted safety for use under medical supervision.” Even though none of the medical applications of hallucinogens was

⁴⁷ Hofmann, *LSD*, 72.

⁴⁸ Quoted in: Charles Grob, “Psychiatric Research with Hallucinogens: What Have We Learned?,” in *Hallucinogens. A Reader*, ed. Charles Grob (New York: Jeremy P. Tarcher / Putnam, 2002), 278.

⁴⁹ Quoted in: Davenport-Hines, *The Pursuit of Oblivion*, 339.

acknowledged the religious use of peyote by members of the Native American Church continued to be protected in the name of religious freedom. It was exempted from the ban.

For researchers this legislation meant even more supervision and paperwork. Apart from FDA approval, now one also had to get permission from the DEA, which set up additional record keeping requirements and only granted licenses to handle Schedule I drugs to scientists who were regarded as “trustworthy.”⁵⁰ Moreover, the newly introduced ethics committees had significantly greater reservations toward controlled substances in general and the infamous hallucinogens in particular. Many researchers backed away from the inconveniences and disrepute associated with these drugs. The pharmacologist Oakley Ray remembered:

I was also running LSD, psilocybin and mescaline studies in rats but then Sandoz decided to get out of that business. Back then, if you wanted LSD for your research, you picked up the phone and called Rudi Bircher at Sandoz and say, ‘Rudi, I need 100 ampoules of LSD.’ He’d send you them or whatever else you wanted if Sandoz produced it. When they got out of that business, you could still get what you needed from the government but it meant a lot of paperwork and it wasn’t worth it. So I scratched that whole line of research.⁵¹

Similarly, Albert Hofmann noted that “[a]ll these legislative and official precautions, however, had little influence on LSD consumption in the drug scene, yet on the other hand hindered and continue to hinder medicinal-psychiatric use and LSD research in biology and neurology, because many researchers dread the red tape that is connected with the procurement of a license for the use of

⁵⁰ Doblin, "Regulation of the Medical Use of Psychedelics and Marijuana", 46-50.

⁵¹ David Healy, *The Psychopharmacologists*, vol. II (London: Chapman & Hall, 1998), 438.

LSD.”⁵² There was still substantial interest in hallucinogens in the scientific community, which led to a number of protests and complaints in prestigious journals such as the *American Journal of Psychiatry* or *Science*.⁵³ But under the increasingly unfavorable conditions most research projects were eventually terminated by the early 1970s.

Vivid Afterlife

Even though hallucinogen research did suffer a significant decline in the 1960s it never came to a total standstill. Despite the numerous hurdles and restrictions limiting the freedom of science it was, in principle, still possible to pursue research on psychedelic drugs and, in fact, some scientists did obtain Schedule I licenses and went ahead. Two of them, the chemist David Nichols and the neuropsychopharmacologist Mark Geyer, would later play a crucial role in the alleged “revival” of hallucinogen research in the 1990s. For those holding a special permit chemical analysis and synthesis as well as pharmacological studies in animals were legally possible throughout the 1970s and 1980s. There were even a very few human studies during the period Geyer ironically refers to as “The Dark Era.”⁵⁴ Admittedly, the scale of this research was infinitesimal in comparison to the vibrant scientific experimentation in the 1950s, but enough to demonstrate that hallucinogen research was not categorically prohibited. The

⁵² Hofmann, *LSD*, 73.

⁵³ Doblin, “Regulation of the Medical Use of Psychedelics and Marijuana”, 41, 46-47..

⁵⁴ See, for example, the Navy-sponsored human LSD studies by P. Francom et al., “Determination of LSD in urine by capillary column gas chromatography and electron impact mass spectrometry,” *Journal of Analytical Toxicology* 12, no. 1 (1988). H. K. Lim et al., “Quantification of LSD and N-demethyl-LSD in urine by gas chromatography/resonance electron capture ionization mass spectrometry,” *Analytical Chemistry* 60, no. 14 (1988).

mechanisms that led to its deterioration were subtler. Psychiatric and psychopharmacological researchers were not denied their academic freedom and yet they were discouraged, worn down, and guided away from further work on these compounds.

One particularly complex figure unwilling to give in to this form of government was Alexander Shulgin. Shulgin received a Ph.D. in Biochemistry from the University of California, Berkeley, in 1954. He became a research director at BioRad Laboratories and then a senior research chemist at Dole Chemical Company. For Dole he invented a profit-making insecticide in the early 1960s although his work centered on hallucinogenic drugs. He left the firm to establish his own private laboratory in 1966 when the political pressure on his work began to make itself felt.

From my point of view, it was becoming increasingly clear that the corporate attitudes toward my work were shifting from encouragement to tolerance, which would in time—I suspected—become disapproval and eventually, of course, outright prohibition. Since my end products were seen to be of no exploitable value, there had been no restrictions on publication, and I had in fact published, in several first class scientific journals, a goodly number of papers describing the chemistry and the activity in humans of new psychedelic drugs [...] But the point on which the writing on the wall became obvious was the day I was asked to no longer use Dole's address on my publications. What I held to be exciting and creative was clearly being seen by management as something that would reflect badly on the corporate image. So I started putting my home address on scientific publications. And since this implied that the research was being done at home, it seemed like a great idea to begin setting up a personal laboratory on the Farm, which I had long dreamt of.⁵⁵

⁵⁵ Alexander Shulgin and Ann Shulgin, *PIHKAL: A Chemical Love Story* (Berkeley: Transform

To earn a living Shulgin taught public health and forensic toxicology at Berkeley and San Francisco General Hospital and worked as a scientific consultant for the University of California, the National Institute of Drug Abuse, the Drug Enforcement Agency, NASA, and a number of other organizations. Holding a Schedule I permit until 1994, he simultaneously invented nearly two hundred new psychoactive, mostly psychedelic substances in his laboratory. In a talk in 2006, Shulgin indicated that in the nineteenth century the Western World only knew two psychedelic drugs: marihuana and peyote. By the 1950s, it was already dozens. And at the beginning of the twenty-first century it was about two hundred—many of which were Shulgin's own creations. If this logarithmic growth continued, Shulgin calculated, there would be about 2000 compounds by 2050.

Each new substance Shulgin tested on himself first, before taking it, in a second step, together with his wife Ann, and finally with a group of friends at his house. This self-experimentation followed a set of strict methodical rules (slow increase of dose, compliance with a minimal temporal interval between two experiments, evaluation of the drug effects according to a scoring system, certain rules of conduct and communication for the group experiments, etc.), which were supposed to ensure safety and comparability of the experiments.

This research took place at the verge of legality and illegality. The Drug Enforcement Agency recognized Shulgin as an authority on hallucinogens, of which there were very few since the decline of academic and industrial research in this field. He had written a handbook on the Controlled Substances Act that

Press, 1991), 41-42. This scientific practice could be compared to that of the gentleman scientists in seventeenth-century England described by Shapin Shapin, *A Social History of Truth*.

had become a standard desk reference for DEA employees and he served as an expert witness for both prosecution and defense in DEA legal trials. In return, the DEA granted Shulgin, whom it apparently considered sufficiently trustworthy, a Schedule I license allowing him to handle certain controlled substances. However, the administration of his new drugs (that had not even undergone preclinical testing in animals) to human subjects like his wife or his friends was against the law. The US attorney's office in San Francisco was keeping a file on Shulgin, although no charges were brought against him.⁵⁶ He was kept in a state of delinquency in the sense of potential criminality, which enabled the state to carefully frame Shulgin's freedom to pursue his research that was regarded as useful and dangerous at the same time. This form of delinquency was meant to produce a docile scientist.⁵⁷

This intricate relationship of complicity between Shulgin and the DEA became tenser when, in 1985, Congress passed the Controlled Substances Analogue Enforcement Act as a reaction to the proliferation of so-called designer drugs. The Act criminalized the sale or manufacture for sale of any chemical with a structure or action "substantially similar" to that of a Schedule I or II drug. Subsequently, scientific journals that had published Shulgin's work beforehand rejected his papers, citing legal concerns. Seeking another outlet, Alexander and Ann Shulgin published the recipes for the drugs he had invented alongside

⁵⁶ Dennis Romero, "Sasha Shulgin, Psychedelic Chemist," *Los Angeles Times*, September 5, 1995 1995.

⁵⁷ For an account of the administration and exploitation of illegalities, see Foucault's discussion of "useful delinquency" in Michel Foucault, *Discipline and Punish: The Birth of the Prison* (New York: Vintage Books, 1977), 280.

novelistic experience reports in two books, *PIHKAL* (1991) and *TIHKAL* (1997).⁵⁸ What had previously only been accessible to the readership of chemistry, pharmacology, and toxicology journals thereby got into much wider circulation. The experience reports were also based on previously unpublished private notes. Shulgin justified this step stating the threat of political repression. "I can see having maybe two or three people in the higher echelons of the government who may not like what I do, and I did not want particularly to have all of this be seizable and burnable," he explained. "So I published it. Now you cannot get rid of it."⁵⁹ The DEA reacted to the publication of *PIHKAL*—apparently a breach of trust—by raiding Shulgin's laboratory in 1994 together with the Environmental Protection Agency forcing him to give up his drug-handling license and pay a fine of \$25,000 for not having complied with environmental regulations.⁶⁰

At about the time when *PIHKAL* was published, the dissemination of knowledge about drugs outside of scientific journals was radically transformed by the emergence of the Internet. From 1992 onwards, underground mailing lists and newsgroups began to distribute information on psychoactive, especially psychedelic substances. A year later the first websites such as Hyperreal and Lycaeum began to publish and archive drug-related materials.⁶¹ Today

⁵⁸ Shulgin and Shulgin, *PIHKAL*. Alexander Shulgin and Ann Shulgin, *TIHKAL: The Continuation* (Berkeley: Transform Press, 1997). *PIHKAL* and *TIHKAL* are acronyms referring to the two chemical classes of hallucinogens, on which Shulgin focused in his work. *PIHKAL* stands for Phenethylamines I Have Known And Loved, *TIHKAL* for Tryptamines I Have Known And Loved.

⁵⁹ Kara Platoni, "2C-T-7's Bad Trip," *East Bay Express*, May 5, 2002 2002.

⁶⁰ But Shulgin claims that "the loss of his license doesn't affect his inventing at all – after all, he doesn't need Schedule I drugs for his own research and is not interested in producing analogues of them. "If a chemical turns out to have an action of a Schedule I drug, I'll just publish the damn thing and go on to something else, (Ibid.)

⁶¹ Andrew Edmond, "Pioneers of the Virtual Underground. A History of our Culture," *The Resonance Project*, no. 1 (1997). For reports on sources of drug information on the Internet about

www.erowid.org is the most comprehensive virtual library in this field. Erowid was founded in California in 1995 by two people calling themselves Earth and Fire and is now run by three persons as well as dozens of volunteers. It is a non-commercial organization that has set up an online library providing information about psychoactive plants, chemicals, and related topics. Its more than 30,000 documents range from images, research summaries and abstracts, media articles, experience reports, information on chemistry, dosage, effects, law, health, and drug testing to traditional and spiritual uses of psychoactive compounds. The sources of information Erowid gives access to are diverse spanning from peer reviewed research publications to subjective experience reports by anonymous drug users to fiction.

The community using these platforms can be described as a scientifically literate drug scene, which shows certain characteristics of a scientific community. Its members participate in private experimentation taking place beyond the sphere of FDA regulations. Of course, the consumption of previously untested drugs involves great risks. In *PIHKAL*, Shulgin reported that one of their group experiments with a drug he called 5-TOM left one of his friends temporarily paralyzed and “zombified.”⁶² Another one of his creations, 2C-T-7, caused three deaths in 2000 and 2001. A freelance drug researcher going by the screen-name “Murple” conducted an e-mail survey on Erowid collecting data on side effects, dosage, experiences, etc., from 423 people. He or she also used Erowid to

ten years later, see John Halpern and Harrison Pope, “Hallucinogens on the Internet. A Vast New Source of Underground Drug Information,” *American Journal of Psychiatry* 158 (2001). Paul Wax, “Just a Click Away. Recreational Drug Web Sites on the Internet,” *Pediatrics* 109 (2002).

⁶² Shulgin and Shulgin, *PIHKAL*, 345-357.

publish the results of this study in 2001. Analyzing the cautious self-observations of those who had responded to his survey Murple reached the conclusion that 2C-T-7 as well as its sibling 2C-T-2 have great potential as tools for therapy promoting “very insightful states of mind” and as “spiritual tools, enabling easier access to meditative states.” But Murple also warned that

[a]long with the potential for benefit, both drugs also present potential risks. This seems especially true for 2C-T-7 [... But] [u]sed in moderation, both drugs seem to be quite safe. While there have been several serious incidents reported, we need to remember that this represents only a tiny fraction of total uses. There have been fewer than ten incidents of concern, out of thousands of total uses. This record looks even better when considering some of the reckless dosages taken by many people. The biggest risk of course is that the risk factors are not really known. Until more research is done, it would be wise to proceed carefully.⁶³

The provision of such information allows drug users to make better informed decisions about their participation in the uncontrolled experimentation with a particular new drug circulating in this experimental drug scene.⁶⁴ Here,

⁶³ Murple, *Sulfurous Samadhi. An Investigation of 2C-T-2 & 2C-T-7* (Erowid.org, 2001 [cited 27 July 2005]); available from <http://www.erowid.org/chemicals/2ct7/article1/article1.shtml>. Cf. Platoni, “2C-T-7’s Bad Trip.”

⁶⁴ The organization of such illicit community-based drug trials has its origins in the 1980s in the AIDS community of San Francisco: “This originally haphazard, individual approach to self-experimentation has become more structured, rational and scientific over the past decade. In organized groups, patients are beginning to design, initiate, and direct their own clinical drug trials. Often, the management of a clinical trial is solely in patients’ hands. All activities are kept relatively secret, especially from the federal and state authorities.” Lisa Basara and Michael Montagne, *Searching for Magic Bullets: Orphan Drugs, Consumer Activism, and Pharmaceutical Development* (New York: Pharmaceutical Product Press, 1994), 182. Bruno Latour celebrates (and mistakenly generalizes) this phenomenon with almost missionary zeal: “As consumers, militants, citizens, we are all now co-researchers [...] and we are all to formulate research problems—those who are ‘confined’ in their laboratories as well as those that [Michel] Callon and his colleagues call ‘outdoor’ researchers, that is all of us. In other words, science policy, which used to be a specialised bureaucratic domain interesting a few hundred of people, has now become an essential right of the new citizenry. The sovereignty over research agendas is much too important to be left to the specialists – especially when it is not in the hands of the scientists either, but in those of industry that no one has elected and that no one controls. Yes, we might be willing to participate in the collective experiments, but on the condition that we give our *informed consent*.” Bruno Latour, “What Rules of Method for the New Socio-Scientific Experiments?,” in

drug safety is no longer ensured by the state on the level of the population, but new forms of communities that engage in collective experimentation take measures themselves to minimize the risks going along with their drug-related activities. At first glance, the prohibition of hallucinogens and other drugs since the 1960s seemed to have created a wild and uncontrolled black market reminiscent of the situation before the enactment of the Pure Food and Drugs Acts and the foundation of the FDA in 1906. But the experimental drug scene that has emerged around hallucinogens and other designer drugs has developed its own, however insufficient means of regulation in order to safeguard the health of its venturesome members as much as possible. Its human trials have produced a rich body of knowledge on substances academic and industrial researchers hardly pay attention to. In the shadow of the impediments imposed on hallucinogen research in the course of the 1960s, a new form of private science came to blossom in a gray zone situated at the fringes of legality.

Experimental Cultures: Configurations between Science, Art, and Technology, 1830-1950 (Preprint 213) (Berlin: Max-Planck-Institut für Wissenschaftsgeschichte, 2001), 133. For a more critical account of this phenomenon, see Nikolas Rose and Carlos Novas, "Biological Citizenship," in *Global Assemblages. Technology, Politics, and Ethics as Anthropological Problems*, ed. Stephen Collier and Aihwa Ong (London: Blackwell, 2005).

3. Rebirth of Hallucinogen Research in Contemporary Neuropsychopharmacology

A New Beginning: Rick Strassman's Quest for the Spirit Molecule

"In 1990 I began the first new research in the United States in over twenty years on the effects of psychedelic, or hallucinogenic, drugs on humans."⁶⁵ These are the words with which Rick Strassman's book *DMT: The Spirit Molecule* begins. Strassman was an associate professor of psychiatry at the University of New Mexico School of Medicine with a rather peculiar interest in the short-acting, but extremely powerful hallucinogen N,N-dimethyltryptamine (DMT):

I was drawn to DMT because of its presence in all our bodies. I believed the source of this DMT was the mysterious pineal gland, a tiny organ situated in the center of our brains. Modern medicine knows little about this little gland's role, but it has a rich "metaphysical" history. Descartes, for example, believed the pineal was the "seat of the soul," and both Western and Eastern mystical traditions place our highest spiritual center within its confines. I therefore wondered if excessive pineal DMT production was involved in naturally occurring "psychedelic" states. These might include birth, death and near-death, psychosis, and mystical experiences. Only later, when the study was well underway, did I also begin considering DMT's role in the "alien abduction" experience.⁶⁶

Even though the endogenous production of DMT is minute, in Strassman's eyes it was key to our humanity. As a Buddhist he believed that human life began 49 days after conception when the spirit ensouls the fetus. The neurobiological correlate of anthropogenesis, Strassman speculated, was a pineal release of DMT: "When our individual life force enters our fetal body, the moment in which

⁶⁵ Rick Strassman, *DMT: The Spirit Molecule. A Doctor's Revolutionary Research into the Biology of Near-Death and Mystical Experiences* (Rochester: Park Street Press, 2001), xv.

⁶⁶ Ibid.

we become truly human, it passes through the pineal and triggers the first primordial flood of DMT.”⁶⁷ Having conducted neuroendocrinological research on another substance excreted by the epiphysis, the hormone melatonin, Strassman decided to test his assumptions by studying the effects of DMT on humans.

Strassman proposed to start off with a randomized double-blind dose-response study. He stuck to the unwritten rules proposing to study DMT as a “drug of abuse” (not a “spirit molecule”) and to focus on its pharmacology instead of psychotherapeutic applications (which would suggest that there is a benefit in taking an illegal drug). He was backed by Daniel Freedman, one of the most powerful figures in American psychiatry at the time (former president of the American Psychiatric Association and editor of the highly prestigious psychiatric journal *Archives of General Psychiatry*) who had conducted LSD research himself in the 1950s and 1960s. Despite the damaged reputation of hallucinogens Strassman’s colleagues at the medical school also turned out to be supportive of his psychedelic research project.

In 1988, Strassman submitted a research protocol to the Human Research Ethics Committee at the University of New Mexico. In the first phase of hallucinogen research, ethics committees had not played a major role yet. Their emergence was part of the establishment and expansion of many new technologies and institutions of social regulation in the 1960s described above. In 1964, the World Medical Association issued the Declaration of Helsinki to enforce the protection of human subjects taking part in scientific research. The

⁶⁷ Ibid., 68. See also p. xvii.

declaration demanded that the risks were to be fully disclosed and balanced by potential benefits, participation in research had to be voluntary, and subjects had to be granted the right to opt out of the experiment at any time without penalty. The practical implementation of these ethical principles was assigned to ethics committees or Institutional Review Boards (IRB), which, from 1966 onward, had to review all research involving human subjects in the United States. These peer-review committees were subjected to detailed regulations by the Federal government. Next to more centralized forms of power (i.e., the rule of law and policies put into practice by the FDA and other government agencies), IRBs allowed the new regulatory regime to infiltrate research facilities by implanting local techniques of self-monitoring and internal control. Being situated within the institution doing the research they are (at least in part) composed of fellow researchers. Their purpose is to approve study designs, to evaluate the trial's progress, and to make sure that test persons are appropriately informed, put at a minimal risk, and that their privacy is protected.⁶⁸ The underlying idea is to enable scientists to check up on themselves by assigning the roles of auditors and auditees among the members of the institution or scientific community.⁶⁹ Such an autonomous self-regulating apparatus is meant to guarantee, but also to shape and delimit the freedom of science.

The ethics committee at the University of New Mexico asked Strassman for a number of precautionary measures. Volunteers had to be screened

⁶⁸ Rothman, *Strangers at the Bedside*, 85-100.

⁶⁹ Marilyn Strathern, "Introduction: new accountabilities," in *Audit Cultures: Anthropological studies in accountability, ethics and the academy*, ed. Marilyn Strathern (London: Routledge, 2000).

medically and psychologically to minimize the risk of serious adverse reactions such as panic attacks or psychotic breakdowns. Only experienced users of psychedelic drugs could be recruited. Since confession of a felony—having taken illegal drugs before—was required to enroll in the study confidentiality and the protection of test subject's anonymity had to be guaranteed. It was assumed that experienced users would be better prepared to deal with the disorienting and potentially frightening effects of DMT. Additionally, they could not sue Strassman or the university claiming that they began using psychedelics because of their participation in the study.

Considering that the effects of hallucinogens are said to be molded by the subject's internal state and expectations and the environment in which the drug experience takes place it was inevitable that this rigid regulatory framework also impacted the results of Strassman's study. Even though the first study was supposed to determine which psychological and physical effects DMT had at different doses the informed consent form had to anticipate the results of the experiment. To make a well-informed decision about her participation in the experiment the test subject had to be told and countersign what drug effects to expect.

I understand that the primary effects of this drug are psychological. Visual and/or auditory hallucinations or other perceptual distortions may occur. My sense of time may be altered (short lengths of time passing slowly or vice versa). I may experience very powerful emotions, pleasurable or unpleasant. Opposite feelings or thoughts may be experienced at the same time. I may be extremely sensitive and aware of the environment; on the other hand, I may not notice anything at all

in the environment. It may feel like my body and mind have separated. Feelings of impending or actual death or confusion might occur.⁷⁰

Needless to say that in a state of heightened suggestibility as induced by hallucinogenic drugs all these phenomena indeed were experienced by test subjects.

The ethics committee also demanded that Strassman's experiments with psychedelic drugs took place within the confines of the hospital. Participants' experiences were flavored by the sterile aesthetics of a hospital ward with its smells of disinfectants and medication. Sessions were occasionally disturbed by hospital service personnel bursting into the experimental room. Therefore, Strassman asked to switch to one of several university-owned houses in the vicinity of the hospital.

However, the Human Research Ethics Committee, many of whose current members were not familiar with our research, was not comfortable with the safety issues off-site studies might raise. They wanted to make sure that security guards were close at hand to manage any volunteers who might act dangerously, and they wanted us to keep studies in the more contained hospital. As is so often the case, their fears led to exactly the outcome they hoped to avoid.⁷¹

When one of Strassman's test subjects suffered from a paranoid episode and managed to flee from the hospital he blamed her reaction on the restrictions set up by the ethics committee. Again the regulatory apparatus not only constituted the external conditions of Strassman's research, but also entered into the outcome of his experiments by affecting the test subjects' experiences.

⁷⁰ Strassman, *DMT*, 102-103.

⁷¹ *Ibid.*, 284.

Of course, the ethics committee of his university was not the only regulatory body Strassman had to deal with. He also had to gain approval from the FDA to use an investigational drug and from the Drug Enforcement Agency because DMT was a Schedule I drug. The DEA had to decide whether Strassman would be allowed to possess the otherwise illegal substance by granting him a Schedule I permit. It did eventually—based on the precondition that the DMT would be stored in a locked freezer in a locked narcotic vault in the hospital pharmacy. Strassman would not have a key to the freezer and was accountable for its contents (by way of meticulous record keeping).⁷² The FDA, on the other hand, had to decide whether it was safe and worthwhile to give DMT to human research volunteers. This process was greatly complicated by the fact that DMT was not readily available. Strassman contacted various pharmaceutical companies. But they were either unwilling to provide all the information about the manufacturing process required by the FDA arguing that it was a trade secret, or refused the liability for human use of their product fearing lawsuits. Or they demanded outrageous sums (up to \$50,000) covering their insurance as well as the uneconomical production of small quantities of an obscure drug. Finally, David Nichols, a professor of medicinal chemistry and pharmacology at Purdue University in Indiana offered to synthesize the necessary amount of DMT for \$300 and the FDA agreed. In November 1990, two years after the application

⁷² Ibid., 106-108.

process had begun, Strassman received the go-ahead for what he conceived of as the first hallucinogen study in more than two decades.⁷³

The Heffter Research Institute

At the LSD Symposium in 2006, David Nichols presents The Heffter Research Institute to the assembled psychedelic community:

I began my career in 1969 concentrating on research on psychedelics and it has been a major focus of my life ever since. Albert, thank you! My life would be very different had LSD not been discovered. And certainly less interesting and colorful. After I got my Ph.D. in 1973 I started thinking about the fact that clinical research had stopped. I thought this was really too bad. I would go to scientific meetings and share beers with colleagues saying: “You know, there should be *clinical* research.” And they would say: “No, no, you can’t do it.” And I would say: “Well, you can do it. You can’t get the government to pay for it, but you need private money.” Around 1990, I would sit telling the same story to someone and I thought: “Dave, you gonna be 90 years old sitting in a rocking chair telling the same story.” So I decided to start The Heffter Research Institute.

Holding a Schedule I permit Nichols had pursued his scientific interest in hallucinogens continuously since the late 1960s. In his laboratory, he synthesized a range of new substances and tried them out on animals. As a well-respected chemistry professor abstaining from human research he never experienced any difficulties with government agencies—even after the illegalization of hallucinogens. He was one of the people in the background providing advice as well as moral and practical support when Strassman prepared his clinical study. When Strassman got approval to giving a hallucinogen as powerful as DMT to humans it seemed as if there could be no

⁷³ Ibid., 108-118.

fundamental obstacles to administering other psychedelic drugs as well. Thus, together with Strassman, Mark Geyer, Charles Grob, Dennis McKenna, and George Greer, Nichols founded The Heffter Research Institute in 1993. Heffter is a virtual institution that comprises laboratories located at various universities enabling them to study psychedelics independent of government funding. In their mission statement, the founders evoke the sense of a new era about to dawn: “We are at a historic moment. Old social orders are rapidly changing. Economic powers are restructuring for the future. There is widespread popular interest in the brain and the mind as never before. Interest in research with psychedelics seems to be growing, and yet organized financial support for this work is on the wane. The Heffter Research Institute is uniquely poised to be THE key player in the revival of psychedelic research.”⁷⁴ Nichols and his allies point out that “[t]he current political and intellectual climate offers new opportunities to reopen avenues of research that have been extremely difficult, if not impossible, to pursue in the past within conventional frameworks.”

The most important change in intellectual climate they refer to was the enormous public attention attracted by the neurosciences. The year Strassman began his DMT study “founded on cutting-edge brain science,” as he wrote, US president George H. W. Bush announced the 1990s as the “Decade of the Brain.”⁷⁵ This was the opening the Heffter founders had long been hoping for. They did not hesitate to climb onto the bandwagon.

⁷⁴ Heffter Research Institute, *Research at the Frontiers of the Mind. Case for Support* (N.D.), 1.

⁷⁵ George H. W. Bush, *Presidential Proclamation 6158* (18 July 1990 [cited]); available from <http://www.loc.gov/loc/brain/proclaim.html>.

Psychedelics have the unique ability to transform fundamentally the very functions that we consider uniquely human: the way we think, feel, communicate, and solve problems. They shift our cognitive and symbolic capacities, our aesthetic sensibilities, and our linguistic and imaginative abilities; the very kinds of brain functions that constitute the fabric of what we experience as mind. Because psychedelic agents are similar to natural substances already present in the brain, the careful study of their effects upon brain function and behavior provides access to primary states of brain and mind and the connections between them. For these reasons, research with psychedelic substances offers an unparalleled opportunity for understanding the relationship of mind to brain in ways not possible using other methods.⁷⁶

Finally, things seemed to start moving again. In 1993, the Heffter Research Institute was founded and the psychiatrist Charles Grob conducted a study on the ritual use of ayahuasca (a psychoactive tea containing DMT) by the Brazilian syncretic church União do Vegetal. 1993 was also the fiftieth anniversary of Hofmann's discovery of LSD. To mark the occasion an academic conference entitled "50 Years of LSD" was organized by the Swiss Academy of Medical Sciences (and sponsored by Sandoz and the Swiss Federal Office of Public Health) in Lugano-Agno, Switzerland. This was the first encounter of the new generation of American and European hallucinogen researchers. When David Nichols, Mark Geyer, and Rick Strassman attended the conference they met the psychiatric research group around Leo Hermle. Hermle and his colleagues Manfred Spitzer and Euphrosyne Gouzoulis-Mayfrank had just reanimated hallucinogen research in Germany when Strassman was working toward the same goal in the United States. Soon Geyer's lab in San Diego would begin to cooperate with Gouzoulis-Mayfrank intermittently. Yet a second contact

⁷⁶ Heffter Research Institute, *Research at the Frontiers of the Mind*, 1.

would turn out to have even greater bearing on the future of Heffter. At Lugano, Nichols and Geyer also got to know Franz Vollenweider, a young Swiss researcher who had begun to build up a laboratory at the Psychiatric University Hospital in Zurich conducting neuroimaging studies on the effects of psilocybin. Nichols remembers that they immediately realized that Vollenweider was “very bright” and “promising” (even though “a bit scrambled”). However, in Vollenweider they not only saw a highly talented young neuroscientist with a passionate interest in psychedelic drugs, but also a potential collaborator who had access to neuroimaging technologies none of their allies in the United States had at their disposal. Even more importantly, Vollenweider was based in Switzerland, a country with a significantly more permissive drug policy and regulatory regime. Hence, the representatives of the Heffter Research Institute were eager to work with him. Despite the optimism they were spreading when addressing potential donors they still felt distressed about the resistance against psychedelic research in America. After all, Strassman’s study had only been approved of after two years of struggling with various regulatory bodies. Geyer recalls: “After meeting Franz and setting up the collaboration I first told the Heffter people about this: There is actual research going on in Europe! What we had been frustrated about getting going in the US was happening in Germany and Switzerland.”

The fact that Vollenweider could conduct clinical research in Zurich became even more important when Strassman left Heffter. Strassman had been the only one who had a clinical laboratory in an academic setting. But he got

increasingly dissatisfied with his work. He resented the restrictions imposed by the ethics committee and the pressure to stick to the biomedical model, in which the mechanisms were more important than the psychedelic experience.⁷⁷ Having pushed through the clinical study lending so much credibility to Heffter's enterprise Strassman also refused to acknowledge Nichols as the president of the organization. Claiming a leadership role for himself he expected his colleagues to join him in New Mexico to build up a center for psychedelic studies. But they refused. Strassman complained: "It was easier to talk about the transformative value of the psychedelic experience than it was to put into practice some of its contents. My colleagues may have had inspiring experiences, but they were not committed to goals that required work and sacrifice." Or, as Geyer puts it: "Despite experiences with these compounds people still had egos to contend with." Eventually, Strassman resigned from his academic position, withdrew from Heffter, and took up weaving Churro fleeces as well as studying Hebrew texts in an attempt to further understand the role of endogenous DMT. In 1996, the Heffter Research Institute integrated Vollenweider's lab *Neuropsychopharmacology and Brain Imaging* as a new site to conduct clinical studies in Switzerland.

The Swiss Advantage of Location

On the second day of the LSD Symposium, approximately 150 demonstrators have gathered in front of the Basel Convention Center to protest against the conference. "LSD—killer drug! LSD—killer drug!," they chant. The protesters

⁷⁷ For a full account of the difficulties Strassman encountered, see Strassman, *DMT*, 278-293.

belong to the Citizens' Commission on Human Rights Switzerland, an organization co-founded by the Church of Scientology, which is known for its antipsychiatric activism. They hand out flyers ("LSD—The Cruel Time Bomb") accusing psychiatrists—many of whom allegedly have come together in the conference building—of giving LSD to their patients worsening their psychiatric condition in order to maintain power over them. Indeed, at the same time, one of those psychiatrists administering hallucinogenic drugs (although not LSD) to healthy volunteers (not patients) is giving a workshop inside. Franz Vollenweider and his collaborator Felix Hasler are talking about "Preconditions for Work with Hallucinogens in Switzerland." They mostly explain the regulatory framework of their research to a lay audience. During the question and answer period one listener asks: "The research you're doing is relatively controversial and I could imagine that you encounter some rough resistance. Where does this resistance come from? Colleagues? Pseudo-religious groups? Politicians? And how do you deal with it?" Vollenweider's answer is surprising:

We have done about 50 studies and examined 600 to 700 people, but I haven't experienced any resistance so far. Once there was criticism from the USA because of an MDMA study we did. They claimed that our doses came close to those given to animals and that this might be dangerous. We checked this meticulously, but our doses were significantly lower than those used in animal models where MDMA is suspected to be toxic. That was the only discussion I had with American colleagues and such disagreements are argued out on conferences. But, interestingly, we have never had any problems here in Switzerland. If there is resistance, it comes from psychiatry insofar as we are seen to be doing too much biology. People always want psychological models. But, of course, doing psychology without biology is nonsense. Psychology is a brain function and the brain is a function of the psyche. It's a vicious circle. This

kind of prattle can be ignored. If someone is still a dualist today, he is behind the times.

Considering the intense politicization of psychedelic drugs in the United States and the regulatory hurdles Strassman had to overcome Vollenweider's assertion that he has never encountered any resistance is astonishing. However, against the background of the liberal Swiss drug policy at large the relative ease with which Vollenweider has been able to pursue his research seems to fit into a broader pattern. The needle-exchange services and heroin-assisted addiction treatment, the drug-checking projects (monitoring the quality of illicit substances on the black market), and the cannabis and so-called smart shops (which, until recently, sold cannabis products and various designer drugs more or less openly) indicate an attitude toward drugs very different from that prevailing in the United States. But what are the exact conditions making these related phenomena possible? Do we have to content ourselves with the impression that "Swiss culture" is more tolerant toward drug use or is a more specific analysis feasible?

Historically, the special development of Swiss drug policy dates back to the early twentieth century when the United States began its attempts at internationalizing its own drug policy. Especially, the problems and conflicts caused by the global trade in opium led to the emergence of drug control as an issue of international concern. In 1912, the Hague Opium Convention was passed as the first international drug policy treaty and the cause was subsequently adopted by the League of Nations. However, Switzerland refused to enter into the convention. In part, this might be explained by the nation's long-

standing reservations toward international involvements.⁷⁸ But a more tangible reason were the economic interests of the Swiss pharmaceutical industry, which served as one of the world's biggest suppliers of heroin. In fact, most manufacturing states with strong pharmaceutical sectors such as Germany, France, Great Britain, and the Netherlands opposed international regulations at the time.⁷⁹ The successful lobbying of companies prevented Switzerland from ratifying the Hague Opium Convention until 1925 when the Swiss government finally gave in to massive international pressure from the USA and the League of Nations.⁸⁰ Although Switzerland did not become a member of the United Nations until 2002, it also joined the UN Single Convention on Narcotic Drugs in 1961 and the Convention on Psychotropic Substances in 1971. The latter was presented as ushering in a new age in drug control and included the international illegalization of hallucinogens. However, in his study of the history of international drug regulations, William McAllister claims that the 1971 convention was based on double standards: "The treaty placed hallucinogens under fairly stringent controls, but applied considerable weaker limitations to the trade in much more widely used (and profitable) substances such as stimulants and depressants."⁸¹

⁷⁸ Cf. Andreas Suter, "Neutralität. Prinzip, Praxis und Geschichtsbewußtsein," in *Eine kleine Geschichte der Schweiz. Der Bundesstaat und seine Traditionen*, ed. Manfred Hettling, et al. (Frankfurt/M.: Suhrkamp, 1998).

⁷⁹ William McAllister, *Drug Diplomacy in the Twentieth Century. An International History* (New York: Routledge, 2000).

⁸⁰ Jakob Tanner, "Rauschgiftgefahr und Revolutionstrauma. Drogenkonsum und Betäubungsmittelgesetzgebung in der Schweiz der 1920er Jahre " in *Schweiz im Wandel. Studien zur neueren Gesellschaftsgeschichte*, ed. Sebastian Brändli (Basel: 1990).

⁸¹ McAllister, *Drug Diplomacy*, 234.

The gradual surrender of Swiss neutrality in the US-driven War on Drugs, which led to the adoption of this new regime, occurred reluctantly. The Swiss historian Jakob Tanner remarks:

Generally, one can say that the power of the United States to define what is and what is not a drug has been crucial. Especially, the Single Convention in 1961, which replaced or abolished almost all previous agreements carries a very characteristic trademark. I think that it wouldn't have occurred to Switzerland to prohibit opiates. Probably, one would have continued to manage this by way of laws regulating the manufacture and distribution of medicines [Arzneimittelverordnungen] as it had been done before the Narcotics Law was enacted.”⁸²

But, however grudgingly, Switzerland eventually did join the international community in adopting a more repressive drug policy. As elsewhere the illegalization of hallucinogenic drugs seriously hampered their scientific investigation even though half a dozen researchers continued to work in the field.⁸³

A second and more momentous parallel to the development in the United States was the exacerbation of the “drug problem” despite of (or maybe: because of) these repressive measures. Paradoxically, the availability and consumption of cocaine increased as the American drug war grew fiercer during the 1980s.⁸⁴ In the meantime, more and more Swiss citizens became addicted to heroin. However, in Switzerland repression did take effect on the price level of the black market. The artificial scarcity of heroin produced by police operations made the drug significantly more expensive. A medical psychologist who had worked in a

⁸² Quoted in: Vannini and Venturini, *Halluzinogene*, 264-265 (my translation—NL).

⁸³ Ibid., 285-305.

⁸⁴ Davenport-Hines, *The Pursuit of Oblivion*, 338-383.

heroin clinic at the time told me that, at the beginning of the 1980s, a Swiss junkie had to raise approximately 600 francs per day to pay for the drugs he needed. As a result the crime rate was skyrocketing. Another informant now involved in a harm reduction project concerning party drugs such as Ecstasy remembered: “Every other week, I had to go to Letten [a place around a former railway station where the Zurich heroin scene met] to get back my bike in exchange for a bottle of codeine cough syrup.”⁸⁵ Soon, political pressure began to mount as more and more citizens were affected by thefts, robbery, and the public display of abject misery in the neat streets of Zurich and Berne.

The United States responded to the “failure” of their War on Drugs by stepping up their efforts.⁸⁶ They imprisoned even more drug users at home and reinforced their police and military operations in those countries where most of the drugs that Americans consumed were produced. The Swiss decided on an almost antithetical response to the problem: They “liberalized” the black market. Following the principles of classical laissez-faire liberalism they tolerated drug trade in a confined area in Zurich (Platzspitz, also known as Needle Park) from the mid 1980s onwards. Heroin and most other substances that were sold there were still illegal and the police closely monitored what was going on, but by and large they stopped interfering if it was not absolutely necessary. Consequentially, the prices fell. At the end of the 1980s, a junkie could get by on 60 francs—a

⁸⁵ Codeine is a widely abused opiate that is legally available in cough syrups.

⁸⁶ Following Michel Foucault’s account of the alleged failure of the prison system to correct the deviancy of its inmates, one might wonder whether the failure to reduce drug consumption has to be seen as a failure of the War on Drugs per se or whether its effects could not be interpreted as also aiming at the proliferation of delinquency entangling subjects in pervasive power relations. Cf. Foucault, *Discipline and Punish: The Birth of the Prison*, 257-292.

tenth of the costs at the beginning of the decade. The downside of the non-intervention of the police was that it created a space of lawlessness, in which warring gangs were competing ruthlessly for their share of the black market. In 1990, the police terminated this collective experiment as gang warfare got out of hand while the number of heroin users continued to rise.

It was just a matter of time until the rate of crimes affecting ordinary citizens would start rising again. The number of heroin addicts was still going up and, in the meanwhile, the AIDS epidemic had hit spreading rapidly among heroin addicts sharing needles. The fact that many of them worked as prostitutes also threatened the Swiss population at large. There was a sense of urgency. At the beginning of the 1990s, the Swiss Federal Office of Public Health (SFOPH) began looking into the possibility of giving heroin to heroin addicts under medical supervision—like insulin to diabetics. In 1993, the Swiss government decided that the open drug scenes had to be closed down by November and that state-run heroin programs had to start on January 1st, 1994.

In the late 1980s and early 1990s, the civil servants at SFOPH were also struggling with a very different drug-related problem. A group of physicians called Swiss Association for Psycholytic Therapy (SAPT) [*Schweizer Ärztegesellschaft für psycholytische Therapie*] had asked for permission to use LSD, psilocybin, and MDMA for psychotherapeutic purposes. In 1988, they received a special permit to administer these controlled substances to patients. But this exemption remained problematic. In 1989, a new government official took over the Department of Pharmacy at SFOPH where he was in charge of both the logistics

of the heroin program and scientific applications of hallucinogenic drugs. After initial skepticism, Paul J. Dietschy approved of both. Neither the United States trying to form a united front in their War on Drugs nor the United Nations Organization advocating a similarly repressive stance were pleased about the Swiss pull out of the internationally established hard line on the use of controlled substances. Dietschy who also served as the representative of Switzerland on the International Narcotics Control Board, the Commission of Narcotic Drugs, and the Commission Pompidou of the Council of Europe had to bear the brunt of international criticism. However, when Claudio Vannini and Maurizio Venturini interviewed him for their history of Swiss hallucinogen research Dietschy stressed the importance of the research he had approved of for Switzerland.

In the international research community, our experiments with heroin or hallucinogens have aroused much interest. In the past, the Americans were at the forefront of this area. But then their government did not approve of such research anymore for political reasons. (This attitude has recently begun to change again.) Switzerland is one of the few countries, in which such experiments are possible at all. Politically, our experiments provoke much skepticism [on the international level]. This is not voiced publicly, but has been articulated repeatedly in discussions with us. [...] Apart from that, the international treaties leave a lot of freedom to the member states as to the conduct in one's own country as long as the interests of other countries are not affected. This freedom must be used for the benefit of Switzerland.⁸⁷

This government support has contributed significantly to the Swiss advantage of location for hallucinogen research making Vollenweider such an interesting collaborator in the eyes of his American colleagues. Since I have come across Dietschy's statement I have begun to wonder what the relationship

⁸⁷ Quoted in: Vannini and Venturini, *Halluzinogene*, 269 (my translation—NL).

between the Swiss government's endorsement of hallucinogen research and the Swiss heroin program was. Was there an underlying policy, a comprehensive plan? To find out I contact Dietschy. At the time of my fieldwork, he is not at the Swiss Federal Office of Public Health anymore. He has moved to Swissmedic, a new government agency regulating medicines, but no controlled substances.⁸⁸ To answer my questions Dietschy invites me to Swissmedic in Berne.

Paul Dietschy turns out to be an authoritative man in his fifties with a long moustache wearing a dark grey suit, white shirt, and a paisley silk tie. We meet in one of the conference halls of the new Swissmedic building. Glass walls separating the room from a foyer indicate transparency. Dietschy has invited a second person to our conversation: a tall bearded man of about the same age, but more casually dressed in a grey shirt and sweater. Rudolf Brenneisen is a professor of pharmaceutical sciences at the University of Berne. The careers of Dietschy and Brenneisen have been closely entwined. During the turbulent years of Swiss drug policy reform Brenneisen became Dietschy's closest scientific ally. He did most of the basic science research Dietschy needed to back up his administrative decisions. For Brenneisen this was the chance of his life. The cooperation with the Swiss government has allowed him to become one of the senior figures in drug research. Together Brenneisen and Dietschy shaped one of the most eventful episodes in the history of drug policy. Now they want their story to be recorded.

⁸⁸ Swissmedic was founded in 2002 to shift the control of medicines from the Swiss cantons (i.e., the states of the Swiss Confederation) to a federal agency establishing a nationally uniform regulatory regime.

PJD: I was trained as a pharmacist. For ten years, I worked as cantonal and hospital pharmacist, half civil servant, half hospital apothecary, that is. In 1989, I joined the Swiss Federal Office of Public Health in Berne where I took over the Department of Pharmacy. Back then, it comprised a narcotics lab and a narcotics section alongside the pharmacopeia and a few other things. Today, we need to talk about two different issues. The first one is psycholytic research, the second one is heroin. That's not the same. There are a number of connections, but not very many. Subsequently, I was responsible for the whole logistics of the heroin trials. To put it casually: For a while, I was the greatest heroin dealer of Switzerland.

RB: How did I get involved in drug research? I have to go back to the year 1979. One day, the police turned up at the doorstep of my institute. I grew up at the Institute of Pharmaceutics at the University of Berne where I did my Ph.D. in natural products chemistry. In 1979, I became senior research associate [*Oberassistent*]. At that time, the police stopped by with some plants, which turned out to be cannabis plants. Nobody knew exactly what was in there and especially how much. That was my first contact to the Swiss Federal Office of Public Health. There was a need for quality control of Swiss cannabis materials. Hence, the SFOPH and the Chief Federal Prosecutor together asked us to do a screening. That is how I stumbled into this field. Beforehand, I had not been interested in psychotropic drugs. We collaborated very intensively with the narcotics lab at SFOPH, which still existed at the time. This gave rise to the idea to go beyond mere provision of services to the police and to do proper research as well. This was the beginning of a very enjoyable and fruitful cooperation. Of course, we tried to get as much funding as possible from SFOPH. Such sponsors were very important for us. Then I was directly promoted from senior research associate to chair. This has never happened again and was due to a particular situation in the department. This put me under pressure with respect to research and I decided to go into psychotropic drug research and to force this. The department and SFOPH with their enormous good will constituted the infrastructure on my side. This was a privilege, which we wanted to make use of. We weren't allowed to do as we pleased—later on, the human trials were added, which is another

important point—but, at first, it was analytic work in the laboratory that was ethically not problematic.

PJD: These are still the preliminaries to hallucinogen research. I would like to add: Historically, when the Narcotics Law was passed in 1951 it was a law to control medically applied narcotics. At the time, addiction or dependency did not yet exist as a political problem. For that reason, this area was not assigned to the physician, but to the pharmacist at the Swiss Federal Office of Public Health, i.e. to myself. I was also the representative of Switzerland in international drug organizations such as the International Narcotics Control Board, the Commission of Narcotic Drugs, and the Groupe Pompidou, i.e. the drug organization of the European Council. Hence, there was a national and an international component.

When I started my job in 1989, there was a medical association for psycholytic therapy, which wanted to do research on patients with LSD, Ecstasy, and psilocybin. As these substances are prohibited the Swiss Association for Psycholytic Therapy (SAPT) had to get a federal license according to Article 8, paragraph 5 of the Narcotics Law. Hence, they asked the Federal Office whether they could do research. My predecessor Dr. Jean-Pierre Bertschinger and the then director kept putting this off. It wasn't quite clear how to deal with it. Nobody had any experience in Europe. What did one have to take into account? Thus there was a vacuum and the response was continuously postponed. But then this medical association complained to the minister in charge. He gave brief directions to the Federal Office: No matter what, but come to a decision! In 1987 or 1988, the SAPT was given authorization without further requirements. When a renewal was due in 1989, my then chief of staff came up to me and told me where to sign. I glanced over the document and asked: "Where is the approval of the ethics commission?" And he said: "The ethics what?" At this point in time, ethics commissions were only just being introduced into human trials in Switzerland. This was pushed by the Swiss Academy of Medical Sciences. The state didn't care yet. Only ten years later, it regulated these issues on the level of laws and decrees. Shortly after I begun my job, I had a meeting with this group of physicians and I told them: "Hey, the ethics commission is missing and I can't see a neat study design. I want to see more." This provoked a conflict. They said: "You have just given us approval and you didn't specify any conditions. Now this new prig comes along and wants to change everything." We were about to tell

them that they could only finish off their current patients when the Baumann case occurred. One of the psycholytic doctors acted in defiance of the regulations and then we successively put the screws on.

NL: That was the Ibogaine story?

PJD: Even before that, in the trials with the authorized substances, Baumann did not stick to the rules and requirements. We had to tell him several times: "You need to do this and that and the cantonal authorities in charge of these trials must be informed." Baumann did his sessions in remote lodges, in a different canton and without supervision.

RB: But that was in France!

PJD: No, not with the other substances.

RB: But the death occurred in France.

PJD: Yes, I'm getting there. We successively put the screws on. And then he used Ibogaine. At the time, it was not yet classified as a narcotic. All he would have needed was a cantonal approval for an ordinary clinical trial. But he tested it in France and his patient died.

RB: A textbook accident! You can read this anywhere: People with a cardiovascular predisposition, with risk factors must not take Ibogaine and this is exactly what happened. Faraway from any emergency room.

PJD: Yes, yes, an elementary mistake! The woman had not been examined. The session took place in a far off hut. By the time, the ambulance arrived she was dead. There were no reanimation devices. Nothing! We learnt about this accidentally and in a roundabout way. He told the relatives that she had died of a heart attack and asked them whether he should arrange for her body to be returned to Switzerland for a lot of money or whether he should burn her and bring them the ashes. But the French prosecution confiscated the corpse. Consequentially, we immediately withdrew all approvals from him and that medical association. We stopped everything. In the beginning, it wasn't clear at all that it had been Ibogaine. Only after the dissection, this became apparent. As we had seen some good results with LSD and Ecstasy we then said: "Okay, the other four therapists are allowed to complete the experiment with their patients, but then it's over." They complained that this was unfair. "Because one of our colleagues did something stupid we are all being punished now!" We told them:

“No, that’s not true. In principle, we are not opposed to this kind of research as it has a great potential to treat severe mental disorders. But, in the future, we will only approve of applications that are *lege artis*, that is: clear clinical design, approval from an ethics commission, etc.

RB: The ones who suffered were the patients in the ongoing program, of course. This was a catastrophe for these psychiatrically at times severely impaired people. The affair caused quite a stir in the media.

But I would like to take one step back and explain why MDMA had become interesting to us and how we got the job of supporting the project pharmaceutically—the LSD project as well, by the way. In the case of LSD, the drug was invented in Switzerland and there was a link, there still is a link as the LSD Symposium in Basel demonstrated recently. The Swiss Association for Psycholytic Therapy has become very active again. One approval is currently under consideration. These are all admirers, disciples, and students of Albert Hofmann. At this point, Hofmann was a supporter of such research programs and until today he asserts vehemently that the therapeutic administration of these substances makes a lot of sense if they are applied correctly.

Back then there was a pharmaceutical problem in procuring these drugs. Sandoz was not capable or willing to supply these substances anymore. How do we get the material? At the time, MDMA was just about to turn up in techno clubs. But we were not allowed to use material from the black market as Good Manufacturing Practice (GMP) was already in place. Therefore, it was our job to get hold of these substances. It happened that there was already some MDMA research in the context of one Ph.D. thesis. In the early 1980s, this cannabis screening had made us curious what else there was in Switzerland. There were the wild hallucinogenic mushrooms, *Psilocybe semilanceata*, which we examined. Nobody knew how much psilocybin was in there. That was a nice piece of work. There was also *Lophophora*, which was freely available. We analyzed how much mescaline these cacti contained. And then MDMA came up. This was the pharmaceutical situation at the outset. Then the SAPT said: Isn’t there someone in Berne? I don’t want to take center stage but, of course, they knew that there was someone working with these drugs analytically, in the laboratory—not clinically. We didn’t want to do that and we weren’t allowed to.

That's how I was pushed into this role and this was a very pleasant development for us as far as research was concerned.

PJD: I have to add: After that death, we had more problems with other SAPT physicians. I can't give away the name because this part of the story has never been made public. But there were people in the clinical trials suffering from severe depression—probably their serotonin supplies had been depleted. Exactly the opposite of what one had aimed at had happened. They suffered from a massive aggravation of the disease. They were not, as they told us, taken care of. The doctor just pushed them aside because it didn't fit into his preconceptions. An investigation against another of these physicians with respect to a different cause was underway. Therefore, we became very reserved. We felt that there was a lack of scientific seriousness. They were freaks who thought: "Here, we get a chance to do something and to make our mark." To some extent, my impression was: They don't want to stick to the rules. As I was the one in charge we sat down together and I said: "Not 'no' in principle—the first experiences and data which I got from you [RB] indicated that these therapies might be a good thing—but from now on the precondition is strict adherence to the rules!" They changed their board and the president and the association became more serious. I also told them: "You private practitioners won't make it on your own! Cooperate with a psychiatric university hospital to establish the scientific basis for neat clinical trials." We gave them some names of people and institutions they could contact. But in three or four years they didn't manage to turn in an application for another trial complying with clinical norms.

RB: This was the point. A couple of freaks. It still counts as a medical blunder if the psychiatrist doesn't know the drug he is administering, if he hasn't had the experience, if he hasn't tested the drug on himself. That is still the case. It's an open secret. The character of these studies was partially responsible for the negative image and the lack of scientificity. Then they made an effort to collaborate with a university, back then with us, and thereby we gained access to biological samples, i.e. blood samples. One didn't know anything about MDMA. This was a critical situation. One uses a substance and doesn't even know its normal metabolism.

NL: Would that still be possible today?

PJD: No.

RB: For us, this was an enormous scientific opportunity, but we were also entering unknown territory.

PJD: This was around 1990. State regulations of clinical trials were only established five years later. We were in a field that was just emerging. As I said, there was only a recommendation from the Swiss Academy of Medical Sciences with respect to ethical issues. The wording of Article 8 of the Narcotics Law dealing with prohibited substances was actually rather open—with the exception of cannabis. The Federal Office for Public Health could grant special permits for prohibited substances: for scientific research, narcotics controls, and limited medical applications. A completely open wording. That provided us with latitude, which we don't have anymore today.

NL: If the requirements were so lenient in Switzerland around 1990 that one could work clinically with substances for which there wasn't even a solid toxicology it seems to me that these regulations came extremely late in comparison to the United States. The Americans tightened their regulations after the thalidomide scandal at the latest. But even before that there had been a process of gradually putting the screws on in response to a series of drug scandals. Why did Switzerland introduce these restrictions so late? Hadn't there been scandals like those in the US?

PJD: Part of the answer is that before the foundation of Swissmedic drug regulation was organized cantonally. Only matters that were affected by international treaties such as the Narcotics Law were dealt with on the federal level because the cantons had no international authority. Some cantons were stricter and others were more permissive. Not until the mid 1990s did the intercantonal control agency coordinating cantonal regulations issue guidelines for clinical trials. Hence, at the Swiss Federal Office of Public Health, we were only responsible for a very small subsection of drugs: illegal narcotics. If you did research with legal narcotics the goal was to develop a medicament. Then you didn't need approval from us, but from the cantons. The law only determined that prohibited substances need to be handled by the Federal Office of Public Health. This was less than 1% of the whole research. We had zero experience with this. Apart from England, there was no research on illicit drugs in Europe, which could have

served as a foundation. I was a civil servant who actually had nothing to do with research. My task was a very different one. But I always got applications for research projects. I was in the situation that I constantly had to face problems, for which I couldn't find an answer anywhere.

RB: In defense of the SFOPH's honor it ought to be said that there was toxicity data on MDMA and also on LSD. After all, it had been developed by Sandoz. One didn't have to reinvent the wheel. The authorities definitely weren't that negligent. We examined blood levels, C max, D max, etc. because the pharmacokinetics was unknown. The psychiatric experiments in Basel allowed us to gain access to samples collected under controlled conditions. Beforehand, there had been forensic trials, but they hadn't been very serious and controlled. This was the first time that someone was allowed to study the MDMA metabolism under controlled conditions, not under street conditions.

PJD: Yes, you never had problems getting approvals from us. In your case, everything was granted that was not granted on the other side.

RB: But only due to the partnership with these physicians this became very uncomplicated—which is not to say: unethical. It was a real privilege and the basis for further research.

PJD: And then Vollenweider came. To me he had been a completely unknown figure until then. He proposed to me to test it on humans. The application was scientifically perfectly neat and correct—I've rarely seen such a solid documentation. The SFOPH waved this through relatively quickly and to a certain extent we also supported his research because it was an important part of the puzzle for us to be able to decide later on whether to test these drugs in humans again. This is how Vollenweider got involved and I have to say that I have always only seen top-quality work from him. Few researchers—you [RB] and Vollenweider among them—never had any problems with us as regards approvals. The SFOPH also supported him financially. These were the days. Today, Swissmedic doesn't have research funds anymore. Back then we had budgets for international projects and for research.

RB: It was an enormous privilege to have authorities that massively supported research. I admit: For me this was *the* chance of my academic career. And I sell

myself like that until today. Without the politics and the research support of SFOPH, financially and ideationally, this would not have been possible.

PJD: These were the good old times. One could decide relatively spontaneously. When you saw a new problem you thought: “Hah, exciting! How do we approach this? What are the issues? Who is interested in this? Is there scientific literature?”

RB: For us pharmaceuticals freaks this was quite a challenge: LSD was not commercially available anymore. Sandoz was not willing to deliver it. How do you get pharmaceutically pure and GMP-produced LSD? Even though back then GMP wasn't what it is today. It was our job to get hold of LSD. We eventually synthesized it, not from scratch, but by chemically modifying ergotamine, a commercially available drug. Thereby, we arrived at 99.9% pure LSD. And Albert Hofmann, I remember that very well, tested it and said that this was the best LSD he had ever had. Scientifically, there wasn't anything to gain from this. It wasn't new—these variants of LSD synthesis had been published before—but it allowed us to get access to these people.

PJD: We can bring the SAPT story to a close now. Maybe two final reminiscences. Reminiscence 1: I left SFOPH in 2001 and gave up these responsibilities. Until then, SAPT did not get any approval anymore. Within ten years they did not manage to turn in a dossier complying with the usual standards of Good Clinical Practice. The second point is a funny reminiscence: At the beginning of the 1990s, we got some psilocybin back for disposal, as we were the public authority in charge of this. It was really ancient material.

NL: Who gave it to you?

PJD: We got it from someone who had used it for experiments, syntheses, for various things. The laboratory assistant called and said: “Mr. Dietschy, I got psilocybin. How shall I dispose of it?” I took a look and called you [RB] and said: “I would like to know whether the substance still meets any quality standards.” The answer came a few days later: “It meets all standards!” Suddenly we had 100 g of pure psilocybin. Nobody else in the world had such an amount. And the production was very expensive. To give you an example: When I went to an international conference of the US Drug Enforcement Agency I mentioned this in an aside to people from DEA labs. They said: “What? You really got that? We need this for our kits.” I asked: “How much do you need? I'll bring it to you to the next

conference in Washington.” Today, this would be inconceivable. These were really easygoing times.

RB: That’s the cue: the link to the US. Of course, they were following what was going on here, also on the level of psychiatric research. “What can Switzerland do? Why can’t we do this as well? Aren’t we allowed to do that, too?” There was Rick Strassman in Albuquerque. They got DMT and other materials with FDA approval. But unfortunately his project failed and he left the US for personal reasons. Then David Nichols took over that role.

PJD: I don’t know whether Vollenweider would ever have been able to start his work if we had not had that psilocybin. If he had had to synthesize it he would probably not have been able to pay for it. Hence, a number of lucky coincidences came together and made this possible.

Swiss Drug Policy since the 1990s

After a short coffee break, Dietschy and Brenneisen recounted equally detailed the adventurous development of the heroin program and Swiss cannabis research and policy in the 1990s. Their accounts were intricate and fascinating, but when we went for lunch after about three hours I still could not see how these different plots were connected forming a distinctive policy approach. Dietschy had already told me in his invitation that “from the end of the 80s to the mid 90s of the last century there was no continuously planned and stringently designed research policy concerning hallucinogens at SFOPH” and that “in the first half of the 1990s, important decisions [on the matter] were rather made on an ad hoc basis.”

Swiss drug policy has been an assemblage of heterogeneous governmental strategies. In the language of drug policy makers this is called the “Fourfold Approach” [*Vier-Säulen-Modell*] comprising four strategic elements or

“pillars”: repression (law enforcement), prevention (hindering the emergence of new drug users), therapy (treatment and reintegration of former drug users), and harm reduction (survival support). In an alternative jargon borrowed from Michel Foucault, one could also speak of an assortment of elements from three different apparatuses: law, discipline, and security. The juridical apparatus implements a purely negative form of normativity, which prohibits certain acts on a certain territory, e.g., the manufacture, sale, and consumption of particular drugs like heroin and LSD in Switzerland. Discipline ideally aims at a continuous panoptic observation of individuals responding even to minute deviations from a norm by disciplinary measures. Close monitoring of all people having to do with illicit substances can serve as an example: Drug scenes are infiltrated by undercover narcotics officers; dealers and consumers are prosecuted; scientists studying controlled substances need special permits and are subject to regular inspections. At the same time, addicts willing to undergo therapy are registered individually (“Nobody could enter into a heroin trial without permission of the SFOPH!”, Dietschy said), tested for additional use of street drugs (based on a method developed by Brenneisen), and have to inject the heroin they receive from the Swiss state under supervision in special outpatient clinics. The heroin-assisted treatment programs serve to enmesh addicts into the safety net of the otherwise not overly developed Swiss welfare state. These measures have been highly successful. In the course of the 1990s, many patients enrolled in those programs managed to return to a life in well-ordered circumstances and the number of heroin addicts declined significantly—in part because the heroin

programs destroyed the image of the junkie as countercultural hero rebelling against society by making him a welfare case dependent on the state.⁸⁹

However, total control of all citizens has remained a totalitarian utopia. Despite the establishment of a massive juridico-disciplinary apparatus it has not been possible to eradicate drug use altogether. As neither proscriptions nor treatment and surveillance of individuals guaranteed the desired outcomes, a third strategy was developed. The emergence of security as a form of government can be interpreted as a response to the limits of legal and disciplinary means. Here, the aim of total control is replaced by the modulation of a pre-existing milieu in order to regulate a population at large. While discipline is based on sustained interventions security adopts a *laissez faire* attitude only intervening as a last resort and after observation and evaluation of the specific tendencies of a given situation.⁹⁰ This strategy was pursued, for example, when the drug trade at Platzspitz was tolerated in the late 1980s. At present, it is also actualized in the form of the drug-checking program. Here, a mobile lab with cutting-edge analytic machinery (the core piece is a High Performance Liquid Chromatograph) from the Cantonal Pharmacist's Office Berne is moving from party to party allowing guests to have the quality and dosage of their black market drugs checked. This enables recreational drug users to make an informed and responsible decision about the drugs they consume. As products of poor

⁸⁹ Hans-Peter von Aarburg and Michael Stauffacher, "From Law Enforcement to Care. Changed Benefits and Harm of Heroin Use in Switzerland through a Shift in Drug Policy," in *European Studies on Drugs and Drug Policy. Selected Readings from the 14th International Conference of the European Society for Social Drug Research (ESSD)*, ed. Tom Decorte and Dirk Korf (Brussels: VUB University Press, 2004).

⁹⁰ Michel Foucault, *Sécurité, Territoire, Population. Cours au Collège de France, 1977-78* (Paris: Seuil/Gallimard, 2004), 3-165.

quality are quickly identified and abandoned within the scene it improves the quality of the drugs traded (for better or worse). In this particular context, the state accepts that illicit drugs are taken and tries to reduce the harm they cause by making the black market more transparent. The drug-checking lab also allows the Swiss state to carry out spot checks. Thereby, it can monitor what is happening on the black market and what patterns of consumption are emerging. This information is mostly used to develop more effective prevention strategies and to warn users (through flyers and postings on party scene-related websites) to stay away from adulterated or mislabeled drugs on the market. The mobile lab also provides an opportunity to approach users of illegal drugs in an informal, but direct manner. Even though it would be wrong to reduce the development of Swiss drug policy in the 1990s to the formation of this security apparatus I contend that the integration of such elements is its most distinctive feature in comparison to the hard-line policies in the United States or neighboring European countries such as Germany and France.

At a panel discussion on “Modern Drug Policy” at the LSD Symposium, Thomas Kessler, the former delegate for drug issues of the city of Basel, argued that progress in drug policy equals differentiation regarding substances and patterns of consumption: heroin-assisted treatment programs for opiate addicts, drug-checking for so-called recreational users of party drugs, strictly regulated sale of strong alcoholic beverages and cannabis, approval of psychotherapeutic applications of hallucinogens in spite of their prohibition in non-medical settings,

etc.⁹¹ In terms of such a differentiation, Switzerland has already gone further than most other countries. The underlying liberal technocratic attitude toward drugs requires more and a different kind of knowledge than mere repression. If a drug is simply prohibited all the state needs to know is how to detect it for forensic purposes. But if the state decides, for example, to prescribe heroin medically it needs to learn about its pharmacokinetics to determine an appropriate form of application (tablets, cigarettes, injections, etc.). It needs to understand its pharmacodynamics, adverse effects, interactions with other medications, etc. The SFOPH funded some of Brenneisen and Vollenweider's research on the basic pharmacology of psilocybin because he needed a firm foundation in case he would have to decide on another therapeutic application. The rationalization of government according to the value of truth that has taken place in the West requires that regulators protect themselves by drawing on scientific authority.⁹²

⁹¹ The kind of differentiation advocated by Kessler and already practiced to a considerable degree in Switzerland (at least in international comparison) also entails reflexivity and continuous self-criticism among those who rule. In a document published on the website of the Swiss Federal Office of Public Health, the evaluation of Swiss drug policy by a group of experts is summarized as "competent, innovative, incoherent, and not sufficiently coordinated." The report states: "Nach Meinung der Sachverständigen bilden Inkohärenz und mangelnde Glaubwürdigkeit die grössten Schwachstellen der Suchtpolitik des Bundes. Während Herstellung, Handel und Konsum der volksgesundheitlich schädlichsten Suchtmittel Alkohol und Tabak legal sind und beworben werden dürfen, herrscht bei den volksgesundheitlich weniger kostspieligen Drogen flächendeckende Prohibition. Auch der Einsatz von Mitteln ist unverhältnismässig: für die Bekämpfung des Konsums der illegalen Drogen (v. a. für die Repression) werden zuviel und für die Bewältigung der Probleme mit legalen Substanzen werden zuwenig Mittel eingesetzt. Moniert wird auch, dass der Bund bei der Bekämpfung von anderen Suchtformen, bei denen aus fachlicher Sicht ein Handlungsbedarf besteht, wenig oder nichts unternimmt." Markus Spinatsch, *Eine neue Suchtpolitik für die Schweiz? Grundlagen und Materialien für eine verstärkte Integration der suchtpolitischen Aktivitäten des Bundes. Kurzfassung eines Berichts zuhanden des Bundesamtes für Gesundheit* (26 April 2004 [cited]; available from <http://www.bag.admin.ch/evaluation/01759/02066/02339/index.html?lang=de#>).

⁹² Nikolas Rose, *Powers of Freedom: Reframing Political Thought* (Cambridge: Cambridge University Press, 1999), 24-28.

In the United States, a legal culture in which government agencies can easily be sued has led to a particularly pronounced tendency of administrators to seek refuge in bureaucratic formalism (alongside massive government funding of research).⁹³ In Switzerland, on the other hand, state bureaucracy has remained relatively restricted. Much social regulation takes place on the community level mediated through more informal ties. Manfred Hettling speaks of “sociability” [*Geselligkeit*] as the predominant form of societal self-organization in Switzerland.⁹⁴ Sociability even seems to be at work within Swiss bureaucracy itself (and—to some extent at least—this might well apply to modern bureaucracy more generally). In principle, bureaucracy is meant to make decisions in a strictly formalistic manner according to rational rules and “without regard to person.”⁹⁵ However, when I asked Dietschy whether Vollenweider’s reputation as a sober scientist had anything to do with the approval of Vollenweider’s clinical research he admitted point-blank that it did play a significant role in the decision of the SFOPH. Especially in such a problematic field as hallucinogen research seriousness and respectability [*Seriosität*] were of great importance. Had there been any incidents it would have been Dietschy as chief administrator who would have been called to account. For this reason, he only wanted to work with people he could trust as scientists, he explained to me.⁹⁶

⁹³ Brickman, Jasanoff, and Ilgen, *Controlling Chemicals*, 304, 309.

⁹⁴ Manfred Hettling, “Bürgerlichkeit. Eine ungesellige Geselligkeit,” in *Eine kleine Geschichte der Schweiz. Der Bundesstaat und seine Traditionen*, ed. Manfred Hettling, et al. (Frankfurt/M.: Suhrkamp, 1998), 231-239.

⁹⁵ Max Weber, “Die drei reinen Typen der legitimen Herrschaft. Eine soziologische Studie,” in *Max Weber. Schriften, 1894-1922*, ed. Dirk Kaesler (Stuttgart: Alfred Kröner Verlag, 2002), 718.

⁹⁶ Similarly, Steven Shapin has pointed to the officially marginalized, but practically still highly important role of trust in individual actors in the other major area of rationalization: science. Shapin, *A Social History of Truth*, 409-417.

Thus, the fact that Switzerland's drug policy is generally liberal and the regulatory conditions for hallucinogen research beneficial does not mean that there is no social control. On the contrary, the regulatory regime is close-meshed—today even more so than in the early 1990s. Special permits are required for research purposes. By now, ethics committees have also been established as an inherent part of biomedical research facilities in Switzerland. The densely woven social fabric of this small country lends even more weight to someone's standing in the community and the concomitant mutual observation of the behavior of fellow citizens.⁹⁷ Switzerland provides a thoroughly regulated, but permissive research environment created and supported by government agencies. The freedom of science they grant is not a "negative liberty," in which people are left alone to do what they wish without interference.⁹⁸ Instead it is carefully framed by legislators, administrators, ethics committees, and funding agencies holding scientists and therapists accountable. This is the apparatus earning Vollenweider and other Swiss drug researchers a certain advantage of location, which liberal Swiss politicians vigorously defend against international pressure. As Thomas Kessler put it: "One has to be incredibly careful not to destroy the great possibilities, which this research presents. [...] Switzerland as a site of thought and research [*Denk- und Forschungsplatz*] must take care that its

⁹⁷ To the extent that the East German theater director Michael Schindhelm provocatively called Switzerland "the better GDR"—in allusion to the widespread spying of GDR citizens on each other. In fact, Switzerland had a major scandal in 1989, the so-called *fiches-affair*, when it became publicly known that the Swiss authorities kept files on 900,000 of 6,500,000 Swiss citizens supposedly to protect the country from communist subversion.

⁹⁸ Rose, *Powers of Freedom: Reframing Political Thought*, 67.

research experiments do not disappear in the machinery of a crude and undifferentiated drug policy.”⁹⁹

The Global Assemblage of Hallucinogen Research

Thomas Kessler’s former political superior Luc Saner also takes part in the discussion about modern drug policy at the LSD Symposium. Saner is a politician belonging to Free Democratic Party of Switzerland (FDP), a party promoting economic liberalism in conjunction with libertarianism. In the 1990s, when Kessler was working at Basel’s Department of Justice, Saner was one of the champions of a liberalization of Swiss drug policy. He advocated to make all generally prohibited substances legally available “in a differentiated manner,” i.e. subject to a spectrum of legal regulations.¹⁰⁰ On the panel, Saner says:

I think that in the case of LSD one must try to get research projects through in order to create the possibility of registering this substance, so that it can be prescribed by physicians. But I have to tell you that this process is highly complex. Registering a drug is not an easy job. Usually, it costs enormous sums, hundreds of millions. And, as a rule, there is only an interest if there is profit. It must be patentable and there must be an economic incentive. That’s often not easy with such designer drugs. Maybe the patent has already been issued and cannot be renewed. In this context, we have proposed that the state steps in. Here, the liberal calls for the state. Thomas is laughing at me, but that’s how it is. The state needs to take a leadership role making sure that the legal preconditions are created to provide some sort of access to these substances. The state would have to take over the registration.

⁹⁹ Vannini and Venturini, *Halluzinogene*, 274 (my translation—NL).

¹⁰⁰ Luc Saner, ed., *Auf dem Weg zu einer neuen Drogenpolitik* (Basel: Helbing & Lichtenhahn, 1998), 9.

After the discussion a number of people from the audience come up to Saner and other discussants to ask further questions. A remarkable encounter ensues. One of the people wanting to speak to Saner is a man in his forties called John Gilmore. From their outward appearance, Saner and Wright could not be more different. Saner is a slick Swiss politician wearing shirt and tie. John, on the other hand, is from California with long hair and a goatee, dressed in a purple batik shirt and sandals. He approaches Saner saying that Saner miscalculated the costs of registering substances such as LSD or MDMA. The hundreds of millions of dollars for the successful development of one drug, which Saner mentioned, actually included a pharmaceutical company's costs of amortizing all the drugs that failed somewhere in the pipeline. In the case of LSD and MDMA we already knew about their safety and efficacy and only had to demonstrate them. Hence, John reckons, the costs for registering LSD or MDMA would be closer to five to ten million dollars. Saner accepts his objection but asks in reply: "Okay, but who would pay those five to ten million dollars? The pharmaceutical industry would only be interested if there was the prospect of profit, but the patents for these substances have long run out." John says: "I could do it. I'm a businessman and a philanthropist. If someone presented a reasonable plan I would be willing to pay for it." Looking slightly stupefied Saner offers Wright one of his business cards.

John Gilmore grew up in a middle-class family and started to work in the information technology business at a time when this did not yet require a college degree. One of the first employees of a major information technology company

he quickly made “too much money,” as he says, by which he means “more than I could usefully spend on myself in my lifetime and more than I wanted to leave to someone else as an inheritance because it tends to corrupt people to receive large amounts of money for nothing.” Hence, he decided to become a philanthropist sponsoring various projects ranging from legal aid for detainees at Guantanamo Bay to the development of free software and hallucinogen research. What ties these projects together is a certain libertarian agenda: “The focus is on individual rights, individual responsibility, and freedom to do what you chose to do.” I first met John at the beginning of the LSD Symposium after I had given a talk about hallucinogen research in Switzerland. Based on my fieldwork in the Vollenweider lab, I had addressed the fact that The Heffter Research Institute received money from private, mostly American donors. After my presentation, John introduced himself as one of the people I had spoken about. As one of its donors he asked me for an evaluation of Heffter as he was unsure whether Heffter served his cause. John has decided to spend ten million dollars in ten years on ending the War on Drugs, which, in his eyes, causes a large amount of human suffering. The most promising strategy to achieve this goal, he thinks, is to get illegal drugs registered for medical applications. Hence his interest in Luc Saner’s suggestion. John is concerned that Heffter might be spending too much money on basic research instead of focusing on making psilocybin into a medicine. Formally, a registration with the FDA requires the demonstration of the drug’s safety and efficacy. The mechanism of action, John argues, could still be explored at a later point in time when a preceding

registration will have made it easier for researchers to study the controlled substances in question. To get there John has a fairly specific plan in mind.

NL: Do you intend to support research on one single substance or would you prefer to contribute to the development of several drugs?

JG: I haven't made that decision yet, but I'm getting to a point where I have to decide that because I'm reaching the end of my ten years / ten million dollars program. There is only so much money left. If I say I can push a variety of things forward or I can make one thing happen, then my preference is probably to make one thing happen. Because in the realm of drug policy there have been people advocating and struggling to improve the policies forever, but mere advocacy seldom works because the governments are so resistant to change. What you actually have to do and what I have been trying to fund are projects that *require* the governments to change, that don't merely suggest that they change. If we actually completed a full drug development program it would require the government to change its scheduling. To move the drug out of Schedule I, which has no medical use, and into another schedule that allows physicians to prescribe it. It's not optional on the government's part to make that change. So the ability to push it to that stage would force a change in drug policy that merely advancing studies on several drugs would not.

NL: You said that your goal was to end the War on Drugs. On your website, you write about the huge number of people who get incarcerated for drug-related crimes. As far as cannabis is concerned that might have a certain relevance. But the share of people who go to jail for crimes related to psychedelics in particular is fairly low. So why focus on this class of substances?

JG: Partly because most other donors in drug policy focus on marijuana. If I depend on them to largely handle marijuana, I can expand the efforts to also include psychedelics rather than psychedelics be left behind when marijuana becomes legal.

NL: And the substances responsible for the majority of imprisonments like heroin and cocaine are off-limits anyways. You won't get them legalized.

JG: Right. And opiates are already widely used in medicine. OxyContin, for example, is a prescription drug that is widely abused, but doctors are free to prescribe it.

There is nothing to fix there in the legal situation unless you're aiming at full legalization, which, I think, is a harder problem than the ones I'm trying to solve.

NL: And there is no medical use for cocaine in the United States?

JG: No, there is. It's in Schedule II. It's used as an anaesthetic for people who have corrective surgery on their noses, for example.

NL: Yeah, or in eye surgery. But if there was a medical use for psychedelics they would probably be put into Schedule II as well. However, that would still be restrictive enough to continue to fuel the War on Drugs just as heroin and cocaine do. So the question is whether the approval of a medical use would really end the War on Drugs.

JG: It wouldn't end the War on Drugs. Indeed, I don't think I will end the War on Drugs by 2010, which was my goal. But like the Berlin Wall, I'm hoping to take a few big stones out of it and then it will probably fall on its own accord, but through normal social processes. The medical use of marijuana has clearly improved the public's opinion of recreational use of marijuana. In each state where medical use has been allowed you can see, over the succeeding years, more and more support for recreational use among the public in polls and in voting. That's because the fear factor goes away. When everyone knows somebody who uses marijuana medically and they don't turn into a demon and they don't lose their job and they don't go out raping small children then they wonder: What is all this trouble with marijuana about anyways? If they want to use it, let them use it.

John's strategy of ending the War on Drugs by funding clinical research is a response to regimes of government built on the production of knowledge providing authority to their authority. The rationalization of government has brought about a situation in which the generation of knowledge is heavily invested with power relations. This is particularly true in the United States, where the legal system makes regulatory agencies particularly vulnerable to attacks from various private interest groups (from libertarian activists like Gilmore to

transnational corporations). As a result there is a high degree of polarization in science. As Brickman, Jasanoff, and Ilgen point out:

The expansion of the government's scientific research capacity in response to political pressure is one aspect of a more general phenomenon in the United States. American regulators, being more politically exposed than their European counterparts, have a greater need to support their actions through formal analytical arguments. [...] The structure of the American rule-making process subjects the analytical case for regulation to intense political scrutiny. Any weaknesses are exploited, and the uncertainties and shortcomings of the relevant scientific base are readily exposed. [...] In this adversarial setting, participating scientists often appear as advocates of particular regulatory outcomes rather than disinterested experts. [...] The polarization induced by the U.S. regulatory process has tainted even the federal government's own research institutions, undermining their credibility as a source of unbiased expertise.¹⁰¹

The greatest loss of credibility of US government-funded drug research in the recent past occurred in 2003 when psychopharmacologist George Ricaurte had to withdraw his sensational study on the neurotoxicity of MDMA published in *Science* one year earlier.¹⁰² Based on primate research funded by the National Institute of Drug Abuse, Ricaurte had postulated such a high degree of neurotoxicity for MDMA in doses regularly consumed at raves that Ecstasy users should have died very frequently. Many of those who had seen the drug being used in their own social environment regarded Ricaurte's claims with great suspicion. Eventually, he had to admit that he had actually administered the significantly more toxic substance methamphetamine (Speed) to the monkeys. Allegedly, this mistake was based on a mislabeling of containers.

¹⁰¹ Brickman, Jasanoff, and Ilgen, *Controlling Chemicals*, 309-310.

¹⁰² George Ricaurte et al., "Retraction," *Science* 297 (2003). George Ricaurte et al., "Severe Dopaminergic Neurotoxicity in Primates After a Common Recreational Dose Regimen of MDMA ("Ecstasy")," *Science* 297 (2002).

Such crises of confidence in government-funded research is exactly what Heffter's competitor, The Multidisciplinary Association for Psychedelic Studies (MAPS), is trying to take advantage of to relegitimize various medical and non-medical applications of psychedelic drugs. MAPS founder Rick Doblin explains at the LSD Symposium: "The key point here is to build credibility. The government has lost credibility about the risks because they completely exaggerate them. The government has also lost credibility about benefits because they completely deny them. So we need to be at the forefront of looking at risks and at benefits." The goal is to acquire greater scientific authority than experts supported by the US government. As an activist organization, MAPS funds both research and lawsuits against the Drug Enforcement Administration employing the scientific knowledge it helps to generate to pursue its political goals.

Even though The Heffter Research Institute also aims at the registration of psilocybin as a medicine, the organization follows a less aggressive strategy trying to stay out of the trenches of the drug war. In their mission statement, its founders declare: "The Heffter Research Institute will neither condemn psychedelic drugs nor advocate their uncontrolled use. The sole position of the Institute in this regard will be that psychedelic agents, utilized in thoughtfully designed and carefully conducted scientific experiments, can be used to further the understanding of the mind."¹⁰³ In a highly politicized field like hallucinogen research, such a profession of impartiality is almost a political statement of its own. After all, soberness and the display of dispassionate objectivity serve as the

¹⁰³ Heffter Research Institute, *Research at the Frontiers of the Mind*, 3.

royal road to reinstate the legitimacy of medical and scientific uses of hallucinogenic drugs. Part of this approach is Heffter's support of clinical research and basic science alike, which Wright criticizes as not sufficiently goal-oriented. The tensions manifesting in this situation arise from a regulatory regime, in which the supposed value-neutrality of science is simultaneously claimed and undermined by the warring parties. The War on Drugs is a war of knowledge, in which victories are often based on new scientific findings. But at the same time, the sharpest weapons blunt rapidly when wielded with too much fervor.

In *Society Must Be Defended*, Foucault argues that the eighteenth century was characterized by "an immense and multiple battle, but not one between knowledge and ignorance, but an immense and multiple battle between knowledges in the plural—knowledges that are in conflict because of their very morphology, because they are in the possession of enemies, and because they have intrinsic power-effects."¹⁰⁴ Technological know-how, trade secrets, and much tacit knowledge were guarded jealously and put forward in economical and political conflicts. The establishment of the modern university around 1800 forced a temporary (and certainly not complete) end of these knowledge struggles by selecting and domesticating, policing and disciplining these polymorphous and heterogeneous forms of knowledge. In the context of hallucinogens, many deviant kinds of knowledge inspired by the aberrant states of mind these drugs induce have been disqualified and eliminated from academic institutions since

¹⁰⁴ Michel Foucault, *Society Must Be Defended. Lectures at the Collège de France, 1975-76* (New York: Picador, 2003), 179.

the 1960s. However, the current epistemic struggle over psychedelic drugs is not a clash of respectable science and obscure esoteric lore, of knowledge and counter-knowledge. The whole conflict takes place within an academic framework. Most players hold positions in universities, usually even in one of the most established and normalized faculties: the medical school. Here, neurotoxicity studies and the investigation of drug-induced neuropsychological deficits are countered with therapeutic trials and quality of life rating scales. But the front lines are not always clear: a neurotoxicity study might also demonstrate lack of toxicity, a therapeutic trial problematic side effects, etc. The conflict is a homoepistemic one.

John Gilmore is neither the only donor of organizations like Heffter and MAPS nor do I want to claim that he is representative of their benefactors. As I have not done systematic research on this culture of patronage I cannot draw any more wide-ranging conclusions. What does seem to be typical though is the fact that Wright made his money in information technology. Many patrons got into the computer, software, and Internet business at the right time and made a fortune.¹⁰⁵ Heffter's most important donor was the late Bob Wallace, one of the founding members of Microsoft, who single-handedly sponsored most research at The Heffter Research Institute before his death in 2002. When I asked Mark Geyer about key events in the history of Heffter he answered:

The two important events, the two biggest ones that shaped the course of Heffter were finding and having Bob Wallace join us and having Bob Wallace die. Those

¹⁰⁵ For an account of the common origins of personal computing and psychedelic culture in the 1960s, see John Markoff, *What the Dormouse Said. How the 60s Counterculture Shaped the Personal Computer Industry* (London: Viking, 2005).

were the two singular events of the most impact. Bob was certainly a recreational pharmacologist, a self-experimenter, avowedly and openly. He was wealthy. He was one of the first five or six in Microsoft. And he was perfect for Heffter because he—more than any other donor that we have had—appreciated the need for basic research. I don't just mean animal research. I mean doing the basic work to assess dose-response characteristics, assess and understand the neurobiology, physiology, and pharmacology of these compounds at a more fundamental level. The classic donor for Heffter is someone who wants us to skip past all of that and go right into treating some patient population. But it's a field that doesn't have the basics yet. Franz and I really feel that we need to start with the more mundane. But the more mundane work isn't very sexy and the donor doesn't see a lot of bang for his buck. So Bob was unusual if not unique in being willing to support both the infrastructure of Heffter and the kind of basic pharmacological studies with the faith that this would eventually evolve into more clinically relevant work. He was intellectually fascinated by the chemistry, the phenomenology, and the underlying neurobiology even if it didn't have the promise of some health-related or world-saving or –shaking consequence or benefit. For him it was the same as it is for me and for Franz, I would say, a matter of great intellectual fascination. That's not the common donor. Bob was committed to \$200,000 per year on a regular basis and that could go for fund raising. It didn't have to go into research. He wanted to use this money to make more money. Most donors don't want to do that. And then he would also support specific projects on top of that. When he died we have never recovered from that loss.

A significant part of the money Heffter received from its American sponsors was pumped into its Zurich branch to fund clinical studies in Switzerland. Such transnational flows from a more restrictive to a more permissive regulatory regime are well known from different contexts. Adriana Petryna has analyzed an “ethical variability” at work in the globalization of drug

trials.¹⁰⁶ Over 40% of clinical trials have been shifted from the United States and Europe to countries such as India and Russia where an abundance of preferably treatment naïve test subjects is available and regulatory conditions are more lenient. Contemporary hallucinogen research is also organized in such a transnational space exploiting differences in nationally organized regulatory regimes. Like stem cell research it is part of what Sarah Franklin calls “the global biological,” a scientific research apparatus stretching across distant sites and linked to the flow of “global capital.”¹⁰⁷

Today, hallucinogen research also has a “global” quality insofar as the results of neuropsychopharmacological experiments are supposed to apply to every human being on the planet.¹⁰⁸ However, in a very peculiar sense, it is also—to use another term coined by Franklin—a “local biological.” Not only can the interpretations of experimental findings differ according to the observers’ perspectives and background assumptions. Despite all efforts to universalize the validity of the facts established in the laboratory they remain more closely associated with the conditions under which they were found than many other phenomena of biological life. The fact that hallucinogens make an organism more susceptible to its surroundings and the increased suggestibility they induce bring about a situation, in which the social context is strongly implicated in the findings of hallucinogen experiments. What is true in the lab is not necessarily true in a

¹⁰⁶ Adriana Petryna, “Ethical variability. Drug development and globalizing clinical trials,” *American Ethnologist* 32, no. 2 (2005).

¹⁰⁷ Sarah Franklin, “Stem Cells R Us. Emergent Life Forms and the Global Biological,” in *Global Assemblages. Technology, Politics, and Ethics as Anthropological Problems*, ed. Aihwa Ong and Stephen Collier (Malden (MA): Blackwell Publishing, 2005), 61.

¹⁰⁸ Aihwa Ong and Stephen Collier, “Global Assemblages, Anthropological Problems,” *Ibid.*, 4-5.

different setting and what is true about one test subject is not inevitably true about every other user of psychedelic drugs. This curious quality also makes LSD—like its psychedelic relatives—a “problem child.” Not because of the widespread abuse implied by the title of Albert Hofmann’s famous book,¹⁰⁹ but because of the difficulties in integrating hallucinogens into an increasingly normalized pharmaceuticals. As the historian of psychopharmacology David Healy put it:

From the pharmaceutical industry’s point of view, the problem drugs are not the opiates or cocaine but the hallucinogens, the drugs so indelibly associated with the 1960s. The problem is not that these drugs could tell us a lot about ourselves and this knowledge might foment revolution, although these do seem to be possibilities. The problem is that with each dose every individual is likely to have a different experience. This is the very antithesis of quality as corporations currently define it. It seems difficult to see how hallucinogens can be brought into the arena of standardization.¹¹⁰

Research in Heffter’s Zurich branch also has a local character inasmuch as Vollenweider’s laboratory cannot be reduced to an outpost of American psychedelic research. Ever since Hofmann’s discovery of LSD, hallucinogen research has been prospering in Switzerland. The Vollenweider lab emerged from this local tradition at the intersection of the new Swiss drug policy and the worldwide neuroscience hype in the 1990s. It received grants from the American Heffter Research Institute, the Swiss Federal Office of Public Health, and national and international science foundations funding basic and clinical neuroscience projects. Just as its US-based counterparts it is a conglomerate of

¹⁰⁹ Hofmann, *LSD*.

¹¹⁰ David Healy, *The Creation of Psychopharmacology* (Cambridge (Mass.): Harvard University Press, 2002), 383-384.

local and global trajectories alike. Contemporary hallucinogen research is a “global assemblage” territorializing highly mobile and abstractable elements of technoscience and transnational flows of global capital at specific sites subject to national regulatory regimes.¹¹¹

Is there a Revival?

January 15th, 2006. After three days of talks, discussions, and celebration, the LSD Symposium in honor of Hofmann’s birthday comes to a close. All speakers are asked to go on the stage of the main conference hall. I feel uncomfortable, somewhat like a square peg in a round hole. Originally, I only planned to attend the event as an ethnographic observer. But, at the time, I was already doing fieldwork at Vollenweider’s laboratory and the pharmacologist Felix Hasler asked me to take over one of his three presentations. He was too busy and I was leisurely hanging out in their office watching him and his colleagues struggling with their usual workload. When I was asked to come on stage it occurs to me that in a way I am about to become part of the field that is the object of my study. There are chairs for us to sit during the closing ceremony. As the stage is filling up with the notables of the world of psychedelia the speaker next to me bends over and whispers reverentially: “Isn’t it incredible with whom we are on this stage together?” After short speeches by the organizers Lucius Werthmüller and Dieter Hagenbach we, the speakers, are given the opportunity to address the symposium’s guest of honor and the gathered psychedelic community. With his

¹¹¹ Aihwa Ong and Stephen Collier, “Global Assemblages, Anthropological Problems,” in *Global Assemblages. Technology, Politics, and Ethics as Anthropological Problems*, ed. Aihwa Ong and Stephen Collier (Malden (MA): Blackwell Publishing, 2005).

sonorous voice, the German ethnologist and drug guru Christian Rätsch calls in Nepalese: “Here, we have come together to pay tribute to the true father of our tribe: Albert Hofmann!!!” Several minutes of tumultuous applause and hooting cheers. Then numerous people express their gratitude to Hofmann for having discovered LSD. MAPS founder Rick Doblin announces a Chinese translation of Hofmann’s book *LSD. My Problem Child* and promises him translations into several other languages as well so that “the whole world can hear the voice that you heard first.” Poems are read out. The Swiss shaman Carlo Zumstein asks us and the entire audience of more than 2000 people to hum together (a highly impressive sound) guiding us through a quick visionary voyage to connect with the spirit of LSD. The late Timothy Leary’s companion Ralph Metzner makes the crowd sing and dance the Bardo Blues with him (a song based on Leary and his adaptation of the Tibetan Book of the Dead entitled *The Psychedelic Experience*). In the middle of these lively performances, Lucius Werthmüller presents a petition signed by Hofmann and the conference speakers advocating scientific research on psychedelic drugs, which will be send to the press, the authorities in Berne and Brussels, “and perhaps also to Washington, even if it won’t be heard there.” After all, the hope that has inspired the organizers of this conference is, as Hagenbach says, “that LSD will take up the place among us humans and in history, which it deserves.”

In the multitude of press reports following the symposium, the significance attributed to the event could not have been more divided. For some, it was a

gathering of diehard hippies vainly trying to rehabilitate LSD.¹¹² For others, the symposium indicated “a scientific coming-out party for the drug Hofmann fathered” and a “quiet comeback of LSD & Co.”¹¹³ One of the voices in this cacophony of newspaper comments is Felix Hasler’s. In addition to his research in the Vollenweider lab the pharmacologist regularly works as a science journalist for Swiss newspapers and the weekly *Die Weltwoche*. Hasler’s judgment about the alleged LSD revival is suitably acidic (no pun intended):

The LSD revival caused by Hofmann’s birthday is not going to last for long anyways. Simply because there is no LSD revival. Neither in research nor in psychotherapy or society. This is not only confirmed by the conference presentations, but also by the latest statistics of the German Federal Bureau of Criminal Investigation. In 2005, the share of LSD in drug-related crime was rounded up to mere 0.1%. When the current spring tide of newspaper articles, which the birthday sparked off will have petered out LSD will presumably return to where it peacefully resided in the three decades preceding Dr. Hofmann’s great jubilee day: in great proximity to insignificance.¹¹⁴

However, as a neuropsychopharmacologist who has himself played a role in the latest episode of hallucinogen research Hasler immediately qualifies his critique: “Still, it would be possible that psilocybin, the little and less infamous brother of LSD, will have a career in research and psychotherapy. This cosmic spice acts shorter, has a more clear-cut pharmacology, and in its mind-altering effects it is much more user-friendly than the notoriously bitchy and moody LSD. Credit

¹¹² Jean-Martin Büttner, “Halluzinogene als Medikament und Sakrament,” *Tages-Anzeiger*, 18 January 2006. Martin Halter, “Alles ist erleuchtet,” *Frankfurter Allgemeine Zeitung*, 20 January 2006. Alex Rühle, “LSD-Kongress in Basel. Kinners, mir wird so blüherant,” *Süddeutsche Zeitung*, 17 January 2006.

¹¹³ Ann Harrison, “LSD: The Geek’s Wonder Drug?,” *WIRED*, 16 January 2006. Sabine Olf, “Leises Comeback von LSD und Co. Halluzinogene werden wieder zur Behandlung von Ängsten und Traumata eingesetzt,” *SonntagsZeitung*, 8 January 2006.

¹¹⁴ Felix Hasler, “Alle lieben Albert,” *Die Weltwoche*, 19 January 2006, 13-14.

where credit is due: After all, this agent has also been isolated and synthesized (and, of course, tried) by Albert Hofmann.”¹¹⁵

Of all reporters writing about the symposium Hasler is by far the best-informed—at least as far as scientific research was concerned. In fact, most of his fellow journalists called Hasler during their own investigations interviewing him as an expert in the field of hallucinogen research. Hasler’s observation concerning the nonexistence of a LSD revival is certainly justified with respect to the current situation. At the time of the symposium, not a single human study employing LSD was taking place anywhere in the world. DMT, psilocybin, and ketamine have played important roles in the new research projects on hallucinogenic drugs taken up since around 1990, but LSD has not part of the story. Because of its notoriety the administration of LSD to humans would have attracted too much public attention and political opposition. Additionally, LSD was said to cause “bad trips” more often than other hallucinogens and the duration of its effects—eight to twelve hours—would have been a burden on the scientists who have to look after their test subjects during the whole time. And, last but not least, LSD is seen as a “dirty drug” affecting many neurotransmitter systems simultaneously. Unlike psilocybin, it did not appear to be a suitable tool for precise neurochemical interventions that allowed correlating the manipulation of a specific neurotransmitter receptor with certain psychological or neurophysiological effects.

¹¹⁵ Ibid., 14.

As a hallucinogen researcher Hasler is not only a particularly well informed observer of the field, but also a strongly positioned actor whose career has been closely associated with psilocybin, not LSD. In his Ph.D. research in Brenneisen's laboratory at the University of Berne, Hasler laid out the basic pharmacology of psilocybin. The resulting publications served as the foundation for subsequent clinical research with the drug, in which he also got involved when joining Franz Vollenweider's team in Zurich. In his representation of the field, Hasler omits that other conferees at Basel were forcefully trying to initiate the LSD revival he negates. The most prominent figure in these attempts is John Halpern, a psychiatrist at Harvard. In collaboration with MAPS, Halpern has been struggling to gain approval for a first therapeutic application of LSD and to restart LSD research at Harvard (as the symbolically highly charged place where it allegedly came to an end when Leary declared himself fired). Having established a track record in hallucinogen research Halpern and his colleague Andrew Sewell have forged a link to Clusterbusters, a cluster headache patient organization. This controversial self-help group claims that small doses of LSD and psilocybin efficiently reduce cluster headache pain and prevent and interrupt cluster headache cycles even in patients resistant to treatment with legally available medications. This might serve as a promising venue to re-establish a therapeutic application of psychedelic drugs. The fact that they would be used to treat a seemingly tangible neurological condition instead of a hazy psychiatric disorder could help overcome the resistance of those highly skeptical of psychotherapeutic applications of psychedelics. After all, LSD treatment of

cluster headaches is not about facilitating access to the contested realm of the unconscious or the resolution of “spiritual crises,” but about fixing a neurochemical disorder. Moreover, based on anecdotal reports from patients recruited through support groups and an Internet-based survey Halpern and Sewell argue that even sub-hallucinogenic doses might be effective.¹¹⁶ Hence, cluster headache patients could possibly be spared the suspect “psychedelic experience.” Treatment would be compatible with everyday life and no panic attacks, psychotic reactions, or suicides would have to be expected. The rationale of the project makes it appear as the royal road to the introduction of hallucinogens to mainstream medicine. By supporting Halpern Doblin is hoping to win the race for the first human LSD study since the 1960s crackdown. He wanted to use the highly visible LSD Symposium to present formal approval of the study—nicely wrapped up as a birthday present to Hofmann—to the press. But the plan did not work out.

History seems to repeat itself. Again LSD research at Harvard has been caught up in a scandal. In 2000, the chemist William Leonard Pickard was arrested by agents of the Drug Enforcement Agency for manufacturing the largest amount of LSD ever seized in the DEA’s history in a decommissioned nuclear missile silo.¹¹⁷ It soon turned out that Pickard had given Halpern \$300,000 (possibly from drug sales) for his research.¹¹⁸ Thereby, Halpern was

¹¹⁶ Andrew Sewell, John Halpern, and Harrison Pope, “Response of cluster headache to psilocybin and LSD,” *Neurology* 66 (2006).

¹¹⁷ Drug Enforcement Agency, *Pickard And Apperson Sentenced On LSD Charges. Largest LSD Lab Seizure In DEA History* (??? [cited]; available from <http://www.usdoj.gov/dea/pubs/states/newsrel/sanfran112403.html>).

¹¹⁸ Seth Rosenfeld, “William Pickard’s long, strange trip. Suspected LSD trail leads from the Bay

drawn into the investigations. In a field as sensitive as hallucinogen research, mere suspicion is enough to seriously threaten a scientist's reputation. Instead of being able to announce the first LSD study, Halpern's presentation at the conference was interrupted by someone in the audience accusing him of having turned informant to the US authorities—just as Timothy Leary reduced his prison sentence for illegal drug use from ten to three years by giving away some of his former friends.¹¹⁹

Among the members of the Heffter Research Institute there was grave concern that the rumors burgeoning around this case could bring the whole field into disrepute. Even without the uproar caused by the Pickard connection the use of LSD in a human study seems questionable. The three infamous letters could easily summon up the heated sentiments of the 1960s. However, it is precisely the symbolic and affective charge of LSD that also allows attracting the attention of certain donors to whom the acronym brings many fond memories of their youth. But apart from the risk of falling back into the trench warfare of the psychedelic era, there are also scientific reasons to oppose the use of LSD. Its shotgun effects on neurotransmitter receptors do not recommend it for surgical interventions in brain chemistry.¹²⁰ Instead of LSD, the Heffterites place their hopes in psilocybin. At the symposium, Heffter president Dave Nichols

Area's psychedelics era to a missile silo in Kansas " *San Francisco Chronicle*, 10 June 2001. According to Rosenfeld, the Heffter Research Institute was also accused of having received money from Pickard, but could prove that this had not been the case and that it had complied with all laws.

¹¹⁹ Jonnes, *Hep-Cats, Narcs, and Pipe-Dreams*, 237.

¹²⁰ Clinically, however, there has been a growing interest in "dirty drugs" since it became clear that highly selective antidepressants (such as selective serotonin reuptake inhibitors (SSRI)) and antipsychotics (D2 antagonists like haloperidol) are often less effective than drugs affecting several neurotransmitter systems at a time. Cf. Healy, *The Creation of Psychopharmacology*, 220.

announces the registration of psilocybin as a medicine as one of his organization's main objectives:

The long-range goal we have at the moment is to bring psilocybin into the mainstream of medical practice and have it registered—probably in Switzerland first, but also in the United States. The principle barrier to that is that it is a Schedule I substance. Two of the key factors that determine it being Schedule I include the fact that it has no recognized medical use and that it can't be used safely. In the studies that are carried out in Zurich, for example, as well as in Charlie Grob's study [on the effects of psilocybin in advanced-stage cancer patients with anxiety] we are doing a lot of work showing that psilocybin can be given safely to normal people. These are subjects that are not suffering from any pathology and they are given, in some cases, substantial doses. We are establishing a record—a number of papers have been published, I'll show you some later on, especially from the Zurich center under Franz Vollenweider's direction—showing that psilocybin can be used safely. That's one of the prongs. The other prong is to identify a medical indication. The study we have under way now is a treatment of dying patients with psilocybin. We previously had a study of psilocybin in obsessive-compulsive disorder at the University of Arizona. We're looking at some other indications now, possibly eating disorder. If we can identify a medical disorder where it really works and if we establish a record of safety we can then petition the regulatory authorities to move psilocybin out of Schedule I into Schedule II so that it could presumably be developed as a medical therapeutic for that indication.

Differentiations between LSD, psilocybin, and other hallucinogenic drugs aside the question posed at the very beginning of this part of the book has not yet been answered: Is there a revival of hallucinogen research? As an anthropologist, I take the "native's point of view" as the starting point of my reflections. A number of actors such as Strassman, Doblin, and Nichols suggest that there is a revival while others are more skeptical. Here, the "revival of hallucinogen research" should rather serve as an object of critical discourse

analysis than as the beginning of my narrative. As indicated above, hallucinogen research has never been completely dead. Many of the stories around its decline belong to a mythology of repression—which is not to say that the consequences (and lack of consequences) of America's aggressively led War on Drugs have not been real enough. But, in principle, hallucinogen research continued to be possible during the 1970s and 1980s. It would also be exaggerated to speak of a sudden boom of the field in the 1990s. Until today, it has never regained the size and significance it had in the 1950s. Scientific and therapeutic applications are still strictly regulated. A registration of drugs such as psilocybin or LSD would lower the hurdles, but considering the costs and the minute economic potential of these drugs it still seems a long way off. Much of the actors' talk of a revival is motivated by personal enthusiasm as much as by strategic considerations. If exuding optimism carries along enough donors the announcement of a renaissance of hallucinogen research might well become a self-fulfilling prophecy.

On the other hand, talk of a revival does have a certain referent. Around 1990 a range of fresh actors entered the field. New laboratories and institutions were founded and novel research projects launched. Many of these ongoing projects employ methods and technologies from the rapidly expanding fields of cognitive neuroscience and neuropsychopharmacology. By latching onto these prospering disciplines hallucinogen research managed to acquire the necessary legitimacy that makes the study of psychedelic drugs a respectable career path in the life sciences. The pharmaceutical industry's great economic interest in the

serotonin system, the target of blockbuster antidepressants such as Prozac and atypical antipsychotics, has also yielded a modest amount of resources for studying classical hallucinogens such as psilocybin and LSD, which act on serotonin receptors as well. However, considering the explosion of research on the brain and psychotropic drugs in the last two decades it appears as if the field of hallucinogen research has at most grown proportionally.

Contemporary research on psychedelic drugs is not a captivating object of social scientific inquiry and philosophical reflection because the field is about to resume the central importance it had for psychopharmacology in the 1950s. Unlike research on widely prescribed classes of psychotropics such as antidepressants or stimulants hallucinogen research will probably continue to be a marginal subject. But marginality is not equivalent to insignificance. Hubert Dreyfus and Paul Rabinow have pointed to the importance of “marginal practices.” Such practices open up a critical perspective on the present without presupposing a viewpoint that pretends to transcend the current situation. It also reveals alternative possibilities that are neither utopian nor nostalgic, but off the beaten track. At present, Prozac, Ritalin, and cognitive enhancers dominate the image of psychopharmacology in social scientific scholarship and bioethical debates. Hallucinogens call attention to a whole range of different issues: their peculiar cultural and political significance, the difficulties in standardizing their effects, the prominence of the overwhelming and unruly “psychedelic experience” so dependent on the individual subject’s mind-set and environment, etc. In no other drug do the problem of experience and its relation to the human brain

appear to be so prominent. At the same time, many of the topics highlighted by hallucinogens are related to wider sets of questions concerning contemporary psychopharmacology, biological psychiatry, and neuroscience at large. In the following chapters, some of these matters will be examined against the background of my ethnographic observations of current hallucinogen research in the laboratories of Franz Vollenweider in Zurich and Mark Geyer in San Diego.

III. WONDER DRUGS IN THE LABORATORY

4. Disenchantment and Spiritualization

Field Trip

Before all 64 electrodes have been fixed to my head to measure my brain waves my circulation breaks down and I fall through a dark tunnel into a void. The walls of the tunnel are covered with colorful spots and shapes. I feel terrified and absolutely helpless. Only when my seat is folded back I come around again. A glass of water brings me back to the cramped soundproof room in which the EEG measurement is to take place. Twenty minutes before, I ingested 18 capsules of psilocybin now kicking in. I still feel giddy and ask for a break before the two researchers continue to prepare my EEG cap. Their schedule is tight. Another scientist has booked the room for the afternoon. They cannot afford to lose more time. If further difficulties ensue the experiment must be broken off, they say. I realize that I need to pull myself together. If I don't stick it out I will give away my only chance of building up rapport with the group I want to study.

This is how my ethnographic fieldwork among Swiss hallucinogen researchers begins in the summer of 2005. I gain access to Franz Vollenweider's laboratory *Neuropsychopharmacology and Brain Imaging* in Zurich as an experimental test subject. So far, my affiliation with the University of California, Berkeley, has turned out to be an obstacle rather than an entry ticket to the world of academic hallucinogen research. "When they see LSD and California they think fun and games," as a hallucinogen researcher from the West Coast will

explain to me later on. Initially, Vollenweider did not respond to my requests to come to his lab as an ethnographic observer. But eventually one of his postdoctoral researchers referred me to an American Ph.D. student in the lab who was looking for healthy volunteers to participate in his psilocybin study. Seizing the opportunity I travel to Zurich to make contact.

I arrive on a warm summer day. The time-honored Psychiatric University Hospital, the *Burghölzli*, is located on the outskirts of the city. From the trolley stop I walk down a lane cutting across a small field to get to the fortress-like nineteenth century clinic where a century ago Eugen Bleuler invented the concept of schizophrenia while Carl Gustav Jung reconciliated psychoanalysis' focus on individual lives with the "collective unconscious" manifesting in art, myth, religion, etc. The *Burghölzli's* extensive grounds comprise a pasture with apple trees and sheep as well as a tree covered hill providing a scenic view of Lake Zurich. The Vollenweider lab is situated in two buildings somewhat apart from the main complex: a more imposing one housing Vollenweider and his secretary's offices and the EEG laboratory, and the clinic's former washhouse, home to about ten doctoral and postdoctoral researchers. There, Boris Quednow, the German postdoc who established the initial contact welcomes me.

Boris and I probably met before. Presumably over ten years ago when I used to go to techno parties in my hometown Cologne, Germany. I was a high school student and went to raves and electronic music clubs almost every weekend. But I remained too much of a geek and did not take enough drugs to be more than a marginal observer in and of the rave scene. The sense of not

belonging never left me since the first time when I had been turned away at the door of a club. Back then—in the early 1990s—Boris worked as a bouncer at some of the places I frequented. A massive long-haired bodybuilder he decided who was hip enough and who was not. When we sat in the sunlit cafeteria it briefly occurred to me that life repeats itself: Again I tried to gain access to a group of people and again Boris seemed to serve as a gatekeeper. However, this time I came as an anthropologist interested in a group of neuropsychopharmacologists focusing on hallucinogenic and entactogenic drugs. Since our last encounter, Boris has become one of them.

When he was still working as a bouncer Quednow must have been a bit of an oddball himself. He had a laboratory in the basement of his father's private clinic in the spa Bad Neuenahr where he isolated a broad range of alkaloids from plants—not for consumption (many drugs of abuse belong to this class of compounds), but out of curiosity. In 1991, he even won a prize for his chemical analysis of the poisonous alkaloid cytisine contained in leaves and seeds of the tree *Laburnum anagroides*. Too much of a misanthropist to follow in his father's footsteps and become a physician and too interested in the mind to become a chemist he eventually studied psychology and underwent five years of psychoanalysis. He did his Ph.D. at the university hospital in Bonn on the neurotoxicity of MDMA (Ecstasy), the most popular drug in the clubs he used to work for. A few months before my arrival he moved to Switzerland and joined the Vollenweider lab to examine whether the brains of long-term MDMA users really suffered from a lack of the neurotransmitter serotonin, a pathology that might

come to affect many members of “Generation Ecstasy” in the future.¹ Such links between the scientists’ lifeworlds and their research interests are not uncommon in the field of hallucinogen and entactogen research. Considering that this still sturdy, but by now shaven-headed contemporary and I spent formative years in the same scene sharing a scientific curiosity with respect to drugs, brains, psyches, and people it is not surprising that we immediately take to each other.

Mystical Experiences and Illusionary Triangles

But there are more hurdles to be taken. In the early afternoon, I meet with Rael Cahn, the American doctoral researcher, running the study I have come to take part in with his Swiss coworker, the psychology student Michael Kometer. Formally, Rael does his Ph.D. in Mark Geyer’s laboratory at the University of California, San Diego, which investigates the effects of hallucinogenic drugs on rodents. But Rael is primarily interested in altered states of consciousness induced by psychedelics as well as meditation, which are difficult to investigate in animals. In the United States, the prospect of getting approval for a human study with hallucinogenic drugs was too uncertain, even in a reputable lab such as Geyer’s. Therefore, Rael has come to Switzerland where the regulatory conditions are supposed to be more favorable and Vollenweider, a close friend and ally of Geyer’s, provides the facilities and expertise necessary to compare the neural correlates of the psychedelic experience in normal subjects with the neurobiological substrate of meditation as practiced by a experienced meditators.

¹ This expression was coined by Reynolds, *Generation Ecstasy*.

What has brought Rael to Zurich is a very personal interest in altered states of consciousness:

I came here because I was interested to look at the effects of psychedelics and to do this kind of comparative study. In particular, I came here because more than in anything else I was interested in using the tools of science, some brain imaging method—it didn't matter to me too much which one, but it ended up being EEG—to look at what's happening in the brain when someone experiences a really clear sense of being one with everything. This experience, which I have had in my own life and which was very much catalytic to my going into this direction, was so striking and real to me that I felt it was important to consider it not just as an internal experience, but as reflecting something that's real about our collective reality and the greater sense of my own life and experience. I had the hope that more people could have that kind of experience and it would change the way in which they interacted with the world in a positive direction.

This Huxleyan sense that altered states revealed a reality usually concealed by everyday consciousness, the experience of which can have a profound impact on our conduct of life has inspired Rael to enter into medical school in California. As a physician Rael was hoping to contribute to the development of what he calls “integrative medicine” combining

the power and perspectives that are available through the biological materialist view on the human body with perspectives that are based more in [...] the power of thought to interact with the body and to stimulate healing and [...] [to] see how such methods can be helpful to people who aren't being helped very much by standard Western biomedicine. So it's both integrating different traditions of medical philosophy and care as well as integrating different levels of the human being in terms of what causes healing to happen instead of just focusing on the material aspect covered by mainstream medicine.

But in the laboratory, Rael has come to experience tensions between this vocation and the norms, expectations, and requirements structuring the field of

cognitive neuroscience. Vollenweider was supportive of the proposal to compare meditating brains with brains under the influence of hallucinogenic drugs, but he also demands a “stable basis.” As the outcome of research on a phenomenon as elusive as consciousness (not to speak of its expansion) seems too uncertain Vollenweider has decided to play it safe and integrate a number of classical neuropsychological paradigms into the study. If fishing for altered states should turn out to be a failure the trial will still produce valuable data leading to a number of publications in established neuroscience journals. Rael, on the other hand, is concerned that subjecting the participants of his study to the disciplinary regime structuring neuropsychological measurements might create an experimental setting inimical to the experience of feeling one with the universe. Eventually, the experimental design turned out to be a compromise between the quest for the neural correlates of mystical experience, which Rael wants to pursue, and a number of more focused neuropsychological tests, which subjects have to undergo in the second part of the trial.

Before I can take part in this study I need to pass a psychiatric interview. Cahn asks me about crises in my biography as well as mental disorders in my family and uses a number of questionnaires and psychological rating scales to generate a psychopathological profile allowing him to judge whether I am eligible for being administered a hallucinogen as powerful as psilocybin. Test subjects who appear to be vulnerable are excluded from the trial. A single case of prolonged hallucinogen-induced psychosis or suicide could entail the closing down of the whole laboratory. However, some of the questionnaires also aim at a

different predisposition quantifying my bent for the mystical and supernatural. Fortunately, this-worldliness does not serve as an exclusion criterion for the drug study. Thus my trip into the world of neuropsychedelica takes its course.

Trip to Outer Space. Day 1 of the psilocybin experiment

When I emerge from the dark tunnel, still nervous and sweating, I am certain that I have not received placebo on this first day of the experiment. The trial is supposed to be double-blind: Neither the scientists nor I knew in advance whether the capsules I washed down with a glass of water contained placebo, a low dose (125 µg/kg body weight), or a high dose of psilocybin (250 µg/kg). These different doses are to be administered randomly on three days separated by at least one week from each other to give my organism enough time to completely metabolize the drugs and return to its normal state before the next experiment. The sudden breakdown of my circulation leaves little doubt that I have ingested a hefty dose today. But after drinking a sip of water and settling back into the massive leather armchair everything seems fine again. A calm, sunny day peeking through the window. A computer screen in front of me generates a flow of colorful psychedelic visualizations of the soft electronic music trickling from the computer's loudspeakers. Soon, Rael and Michael continue to prepare the EEG cap on my head.

It seems to have taken forever, but finally they are done. The sunlight gets shut out, the chamber darkens. The researchers retreat to the adjoining room containing monitors and computer equipment from where they can observe me

through a window. The door closes. Total silence. I am on my own now: The desired correlation of first person perspective (on this side of the observation window) and third person perspective (my brainwaves on the monitor next door) should not be perturbed by second person issues.² Social relations count as a distractor. The measurement begins. I am supposed to keep my eyes closed for 15 minutes while continuing to concentrate on my breathing (to produce an EEG recording that can be compared to the experienced meditators' meditations). Whenever I feel that something peculiar is happening to me I am supposed to press a button to describe what I have just experienced through an intercom system. Rael and Michael hope to identify the neural correlates of these introspective reports in the EEG recordings later on. Thereby, my subjective experiences will be given an objective corporeality and traces of my private life, however irre recognizable, will become accessible to public view.

The second my eyelids go down an enormous cave opens up in front of me. All surfaces are covered with geometric patterns, spinning fractals in shades of dark red. There is something uncanny, almost demonic about the scenery. I look around anxiously, then—as I realize that no imminent danger is looming—more curiously. Curiously, but without the particular kind of pleasure marking the joy of discovery. An oddly affectless state of mind. Despite the warm tones the impressions are cool. I do not like the aesthetics of the vision. It reminds me of the psychedelic paintings of Alex Grey. For a moment, I feel irritated by the fact that my brain cannot do better than imitate the geometric forms prevailing in

² Cf. Roepstorff, "Brains in scanners."

psychedelic art. Or are these patterns a product of the neurochemical effects of psilocybin like the “form constants” (lattices, spirals, tunnels, cobwebs), which the psychologist Heinrich Klüver had postulated in his laboratory study of peyote-induced visions in 1928?³ Do they mirror certain architectural features of the visual cortex as the mathematician and computational neurobiologist Paul Bressloff has claimed more recently?⁴ I hear whirring sounds in stereo moving from the right to the left. They are pseudohallucinations: I can tell that they are not out there in the laboratory even though they traverse some sort of space. I wonder whether it is the phenomenal space of my mind or the surface of my cerebral cortex. I also experience real auditory hallucinations hearing a radio from afar, inaudible messages. They frighten me as “hearing voices” is said to be one of the hallmarks of schizophrenia.⁵ I tell Rael and Michael about this. Speaking to them is a way of surfacing from the trip and re-establishing contact with the familiar world out there. It gives me a moment to get my breath back before returning to the strange fractal cave behind my eyelids. By now the patterns have turned green and sharply indented. They make me feel uncomfortable. I wonder whether I need to attribute them to myself. Do they

³ Heinrich Klüver, *Mescal and Mechanisms of Hallucination* (Chicago: University of Chicago Press, 1966), 2-59.

⁴ Paul Bressloff et al., “What geometric visual hallucinations tell us about the visual cortex,” *Neural Comput.* 14, no. 3 (2002). Paul Bressloff et al., “Geometric visual hallucinations, Euclidean symmetry and the functional architecture of the striate cortex,” *Philosophical Transactions of the Royal Society* 356, no. 1407 (2001).

⁵ At the time of the experiment, I was already familiar with the long-standing debate about the hallucinogen model of psychosis, which will be discussed in the next chapter. One of arguments of the critics of model psychosis research is that as opposed to the mostly visual alterations of sense perception caused by hallucinogens schizophrenia is primarily marked by auditory hallucinations. This is a good example of how the experience of drug effects can be determined by the subject’s preconceptions.

represent an aspect of my personality that I dislike? Or are they merely neurobiological artifacts resulting from the effects of psilocybin on my brain? Overall, the visionary world I experience appears to be bizarre and alien, more outer space than my inner life. I do not feel at home there. Only toward the end of those 15 minutes do I begin to relax. I feel a touch of joy and serenity. This must have changed my facial expression: Rael turns on the intercom telling me that they have detected an increase of muscle tension in my face interfering with the EEG recording.⁶ He asks me to relax again. While I am still wondering how they can expect me to reach a state of ecstasy if I even need to control the minutiae of my facial play the lights turn on and the first measurement is over.

Before moving on to the neuropsychological tests I am to take part in a short pilot study experiment investigating the effects of psilocybin on the neural correlates of the experience of music. The anthropologists Marlene Dobkin de Rios and Fred Katz describe the use of music in New World hallucinogen rituals to structure the experience and guide the participants of such ceremonies through the strange realms of consciousness opened up by the drugs. The shamans' songs allow them to evoke and control the visions of their inebriated clients. "Generally speaking, hallucinogenic drug users in non-Western society take such plants to achieve specific cultural goals, that is, see the source of bewitchment in a vision, achieve contact with the supernatural to divine the

⁶ The problem of the test subject's body as a source of interference in experimental psychology has already been addressed by Henning Schmidgen, "A Roaring Silence: Encountering the Body Without Organs in Time Experiments around 1900," in *Experimental Cultures: Configurations between Science, Art, and Technology 1830-1950 (Preprint 213)* (Berlin: Max-Planck-Institut für Wissenschaftsgeschichte, 2001).

future, hear the voice of a fertility god, and so on. Music, in these instances, can be used by the shaman actually to provoke special types of visions.”⁷ What Cahn and Kometer are interested in is the neurobiological mechanism of this acoustic evocation of visions. Low Resolution Brain Electromagnetic Tomography (LORETA), an algorithm which allows computing from the scalp-recorded voltages the intracerebral, three-dimensional configuration of neuronal activity, will enable them to examine interactions between my auditory and visual cortices at a high temporal resolution not achievable with PET and other three-dimensional neuroimaging technologies.⁸ They expect the musical patterning of visions to correlate with an increased synchronicity of electrophysiological activity in these two brain areas. Karl Weber’s 1966 study mentioned in the introduction aimed at elucidating the intensification of the experience of music under the influence of hallucinogens by examining the ability of musicians to discriminate between different tones (finding that they did worse when drugged). Here, however, no behavioral measure is applied and no performance tested. All I need to do is to lean back in the armchair and listen while the EEG records my brain waves.

Again the lights are switched off, I close my eyes, and the music begins to play. It is a shallow electronic piece of so-called psytrance entitled “Paradis perdu”—paradise lost. The sound is spheric, dreamy, and melancholic. The

⁷ Marlene Dobkin de Rios and Fred Katz, "Some Relationships between Music and Hallucinogenic Ritual: The 'Jungle Gym' in Consciousness," *Ethos* 3, no. 1 (1975): 68-69.

⁸ Alex Gamma et al., "Comparison of Simultaneously Recorded [H215O]-PET and LORETA During Cognitive and Pharmacological Activation " *Human Brain Mapping* 22 (2004).

synthesizer strains do not aim anywhere, but lose themselves in the infinity of the universe. The music smells of New Age and joss sticks. Its sentimental beautification irks me. I am annoyed by the fact that the experimenters are trying to force rose-colored glasses on me. But at the same time I cannot resist the music. I see a hilly landscape in pastel colors. A kitsch fantasy, extremely absorbent even though my aesthetic judgment does not succumb to its postcard beauty and its suggestion that at a different time and place everything was fundamentally alright. At the same time I look at myself through the eyes of the natives of Huxley's utopian *Island* and wonder how much bitterness and disillusionment is implicated in my inability to naively enjoy this artificial paradise.⁹

I have missed my last chance to reach a state of ecstatic ego dissolution. The experimental psychological testing that follows provides little opportunity to go into raptures. A fast and incessant sequence of flashing images is raining down on me from the computer screen. Constantly, I need to respond to these challenges by pressing different buttons. One time I need to distinguish little blue circles from big blue circles and checkerboards, but I always fail to remember how big the big circles and how small the small circles were unless I see them right after each other. Another time, I have to distinguish concrete black triangles from their illusionary counterparts (so-called Kanizsa triangles, see below). Then a circle is brightly flickering on the screen. I am meant to count the number of flashes I perceive while the loudspeakers fire volleys of a distracting rat-a-tat-tat.

⁹ Huxley, *Island*.

And, finally, I have to detect faces in a rapid succession of black and white images popping up in front of me. During this phantasmagoria of neuropsychological tasks I experience extreme difficulties in keeping to the point. Just focusing my attention on the screen turns out to be demanding. Again and again my mind begins to wander. I realize that my performance is very poor. Often I become aware of mistakes I have just made, but I cannot keep abreast of the onslaught of flashing images. On top of that, Rael repeatedly asks me to control my nictation to avoid disturbing the EEG measurement (for example, I must not blink after seeing a big blue circle or when recognizing a face) and several times they also tell me to relax certain parts of my face while random thoughts and existential questions continue to crop up. It is impossible to juggle all these things simultaneously. I feel overstrained and self-alienated by the fact that my nervous system cannot cope with this rush of exigencies and sensory stimuli.

When the whole measurement is finally over at 1:30 pm I am exhausted and somewhat ill-tempered. As the effects of the drug are slowly fading out Rael, Michael, and I pass by the hospital cafeteria to grab some food before we climb up the wooded hill on the clinic premises. Here, they take their experimental subjects to chill out. I am glad to have escaped the laboratory and the hilltop offers a scenic view over Lake Zurich, but I am too worn out to enjoy the panorama. We sit down on a bench and talk about the experiment. The researchers interview me in a casual manner asking questions about how I experienced different parts of the trial while I am trying to learn from them what

their purposes were. Often they do not want to reveal their aims as such knowledge could influence my behavior during the two measurements to come. I am still scatterbrained jumping from one subject to another. But overall I am coming to understand that they are less interested in my performance (whether I press the right button at the right time) than in the electroencephalographic inscription of my neuronal responses, the so-called event-related potentials (ERPs), to the stimuli presented on the computer screen. With the help of LORETA, they are trying to localize the neuroanatomical sources of these electric signals.

Misperceptions in a Decentralized Brain

Anthropologically, the most interesting thread running through different parts of the study is the “binding problem,” which is closely related to the phenomenon of consciousness. Since the outset of modernity, consciousness and the self were conceived of as punctual or lacking extension—a point of convergence where sensory perceptions of the surrounding world were integrated.¹⁰ When in the eighteenth century the subject began to materialize in the brain the idea of a center of consciousness was initially preserved. Hierarchically structured the brain was thought to accommodate a higher-order observer overseeing everything else that was going on in this organ. Since the shift from such an “organ of the soul” to the modern brain as a decentralized biological structure at the beginning of the nineteenth century, this view has been replaced by various

¹⁰ Charles Taylor ascribes this view to John Locke. René Descartes would be another legitimate candidate. Cf. Charles Taylor, *Sources of the Self. The Making of the Modern Identity* (Cambridge (Mass.): Harvard University Press, 1992).

conceptions of the brain as a complex of discretely located, but interacting mental properties and functions.¹¹ One of the most recent and by now widely received alternatives assumes a network architecture, in which separate parts of the brain represent different aspects of an object (form, color, etc.) without running together in a superordinate center. Accordingly, there is no observer in the brain. Instead consciousness emerges from interactions of different brain areas. But this has raised the question of how neuronal processes taking place in different locations are coordinated to form a coherent whole. If there is no single nerve cell representing a specific object (like the famous “grandmother neuron” firing whenever someone sees their grandmother) how can an ensemble of cells representing different aspects of sensory perception code for a common content? This is called the binding problem. In 1989, the German neuroscientist Wolf Singer and his American colleague Charles Gray offered an answer to this question: The binding of features recognized as belonging to the same object takes place in time, they claimed. By synchronizing their firing rates at about 40 Hz, i.e. in the gamma range, neurons are able to generate a temporarily integrated system representing a certain object. However, for this content to also become an object of conscious awareness yet another brain area needs to join in representing this representation. All these different parts of the brain must be activated simultaneously firing in time with each other.¹²

¹¹ Cf. Hagner, *Homo cereбрalis*.

¹² Wolf Singer, *Der Beobachter im Gehirn. Essays zur Hirnforschung* (Frankfurt/M.: Suhrkamp, 2002), 65-72.

Gamma range EEG activity is regarded as the electrophysiological substrate of binding phenomena, which are closely associated with conscious awareness of objects. It is produced in a circular interaction between thalamus and cortex, i.e. within the cortico-striato-thalamo-cortical (CSTC) loop, which Vollenweider conceives of as the key structure in the generation of consciousness and its altered states. In their study, Rael Cahn and Michael Kometer examine the effect of psilocybin on this neural network and the resultant modulation of gamma activity. In a grant proposal, Cahn cites studies indicating that there was increased gamma activity in the frontal cortex of an experienced meditator striving for self-dissolution as well as in occipital-temporal-parietal scalp electrodes measuring electrocortical activity of members of the Brazilian Santo Daime church after ingestion of ayahuasca as a religious sacrament. Following Singer and Gray, Cahn interprets this localized gamma activity “as underlying the conscious binding of experiential contents,” in this case mostly “the strong visual activity typically encountered with ayahuasca use.”¹³ Following these cues Rael and Michael are especially interested in their test subjects’ gamma activity during the first introspective part of the study. Furthermore, binding is at stake in the music experiment where the researchers are looking for the hypothesized synchronization of auditory and visual cortex. And, finally, as the neural correlate of binding gamma activity also takes center stage in the neuropsychological tests in the second part of the experiment. To illustrate this last instance as an example of how conscious awareness and its neurobiological

¹³ Rael Cahn, “Neurophysiological Correlates to the Experience of Self and Binocular Rivalry Stimulus Processing as Modulated by Meditation and Psilocybin Administration [unpublished study proposal],” (2005).

substrate is experimentally operationalized I will focus on the Kanizsa triangle task.

The Kanizsa triangle is an optical illusion invented by the Italian psychologist Gaetano Kanizsa in 1955. It consists of three Pac-Man-like figures.

If their “mouths” are turned toward each other as shown in the illustration we perceive the “subjective” or “illusory” contours of a nonexistent white triangle. Assembling the lines and corners in such a way that they are seen as parts of a coherent figure requires a binding process. To

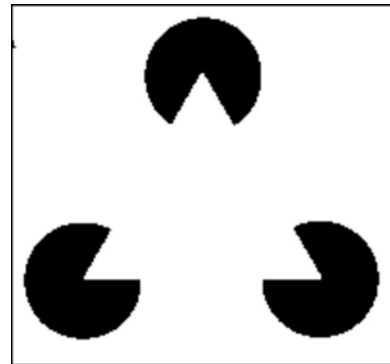


Figure 1.) Kanizsa triangle

examine the neural activity underlying this illusory perception Cahn and Kometer compared the event-related potential evoked by the presentation of a Kanizsa triangle with a control condition, the presentation of the three Pac-Men now looking into different directions. In the control condition, the test subject perceives the same three elements, but does not recognize them as parts of a gestalt. Hence, the gamma activity is significantly more pronounced when a Kanizsa triangle is shown. From Vollenweider's CSTC model (discussed in more detail below) Cahn and Kometer derived the hypothesis that altered states of consciousness induced by psilocybin go along with a reduction of cerebral binding of perceptual information. At the same time, 5-HT_{2A} agonists such as psilocybin have been reported to induce cortical activity in the gamma range independent of sensory input, which might explain how hallucinogenic drugs provoke hallucinations. This mechanism could throw light on the pathogenesis of

schizophrenia also characterized by alterations in gamma synchronicity. When Rael and Michael made me look at the Kanizsa triangles they wanted to test the assumed decrease of perceptual binding by comparing the gamma oscillations elicited by the stimulus under the influence of psilocybin with the placebo response.¹⁴

The laboratory-type tasks of this last part of the experiment operationalize the concept of binding, which the first part of the study revolving around meditative introspection explores in a manner less clear-cut, but closer to the lifeworld. The concept of binding implicates a new self-image of *homo cereбрalis*. Consciousness continues to be inseparably associated with the brain, but it does not appear as a control center anymore. Instead it emerges from the interactions within a decentralized and dynamic neural network constituted by cell assemblies temporarily synchronizing their activities. Cahn's interest in altered states of consciousness induced by meditative practices and psychedelic drugs is based on the assumption "that the ordinarily-experienced limited sense of self associated with an individual's body and personality is actually a very superficial aspect of the human self and that the true self as revealed through these domains of activity is actually universal and boundariless, timeless and at one with all else."¹⁵ Even though this "experimental mysticism" inspiring their project is at odds with the view of hallucinogen action as an "experimental psychosis" Cahn and Kometer study the effects of hallucinogenic drugs with technologies

¹⁴ Michael Kometer, "Elektrophysiologische Korrelate visueller und kognitiver Prozesse und deren Modulation durch Psilocybin" (Lizentiatsarbeit, University of Zurich, 2006), 19-21 and 39-43.

¹⁵ Cahn, "Neurophysiological Correlates to the Experience of Self," 1.

and test paradigms used in model psychosis research as well. It seems as if these interpretive frameworks incorporating values and worldviews remained inconsequential to scientific practice.

Return to a Conflicted Self. Day 3 of the psilocybin experiment

After a tiresome, but unspectacular placebo measurement on the second day of the experiment I receive the low dose of psilocybin two weeks after my arrival in Zurich. In the case of placebo administration, I could clearly tell after 30 minutes that there was no drug action despite the double-blinded design of the trial. But low dose and high dose turn out to be more difficult to distinguish. This time, the drop of my blood pressure is less pronounced and does not frighten me anymore, but emotionally the trip seems even more intense. Instead of marveling at the exotic landscapes of a foreign wonderland I am confronted with my own life now. Visions trigger highly emotive and conflicted trains of thought mostly revolving around my partner, the question of having children with her, and my anxieties with respect to leading a bourgeois family life. Under the influence of the drug I feel more accepting toward myself and less afraid of long-term commitments. Worries concerning daily life, my academic career, and my self-image have taken a back seat. What really matters are the bonds of love. For the time of the trip and for a few days after, I experience a resolve with respect to my most profound value judgments that is to vanish all-too soon in the dissonances of everyday life.

Before leaving Zurich on the next day I have an appointment with Franz Vollenweider. His office is smoky. On the shelf I discover a portrait of Freud next to a picture of the Dalai Lama. The walls are covered with research awards, children's drawings, PET scans, a poster of Watson and Crick in front of the DNA double helix, and a photo of Vollenweider and his friend Albert Hofmann. I ask him straight out whether I could come back to do fieldwork in his laboratory. He immediately agrees explaining his own interest in our collaboration: He is planning to write a book about the philosophical implications of hallucinogen research. But at this point of his career, he cannot afford to spend much time on elaborating such thoughts. The scientific rat race does not grant much leisure to reflect on the broader context of one's empirical work. Vollenweider regards me as an intellectual interlocutor who might help him to articulate and develop some of his ideas informally before he will be able to spell them out in a more systematic fashion in the future. We agree that I am going to come back in October to observe their research activities for half a year.

Vollenweider: Looking Beyond from a Solid Standpoint

Vollenweider's research on altered states of consciousness originated in the early 1990s. In our first formal interview, he provides an autobiographical sketch of his background and development leading up to this enterprise. Franz Xaver Vollenweider was born in 1954 growing up in the hinterland of Zurich and in Lucerne where his mother's family owned a bakery. His father was a businessman working for an American company. He was interested in

philosophy, the humanities, and the natural sciences and liked to experiment in a chemistry laboratory at home. Vollenweider remembers: "There was a strong tension between the maternal side baking and selling bread and the paternal side of the family, which was rather artistic, a lot of libertines. I always felt this tension enticing me from early on to look beyond bourgeois life. I can still hear my father say to my mother: For you the cash needs to be correct, for us the orchestra must be in accord [*Bei Euch muss die Kasse, bei uns muss das Orchester stimmen.*]." As an adolescent Vollenweider began to rebel against his mother's rigid religiosity. Playing in a successful jazz-rock band devoured much of his time and one year before finishing high school he dropped out, broke with both his parents, left home, and moved to Zurich. He was torn between art and science. While doing an apprenticeship as a laboratory technician he graduated from high school by correspondence course with excellent grades. He began to study chemistry, but switched to medical school after two years because he was too interested in things human. An arduous reader of Freud since age 17, he went into psychoanalysis with a neo-Freudian analyst.

NL: Why did you choose a Freudian?

FXV: Even though Jung appealed to me with his archetypes and transpersonal ideas Freud was like the natural sciences to me: something tangible. His theory of drives, the ego, the super-ego, and the id, these things seemed true-to-life. What there is besides my personal existence—ancestors, transpersonal realms, and what have you—can still be explored later on. This is still with me today: I always want to have a firmly established basis and then I want to look beyond it, but from a solid standpoint. I think I got that from my father. This just crosses my mind. Somehow he was crazy with his ideas, but he exemplified to me through his own life that one needs a stable basis and from there one can go on excursions:

mentally, economically, or professionally. I never studied medicine because of the money, but I thought—this was another of those childish ideas—if all else fails then I can still practice as a physician. [Laughs.] Maybe that's the mother with the bakery, baking little buns, security.

Vollenweider's analysis was not only a way of working through his family relations, but also a quest for "the demon who holds the fibers of his very life."¹⁶ Eventually he did find his vocation in a rigorous neuroscientific investigation of hallucinogen-induced states of mind. Here, his need for a firm ground was reconciled with the desire to venture out into the realm of ecstasy and psychosis on the far side of bourgeois waking life.

After a few years in neuroscience labs, Franz Vollenweider began to work as a psychiatrist at the Psychiatric University Hospital in Zurich in 1990. The *Burghölzli* had—and still has—a strong psychodynamic tradition attracting those preferring the unconscious to neurotransmitters, philosophy and theology to biology, and social psychiatry to drug treatment. But Vollenweider came to work in the department of Jules Angst who had conducted a significant amount of psychopharmacological research throughout his illustrious career. Angst had published scientific articles on the "Dangers of LSD" (1967) and "Hallucinogen abuse" (1970) and he had been associated with some of the research projects on hallucinogenic drugs that had been conducted at the *Burghölzli* since the 1940s after Albert Hofmann's discovery of LSD.¹⁷ Until 1987 the German psychologist Adolf Dittrich had studied altered states of consciousness in Angst's department

¹⁶ Weber, "Science as a Vocation," 156.

¹⁷ Jules Angst, "Gefahren des LSD," *Schweizer medizinische Wochenschrift* 97, no. 42 (1967). Jules Angst, "Halluzinogen-Abusus," *Schweizer medizinische Wochenschrift* 100, no. 16 (1970).

analyzing data from ASC induced by a broad range of technologies ranging from meditation and hypnosis to sensory deprivation and hallucinogenic drugs such as DMT, cannabis, and laughing gas. Before returning to Vollenweider's project I would like to present some of the building blocks, which it has assembled.

Dittrich's Psychometry of Ecstasy

Adolf Dittrich's work provided a key element of Vollenweider's approach. The two hallucinogen researchers spent many a night discussing on the balcony of Dittrich's apartment. What they had in common was a passionate interest in altered states of consciousness and a desire for a scientifically sound perspective on these extraordinary states of mind. Dittrich was first and foremost a psychological methodologist whose forte was statistics (Angst called him "my mathematician").

Partly this methodological rigor was a response to the tensions evoked by research on hallucinogenic drugs and altered states. As Dittrich's former partner Maja Maurer put it: "As a psychologist, if you didn't do mainstream work methodology became a weapon," which allowed defending oneself against hostilities. The animosities toward Dittrich's research were provoked by its political context and implications. In the introduction to his habilitation, he quoted an ethnological study according to which 90% of almost 500 examined cultures had institutionalized altered states of consciousness whereas the West differed strikingly in its disdain, pathologization, and criminalization of "non-ordinary

waking states.”¹⁸ In Dittrich’s eyes, the countercultural embrace of such forms of consciousness since the 1960s was no aberration, but an “adjustment to the vast majority of other cultures.”¹⁹ But Dittrich did not approve of altered states under all conditions: Incurring the displeasure of the district attorney, he had supported a study on the psychiatric consequences of sensory deprivation in solitary confinement. The frictions generated by the politics of consciousness contributed to Dittrich’s departure from Angst’s department in 1987.

Although Dittrich did not keep quiet about his political convictions he was not an activist, but a basic researcher whose most important work was the development of the self-rating scale APZ serving to describe altered states of consciousness quantitatively. To provide standardized and comparable data on ASC one had to replace or complement free reports on these experiences by an itemized questionnaire. Based on a review of the literature and already existing rating scales from schizophrenia research, theological studies of mystical states, etc., his own clinical experience, and self-experiments with hallucinogenic drugs and sensory deprivation Dittrich collected about 800 potential items, 94 of which eventually proved their worth in empirical studies. To test both his rating scale and the hypothesis that all altered states of consciousness had a common denominator independent of different means of induction, Dittrich tried out the APZ in studies provoking altered states pharmacologically through hallucinogens

¹⁸ Dittrich refers to Erika Bourguignon, *Religion, altered states of consciousness, and social change* (Columbus: Ohio University Press, 1973).

¹⁹ Adolf Dittrich, *Ätiologie-unabhängige Strukturen veränderter Wachbewußtseinszustände. Ergebnisse empirischer Untersuchungen über Halluzinogene I. und II. Ordnung, sensorische Deprivation, hypnagoge Zustände, hypnotische Verfahren sowie Reizüberflutung* (Stuttgart: Ferdinand Enke Verlag, 1985), 5.

such as DMT and nitrous oxide (laughing gas) and by way of sensory deprivation in an isolation tank (i.e., a container in which subjects float on a body temperature magnesium sulfate solution in total darkness and silence depriving them of all external sensory stimulation). Dittrich's statistical analysis of the results demonstrated that altered states could be clearly demarcated from normal waking consciousness as well as from the effects of non-ASC-inducing drugs such as antipsychotics or alcohol. Despite their common core, factor analysis, cluster analysis, and multidimensional scaling allowed differentiating these states internally into three interdependent dimensions or subscales. Each of these subscales was constituted by a cluster of items, which experimental subjects had assessed in a highly correlated manner. Dittrich called the three dimensions "oceanic boundlessness," "dread of ego-dissolution," and "visionary restructuralization." "Oceanic boundlessness," a term Freud had taken over from the French writer Romain Rolland, designates a positively experienced state of ego-dissolution, in its most pronounced form the ecstasy of mystical experience.²⁰ But the disintegration of the self can also—at times simultaneously—be experienced as utterly terrifying (as in so-called horror trips under the influence of hallucinogens, but also in the sense of Rudolph Otto's notion of the numinous, the *mysterium tremendum* inspiring dread, wonder, and reverential respect at the same time in the face of the divine—an experience supposedly at the heart of all religions). This angst elicited by the breaking up of ego boundaries is quantified by the subscale "dread of ego-dissolution." Finally,

²⁰ Sigmund Freud, "Das Unbehagen in der Kultur," in *Gesammelte Werke* (Frankfurt/M.: Fischer, 1999 [1930]), 421-431.

“visionary restructuralization” assesses the degree of perceptual alterations and distortions occurring in an altered state of consciousness. These three dimensions were meant to define operationally what the writer Aldous Huxley had called heaven, hell, and visions.²¹

The hypothesis, which Dittrich tested with this newly developed tool was also derived from Huxley’s writings on hallucinogenic drugs and altered states of consciousness. In his 1944 book *The Perennial Philosophy*, Huxley had popularized the German mathematician and philosopher Gottfried Wilhelm Leibniz’s notion of *philosophia perennis* designating the common, eternal philosophy based on the experience of divine reality that supposedly underlies all religions, and in particular the mystical streams within them.²² Dittrich wanted to identify this “archetypal core” or “basic pattern of human experience” by means of quantitative psychology. He presented the overlap between the psychometric self-ratings of altered states of different etiologies as indicating (or “not falsifying,” as Dittrich wrote in the jargon of Karl Popper’s critical rationalism) the postulated common denominator characterizing ASC in general, the presumably universal core experience identifying humankind as a spiritual species.

²¹ Dittrich, *Ätiologie-unabhängige Strukturen veränderter Wachbewußtseinszustände*, 199-211. See also Adolf Dittrich, “Psychological Aspects of Altered States of Consciousness of the LSD Type: Measurement of their Basic Dimensions and Prediction of Individual Differences,” in *50 Years of LSD. Current Status and Perspectives of Hallucinogens*, ed. A. Pletscher and Dieter Ladewig (New York: The Parthenon Publishing Group, 1994). Dittrich refers to Aldous Huxley, *Heaven and Hell* (London: Chatto & Windus, 1956).

²² Aldous Huxley, *The Perennial Philosophy* (New York: Harpers & Brothers Publishers, 1944).

Investigating the Neural Correlates of Altered States Consciousness

Vollenweider had first read about Dittrich's research in a newspaper article in the late 1980s and was intrigued by Dittrich's claim that different psychological and pharmacological interventions led to similar outcomes. "I then had the idea: If Dittrich is right about different modes of induction discharging into the same dimensions then it must be possible to capture this neurobiologically. That is to say, if I provoke a certain degree of oceanic boundlessness with psilocybin and I do the same thing with ketamine, which has a completely different chemistry, and I reach the same result, then the effects converge in a common pathway and the overlap should be biologically detectable." Huxley had already assumed that the experiential core of altered states inspiring the perennial philosophy shared by the world's different religious and spiritual traditions was rooted in a common physiology. In Huxley's eyes, a broad range of technologies of the self—from the "senseless repetitions" of magical rites to hours of singing by shamans and Christian and Buddhist monks—led to the same effects. Historically, Vollenweider's quest for the neural correlates of altered states of consciousness originated from Huxley's supposition that there was a uniform biological basis underlying "non-ordinary waking states." What Dittrich had investigated psychologically Vollenweider wanted to approach with the tools of contemporary brain research.

Angst supported Vollenweider's project to provoke altered states in healthy test subjects with the help of hallucinogenic drugs. Vollenweider managed to obtain a grant from the *Swiss National Science Foundation* (which,

at the time, was highly unusual for a young researcher like him) and set up a collaboration with a research institute for nuclear physics about one hour from Zurich where he could use one of the first PET scanners in Switzerland. Thanks to his initiative and entrepreneurial drive Vollenweider was able to introduce neuroimaging studies to the *Burghölzli* while resuming its long-standing tradition of hallucinogen research in the age of cognitive neuroscience.²³ Of course, he was not alone with his interest in this class of substances. Since he had read the newspaper article on Dittrich's work a lively discussion had developed between the two. Vollenweider also knew members of the Swiss Association for Psycholytic Therapy advocating and experimenting with psychotherapeutic applications of hallucinogens. But he maintained a certain distance toward their activities. Internationally, the symposia and conferences of the European College for the Study of Consciousness—a virtual institution founded in 1985 by the German psychiatrist Hanscarl Leuner—provided a meeting place for the small, but burgeoning scene of European hallucinogen researchers, mostly from Germany and Switzerland. Here members of different ideological camps came together. Advocates of psycholytic therapy exchanged ideas with basic science researchers while stern biological psychiatrists spoke to practitioners of neo-shamanism. At one of these events around 1990, Vollenweider met the group of psychiatrists around Leo Hermle who were about to reanimate model psychosis research with hallucinogenic drugs in Germany. However, despite this loose network of like-minded people and Switzerland's history of hallucinogen research

²³ Before Adolf Dittrich and Franz Vollenweider, hallucinogen research was conducted at the Burghölzli by Werner Arthur Stoll, Brigitte Woggon, and Martha Koukkou-Lehmann. Cf. Vannini and Venturini, *Halluzinogene*.

Vollenweider stayed apart from other groups and slowly built up the necessary infrastructure for his project by himself.

Neuroimaging beyond Cyberphrenology

The research establishing Vollenweider's reputation in the early 1990s was a PET study on the effects of psilocybin and ketamine on the brains of healthy volunteers. He demonstrated that both hallucinogens—despite their very different pharmacological mechanisms of action—increased metabolic activity in the frontal cortex. The degree of this hyperfrontality correlated with the intensity of the experience of ego-dissolution as measured by Dittrich's APZ questionnaire and two more psychometric scales (the inventory of the *Association for Methodology and Documentation in Psychiatry* (AMDP) and the Ego Pathology Inventory (EPI) developed by Christian Scharfetter, another psychiatric researcher at the *Burghölzli* interested in altered states of consciousness). Similar metabolic patterns had been found in schizophrenic patients suffering from acute psychotic episodes. Therefore, Vollenweider's findings provided further support to the revival of the hallucinogen model of psychosis: Both psilocybin and ketamine administration not only provoked "a psychosis-like syndrome that resembled in many ways acute schizophrenic experiences," but they also led to similar neurophysiological changes in brain activity.²⁴

²⁴ Franz Vollenweider et al., "Metabolic hyperfrontality and psychopathology in the ketamine model of psychosis using positron emission tomography (PET) and [18F]fluorodeoxyglucose (FDG)," *European Neuropsychopharmacology* 7, no. 1 (1997). Franz Vollenweider et al., "Positron emission tomography and fluorodeoxyglucose studies of metabolic hyperfrontality and psychopathology in the psilocybin model of psychosis," *Neuropsychopharmacology* 16, no. 5 (1997).

A closer look at Vollenweider's approach runs counter to a number of recent discussions of neuroimaging studies in the history and anthropology of science. First of all, it is a common misunderstanding that neuroimaging is primarily about the colorful images, which it produces and which the media have made the hallmark of the neuroscience hype since the Decade of the Brain. In fact, the alleged iconophilia of cognitive neuroscience is an iconophilia of science journalism.²⁵ In her astute article on the iconoclasm of imagers entitled "Images Are Not the (Only) Truth," Anne Beaulieu points out "that for researchers, if these pictures are pictures of anything, they are pictures of numbers." "The abundance of representations in neuroscientific contexts that overwhelms the neophyte clashes with the conceptions of researchers that they are involved in making measurements of the brain, not obtaining images of it."²⁶ The point of Vollenweider's study was to establish a mathematical correlation between numbers: "To explore the relationship between psilocybin-induced [psychological] reactions and metabolic alterations, the APZ, AMDP, and EPI scores for hallucinatory disturbances, ego, and thought disorders were correlated with the

²⁵ For an analysis of the role of neuroimaging in the alleged "neuroscience revolution," see Anne Beaulieu, "The Brain at the End of the Rainbow. The Promises of Brain Scans in the Research Field and in the Media," in *Wild Science. Reading Feminism, Medicine and the Media*, ed. Janine Marchessault and Kim Sawchuk (London: Routledge, 2000). Joseph Dumit, *Picturing Personhood: Brain Scans and Biomedical Identity* (Princeton: Princeton University Press, 2004). Eric Racine, Ofek Bar-Ilan, and Judy Illes, "Brain Imaging. A Decade of Coverage in the Print Media," *Science Communication* 28, no. 1 (2006).

²⁶ Anne Beaulieu, "Images Are Not the (Only) Truth: Brain Mapping, Visual Knowledge, and Iconoclasm," *Science, Technology, & Human Values* 27, no. 1 (2002): 59 f.

changes of absolute metabolic rates of glucose or metabolic ratios [in different brain areas].”²⁷

Furthermore, it has been argued that neuroimaging has led to a marginalization of introspection. In Vollenweider’s research psychometric rating scales were used to convert the experimental subjects’ introspective accounts of their drug experiences into numbers. Thereby, they allowed to establish a quantitative correlation between subjective experiences and changes in metabolic activity in certain cerebral “regions of interest.” Of course, filling in questionnaires such as the APZ is not comparable to writing detailed experience reports (as the phenomenological psychiatrist Kurt Beringer asked of the subjects of his mescaline trial in the 1920s, for example²⁸). Nevertheless self-rating scales do represent a standardized and quantitative form of introspective accounts providing access to test persons’ subjective experiences in a form that is compatible with the numerical data generated by brain scanners. Despite a widespread methodological distrust in introspection such associations of neuroimaging technologies and introspection are indispensable in contemporary cognitive neuroscience: to identify the neural correlates of (altered states of) consciousness and other subjectively experienced mental events and processes neuroscientists need to take the first-person perspective of experimental subjects into account.²⁹ As a matter of fact, after five decades of behaviorist hegemony

²⁷ Vollenweider et al., “Positron emission tomography and fluorodeoxyglucose studies of metabolic hyperfrontality and psychopathology in the psilocybin model of psychosis,” 365.

²⁸ Beringer, *Der Meskalinrausch*.

²⁹ For a critical discussion of the role of introspection in cognitive neuroscience, see Anthony Jack and Andreas Roepstorff, eds., *Trusting the Subject? The Use of*

and its “scientific taboo against consciousness,” neuroimaging has led to a rehabilitation of introspection as the royal road to conscious experience, i.e. the mental correlate of the neural measures of fMRI and PET scans. Hence, the test subjects’ subjectivity is heavily implicated in the functional images.³⁰ The reconfiguration of our understanding of mind and brain brought about by neuroimaging technologies is no mere biologization of mental life, but also a “mentalization” of the brain.

In his book *Der Geist bei der Arbeit*, the historian of science Michael Hagner shows that the history of functional brain images begins with Franz Joseph Gall’s phrenology mapping mental properties, talents, and character traits (e.g., pride, conscientiousness, or devoutness) onto the skull and into the brain. Like Joseph Dumit, Hagner interprets the localization of mental functions in certain brain areas through neuroimaging as a kind of “cyberphrenology” reintroducing the typological classification and discrimination of individuals predominant in nineteenth and early twentieth century organicist thought into contemporary neuroscience.³¹ However, looking at Vollenweider’s research on altered states opens up a different perspective: Here, what is investigated with the help of neuroimaging technologies are mental states, not traits. Instead of being pigeonholed according to certain neuronal characteristics the cerebral

Introspective Evidence in Cognitive Science, 2 vols. (Charlottesville (VA): Imprint Academic, 2004).

³⁰ Baars, “The Double Life of B.F. Skinner.”. Andreas Roepstorff, “A Double Dissociation in Twentieth Century Psychology? A commentary on Bernard Baars: The Double Life of B.F. Skinner,” *Journal of Consciousness Studies* 10, no. 1 (2003).

³¹ Hagner, *Der Geist bei der Arbeit*, 170-179, 187-194, and 219-222. See also Dumit, *Picturing Personhood: Brain Scans and Biomedical Identity*, 23. William Uttal, *The New Phrenology. The Limits of Localizing Cognitive Processes in the Brain* (Cambridge (Mass.): MIT Press, 2001).

subject is decomposed into a flux of ephemeral states arrived at by way of intraindividual comparison. The life of the living brain manifests in the subtraction of one scan from another while the life of the mind appears as the quantitative difference between two self-rating scales.³² Of course, the actual biological and mental processes in between remain evasive and unobserved. However reductive and dissatisfying this perspective might be it presents the subject as an animate organism moving from state to state. Maybe one could even argue that Vollenweider's approach is representative of a broader historical shift from studying character traits to transient mental and cerebral events. In the age of cognitive neuroscience, there is a trend toward tracing moral decision-making processes instead of localizing conscientiousness and the search for the seat of devoutness has given way to the neurobiological study of mystical experiences. This development has been facilitated by technologies such as PET scanning and functional magnetic resonance imaging allowing to measure brain activity *in vivo* (in lieu of studying skulls and dissecting dead brains as in the heyday of phrenology). Increasing temporal resolution of imaging technologies has enabled neuroscientists to move from a static perspective on the brain and the corresponding focus on unchanging personality traits to more and more dynamic representations of cerebral processes supposedly underlying the stream of consciousness. The temporality of PET scanning is met by Dittrich's APZ questionnaire which is given to a test subject at the beginning and at the end of an experiment to measure the difference between two subjective states instead

³² Cf. Simon Cohn, "Increasing resolution, intensifying ambiguity: an ethnographic account of seeing life in brain scans," *Economy and Society* 33, no. 1 (2004): 68.

of personality-related predispositions. Both technologies are tailored to the short lifespan of Vollenweider's epistemic object: altered states of consciousness passing away as the administered drugs are being broken down by the body's metabolism. Such work is not aptly characterized by the term "cyberphrenology."

Integrating PET Images and Introspection in a Cybernetic Model of the Brain

An analysis of Vollenweider's approach also calls for another reconsideration of Hagner's account of the historical status of brain imaging. In Hagner's eyes, computer-generated brain scans have entailed an anthropological revisionism reintroducing an organicist understanding of the brain. This understanding had originally been associated with the typological style of thought implicit in racism and eugenics before it was replaced by the functionalist conceptions of cybernetics. Hagner describes this transformation as follows: The cyberneticians' technician perspective on man

did not insist on bodily structures, but on functions; it was not interested in individual features, but in general laws of these functions, including thought, perception, and action; it did not back proportions or topographical constellations in general, but dynamic states, wirings, circuits, and regulatory processes, with respect to which it was irrelevant whether they were implemented through organic substances such as nerve cells or fibers or through machines. [...] Cyberneticians did not look at the brain as an organ anymore, in which intelligence and emotions, thought and drives were inscribed in different locations, but as a functional unit processing information, communicating, and solving problems.³³

³³ Hagner, *Der Geist bei der Arbeit*, 203 (my translation—NL).

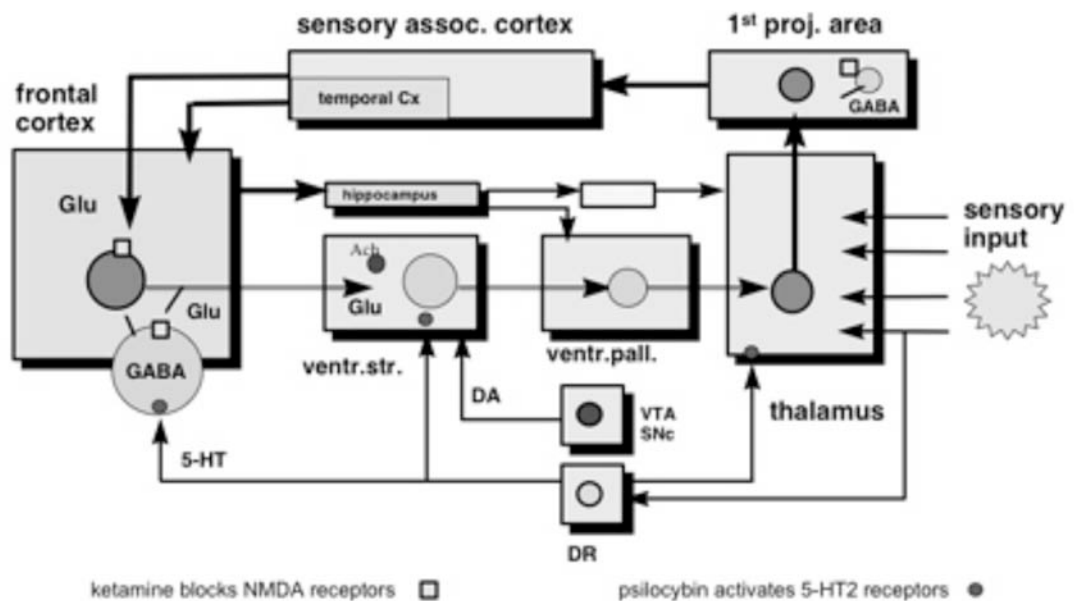
According to Hagner, neuroimaging technologies and their predominant reception in cognitive neuroscience and the public are currently reverting to a pre-cybernetic image of the brain and man, which he conceives of as a disconcerting development.³⁴ However, a closer look at Vollenweider's project—which can be regarded as representative of a much broader movement in the cognitive neurosciences—shows that neuroimaging is far from replacing cybernetic models of neural functioning. Instead the data generated by such measurements of spatially differentiated brain activity is used to correct or corroborate dynamic models of the brain as information-processing system. A key element of Vollenweider's interpretation of the effects of hallucinogenic drugs is the classically neurocybernetic CSTC model of sensory information processing and altered states of consciousness:

Based on the available neuroanatomical evidence and pharmacological findings of psychedelic drug actions, we proposed a cortico-subcortical model of psychosensory information processing that can be used as a working hypothesis to analyze and integrate the effects of different chemical types of hallucinogens at a system level. The model conceptualizes psychedelic states as complex disturbances that arise from more elementary deficits of sensory information processing in cortico-striato-thalamo-cortical (CSTC) feedback loops. [...] [It] includes the view that the thalamus acts as filter or gating mechanism for the extero- and interoceptive information flow to the cerebral cortex and that deficits in thalamic gating may lead to a sensory overload of the cortex, which in turn may ultimately cause the sensory flooding, cognitive fragmentation and ego-dissolution seen in drug-induced altered mental states and psychotic disorders. The filter capability of the thalamus is thought to be under the control of cortico-striato-thalamic (CST) feedback loops.³⁵

³⁴ Ibid., 221 f.

³⁵ Vollenweider, "Recent Advances and Concepts," 24.

Cortico-striato-thalamo-cortical feedback loops (CSTC)



In the CSTC model, the brain—or more precisely: the thalamus—appears as a filter reducing the amount of sensory information, which the sense organs receive constantly. Only a small portion reaches the so-called higher brain areas becoming the object of consciousness. The conception of the brain as filter originates in the psychological and philosophical discourse of the late nineteenth century. A detailed historical analysis of this idea is still a desideratum, but it must have gained some currency considering that it appeared in the writings of the Cambridge philosopher Charlie Dunbar Broad, his French colleague Henri Bergson, and the American psychologist and philosopher William James.³⁶ In the

³⁶ James maintained that consciousness did not depend for its existence upon the brain, but was only filtered through it: “According to the state in which the brain finds itself, the barrier of its obstructiveness may also be supposed to rise or fall. It sinks so low, when the brain is in full activity, that a comparative flood of spiritual energy pours over. At other times, only such occasional waves of thought as sleep permits get by. And when finally a brain stops acting altogether, or decays, that special stream of consciousness which it subserved will vanish entirely from this natural world. But the sphere of being

1950s, the image of the brain as filter was taken up by Aldous Huxley who used it to explain the effects of hallucinogenic drugs after his famous first self-experiment with mescaline:

Reflecting on my experience, I find myself agreeing with the eminent Cambridge philosopher, Dr. C. D. Broad, "that we should do well to consider much more seriously than we have hitherto been inclined to do the type of theory which Bergson put forward in connection with memory and sense perception. The suggestion is that the function of the brain and nervous system and sense organs is in the main eliminative and not productive. Each person is at each moment capable of remembering all that has ever happened to him and of perceiving everything that is happening everywhere in the universe. The function of the brain and nervous system is to protect us from being overwhelmed and confused by this mass of largely useless and irrelevant knowledge, by shutting out most of what we should otherwise perceive or remember at any moment, and leaving only that very small and special selection which is likely to be practically useful." According to such a theory, each one of us is potentially Mind at Large. But in so far as we are animals, our business is at all costs to survive. To make biological survival possible, Mind at Large has to be funneled through the reducing valve of the brain and nervous system. What comes out at the other end is a measly trickle of the kind of consciousness which will help us to stay alive on the surface of this particular planet. [...] Most people, most of the time, know only what comes through the reducing valve and is consecrated as genuinely real by the local language. Certain persons, however, seem to be born with a kind of by-pass that circumvents the reducing valve. In others temporary by-passes may be

that supplied the consciousness would still be intact; and in that more real world with which, even whilst here, it was continuous, the consciousness might, in ways unknown to us, continue still." William James, "Human Immortality: Two Supposed Objections to the Doctrine. Preface to Second Edition," in *William James. Writings 1878-1999*, ed. Gerald Myers (New York: The Library of America, 1999 [1898]), 1111. Together with a copy of this lecture James sent a letter (dated 14 December 1902) to Henri Bergson, in which he wrote: "It may amuse you to see a formulation like your own that the brain is an organ of *filtration* for spiritual life." Quoted in: Gerald Myers, *William James. His Life and Thought* (New Haven: Yale University Press, 1986), 354. Here, James refers to Bergson's lectures on immortality.

acquired either spontaneously, or as the result of deliberate "spiritual exercises," or through hypnosis, or by means of drugs. [...]

[The] effects of mescaline are the sort of effects you could expect to follow the administration of a drug having the power to impair the efficiency of the cerebral reducing valve. When the brain runs out of sugar, the undernourished ego grows weak, can't be bothered to undertake the necessary chores, and loses all interest in those spatial and temporal relationships which mean so much to an organism bent on getting on in the world. As Mind at Large seeps past the no longer watertight valve, all kinds of biologically useless things start to happen. In some cases there may be extra-sensory perceptions. Other persons discover a world of visionary beauty. To others again is revealed the glory, the infinite value and meaningfulness of naked existence, of the given, unconceptualized event. In the final stage of egolessness there is an "obscure knowledge" that All is in all—that All is actually each. This is as near, I take it, as a finite mind can ever come to "perceiving everything that is happening everywhere in the universe."³⁷

Huxley's explanation contains a number of interesting elements that still play an important role in the scientific and non-scientific discourses around hallucinogenic drugs. From the perspective of contemporary neuroscience, which usually emphasizes that the brain constructs its image of the world instead of being merely receptive it seems remarkable how assertively Huxley presents the central nervous system as "eliminative and not productive"—even though elimination and selection could also be seen as playing a crucial and highly creative role in the production of reality. Presenting the brain as a reducing valve rather than a system actively generating a mental picture of the world has both epistemological and ontological implications with respect to the psychedelic experience: If the brain does not autopoietically make up or add anything then the inner experience needs to have an external referent. Accordingly, so-called

³⁷ Huxley, *The Doors of Perception*.

hallucinogenic drugs do not actually produce “hallucinations,” illusions, and delusions, but they provide access to a dimension of reality that remains inaccessible to us in normal waking states, a divine or supernatural sphere not conducive to the biological survival of the human organism, but edifying to man as a spiritual animal striving for more ethereal goals than self-preservation and procreation. Even though Vollenweider did not adopt the assumption that hallucinogens reveal any higher or deeper levels of reality other than the unconscious material occasionally coming to the fore on trips he did take up the idea of the brain as a filter, which he rearticulates in the cybernetic vocabulary of the information age.

The CSTC model depicts the brain as an information-processing system, in which the “thalamic filter” protects the cerebral cortex from sensory overload, which would result in the formation of psychotic symptoms.³⁸ As a cybernetic model it implicates a theory providing a set of testable hypotheses. Based on the circuit diagram of the cortico-striato-thalamo-cortical feedback loops showing the activating and inhibiting connections between different brain areas and the neurotransmitters, which enable these areas to regulate each other, Vollenweider postulated that a reduction of glutamatergic neurotransmission by the NMDA antagonist ketamine as well as a stimulation of the serotonergic system by the 5-HT_{2A} agonist psilocybin should both result in an opening of the thalamic filter and, subsequently, in sensory overload and metabolic activation of the frontal cortex.

³⁸ For a genealogy of the conception of the brain as information-processing system, see Markus Christen, “The Role of Spike Patterns in Neuronal Information Processing. A Historically Embedded Conceptual Clarification ” (Ph.D. thesis, Swiss Federal Institute of Technology, 2006).

Moving from cybernetic representation to pharmacological intervention Vollenweider tested this hypothesis experimentally by measuring the outcome with positron emission tomography and psychometric questionnaires such as the APZ. The mathematical correlation between metabolic changes in different anatomical locations and the quantified introspective accounts of the test subjects' experiences served less to equate one region with one function, but opened up a perspective on the brain at a systems level.

[T]he central hypothesis of a frontocortical activation in psychedelic states could be confirmed. Both ketamine and psilocybin led to a marked metabolic activation of the frontal cortex and a number of overlapping regions. To elucidate the relationship between regional metabolic activation of the brain and specific states of consciousness a correlational analysis was performed. One of the main findings of this computation was that ego dissolution and derealization phenomena correlated with the increase of metabolic activity in the frontal cortex including anterior cingulate, and also with changes in the temporal cortex and basal ganglia. These findings demonstrated that not a single brain region, but distributed neuronal networks are involved in psychedelic and psychotic symptom formation.³⁹

Unlike classical neuropsychology which inferred the cerebral location of a mental function from correlating circumscribed brain lesions to resulting functional deficits the systemic approach enabled by neurocybernetics and functional imaging (which allows to look at the brain as a whole) has led to the development of theories that explain the interplay of different parts of the brain executing a certain function.⁴⁰

³⁹ Vollenweider, "Recent Advances and Concepts," 25.

⁴⁰ Beaulieu, "Images Are Not the (Only) Truth," 73.

Michael Hagner argues that neuroimaging has neither led to any major theoretical breakthroughs in the neurosciences nor has it produced a substantially new image of man.⁴¹ Rather, Hagner contends, it threatens to entail a relapse into the organicist typologies of phrenology, a physiognomy turned inward. From the particular vantage point of my case study, a less epochal account seems appropriate. Functional neuroimaging has not replaced introspection and cybernetic models of brain functions and the theories they incorporate, but gave rise to a heterogeneous, but productive assemblage with these historically older elements. Correlated with an itemized and quantified form of introspection functional imaging provides empirical data supporting or undermining a neurocybernetic model.

Peace of Mind and Clash of Worldviews

When returning to Zurich two months after my participation in Cahn's experiment, he has already begun to work on the second part of his study. I was the last of eighteen test subjects included in the first arm. The other seventeen were mostly students recruited from an online job exchange (www.marktplatz.ch) for approximately \$320 each.⁴² Subjects for the second arm of the study are less readily available as they need to have many years of meditation experience. Nevertheless, Rael manages to recruit a number of long-term meditators from

⁴¹ Hagner, *Der Geist bei der Arbeit*, 34-37, 164.

⁴² The fact that test subjects can be recruited from the local student population is one of the major advantages of location of Swiss hallucinogen researchers over their German colleagues where only qualified physicians and medical personnel are allowed to take part in experiments with hallucinogenic drugs. In the United States, the situation differs from institution to institution. Often, only "experienced" subjects are permitted to avoid spoiling the drug-naïve population.

Swiss meditation centers, among the readers of magazines such as *Buddhismus Aktuell* as well as a famous monk from the entourage of the Dalai Lama who came to Zurich on the occasion of the *Buddhism and Neuroscience* conference in 2005. The plan is to compare the brainwaves of these supposedly “supranormal” individuals during meditation with those of “normal” test subjects under the influence of psilocybin and to see how the meditators themselves are doing on the drug. The underlying assumption is the psychophysiological traits, which have been shaped over the years by regular spiritual exercises, will be actualized in the specific mind/brain states examined during the experiment.⁴³

“This is it!”—A Zen Master Meets Jesus

One day in December, Rael invites me to observe one of his measurements because he has a particularly interesting test subject over that day. When I arrive in the EEG lab the experiment has already started. The room is only lit by the computer screen showing the subject’s brain waves. Looking through the observation window I cannot see anything at first glance. But as my eyes get used to the darkness I begin to make out the shaven-headed Zen master dimly illuminated by the monitor in front of him sitting bolt upright in the leather armchair. A tangled mass of wires seems to be coming out of the back of his head disappearing in the dark. On this day, Jan, a Swiss meditation teacher in his fifties, has been administered psilocybin. Rael is excited: During the meditation period Jan’s brain waves are particularly “calm,” as Rael says,

⁴³ Here, states are examined in relation to traits acquired by a particular class of individuals identified as “long-term meditators.”

showing comparatively strong activity in the alpha range.⁴⁴ And—what is even more important—like the previously measured meditator he reports an experience of cosmic unity. Since the preliminary analysis of the data from the normal test subjects on psilocybin has been rather disappointing with respect to their oceanic boundlessness scores Rael is gaining new hope that eventually he will be able to obtain EEG recordings of a number of subjects merging in the universe. Unlike me, Jan looks serene and happy after the measurement. Rael interviews him to learn more about the experience that went along with those unusual EEG patterns. Jan recounts that at the beginning he saw hideous faces and carnivalesque processions of ghosts. But then he remembered the *Tibetan Book of the Dead* and reminded himself that these were only projections of his ego. Eventually, he resorted to a simple mantra that he had learned as a novice, a meditation over two words coupled with special attention to the physiological process of inhalation and exhalation. Thereby, he managed to repel the spooky spectacle and was elevated to a “higher state of consciousness.” Much to his surprise and even disappointment his experience of unity was associated with the name of Jesus—even though Jan does not conceive of himself as Christian. It must have to do with his upbringing in a Christian family, he muses. He was relieved and delighted when subsequently thinking of Buddha further deepened this state of ego-dissolution. Compared to his everyday consciousness, he says, he gained a much more profound insight into the fact that the ground of all existence is love. “Divine love,” he specifies, “or even better: being.” This occurred to him as an eternal truth: “It has always been that way and it will

⁴⁴ To protect the privacy of the test subject the name has been changed.

always be that way. When reaching that state,” he tells us, “I thought: ‘This is it! This is it!’” The state he had been striving for during three decades of meditation exercises.

Buddhism and Cannibalism

Several weeks later I attend another measurement in the EEG lab. I am already familiar with the test subject, a German Buddhist in her mid-thirties. Having been trained as a physician I examined Karin medically on the previous day to make sure she was physically and psychiatrically healthy.⁴⁵ This was part of the rigorous screening process every test subject had to undergo before being admitted to the study to prevent critical incidents threatening the well-being of participants. As there is a lack of qualified medical doctors in the laboratory (most researchers are psychologists and biologists) I sometimes help out taking over such health checks or giving intravenous drug injections in another study. Karin has come all the way from Germany to serve as a test subject because she is eager to experience the effects of psilocybin in a controlled setting. But only this one time, she says, after all she is a Buddhist—which does not keep her from regularly smoking joints though. While Rael is preparing the EEG lab we chat with Karin. She asks him if her electroencephalogram will allow him to see whether she is “on the right path” with respect to her meditation. She explains that she regularly poses this question to the Tibetan lamas teaching the meditation courses she attends in Germany. But Rael fends off. He is not a lama. All he can tell her, he says, is that her EEG (just as Jan’s) shows pronounced

⁴⁵ Again, the name of the test subject has been changed to protect her privacy.

alpha waves. But this might have many reasons: It could well have to do with her daily practice of meditation, but it might also be due to her cannabis consumption or genetic predisposition. As far as drugs are concerned Karin expresses her conviction that they can only affect the mind if one allows them to. Once she took cocaine, she says, shortly after going to sleep without any sleeping pills. She is very critical of biological psychiatry. As a Buddhist she believes that the mind exists independently of the body. Before the measurement begins Karin prepares herself for the meditation. Instead of the heavy leather armchair her meditation cushion is lying on the floor in front of a little altar with a picture of the Dalai Lama. She sits down in meditation posture and begins to read out a Tibetan text invoking and thanking a lengthy list of lamas before telling those present to kill and eat the reader in case they were hungry. Those who have enough time should fry the meat while those in a hurry are recommended to eat it raw. This brute offer is supposed to serve as an exercise of detachment from the body. As a Buddhist, Karin explains to me later on, one contemplates death a lot.

Rebuffing Drug Mysticism

Unfortunately, I cannot not attend the actual measurement (which turns out to be a placebo day anyways) because I have already scheduled an interview with another researcher in the lab. Philipp Csomor is a neurobiologist doing a Ph.D. on two different “filter paradigms”—prepulse inhibition (PPI) and P50 suppression (the former will be discussed in more detail in the next chapter)—and the role of these paradigms in schizophrenia research. I first met Philipp on the day of my arrival when I had lunch with some people from the research team. In the

cafeteria, the conversation turned to the recent attendance of the Dalai Lama at a conference in Zurich. I asked whether this was the *Buddhism and Neuroscience* conference I had read about in a newspaper and Philipp snapped: “Buddhism and Pseudoscience” getting into a biting, but comic rant against the Tibetans’ spiritual leader. A few months later, Philipp approached me as a social scientist to ask whether I thought that the “drug mysticism” prevalent in hallucinogen research did harm to serious scientific investigations in the field. In the interview with him, he tells me about his own experiences with psilocybin and ketamine he had as a test subject in his colleagues’ studies.

NL: Have these experiences brought “drug mysticism” any closer to you? Can you understand people holding the view that hallucinogenic drugs open up a transcendent reality any better now?

PC: No, in fact, I understand them even less. Let’s assume I’m having a beautiful trip. I’m lying there, feeling well, seeing nice colors, interesting shapes, and the music sounds very special to me. I’m also having some unusual ideas. But at any moment of the experiment I know that I am in this state because I took psilocybin. I could attribute every experience to neurotransmitters and not to some higher power. For this reason, I didn’t feel connected with something supernatural. I rationally ascribed my experience to 5-HT_{2A} receptors. I had some rather bizarre thoughts. I saw an underground railway map in front of me. Different stops represented different individuals. Then I realized how complex social interactions are in our society. You’re in touch with a great many people, but you don’t deal with all of them in the same way. For example, some things you tell certain people, but not others. The vision illustrated the complexity of society nicely. It was quite illustrative and felt very deep and I still think that it’s true. But it was just an insight and that’s it. And even if I had thought that there was a higher entity controlling our fate or something like that I would have told myself afterwards: “Funny, you’ve really been going around the bend.” All of this can be explained

by the fact that certain processes establish connections between certain cells. I wouldn't have mystified this.

NL: You once asked me whether I believe that such mystifications are detrimental to drug research? How do *you* evaluate “drug mysticism”?

PC: In the context of research—not in the case of the Incas in the jungle—I think of the mystification of drug experiences quite negatively. Our existence here in the lab is somewhat insular but there are a lot of people out there who are against such experiments and who're just waiting to shoot down those associated with them and to restrict this kind of research. Mystification of an issue that, in this context, is treated in a natural scientific manner is a rather delicate issue. Mysticism and the natural sciences are at odds with each other.

NL: That is contrary to what Albert Hofmann said at the LSD Symposium. He claimed that every natural scientist had to be a mystic as well marveling at the wonder of creation.

PC: Then we need to define more clearly what is meant by the term mystic. You don't need drugs to experience the wonder of nature. I can simply sit down thinking about the perversity of the fact that we exist at all. Just watch one of these films about the universe. Everywhere it's cold, and dreadful and here there were a couple of single cell organisms and today we're driving around in cars! That's completely incredible and crazy! But for this insight I don't need drugs.

The mystification of drugs in the context of brain research makes such investigations appear to be rather dubious. What I find interesting about this field is that a number of figures are treated like icons. They are being adored and worshipped. Take Albert Hofmann, for example. There are people getting down on their knees in front of him kissing his feet and the conference hall is filled by a cheering crowd and some are dancing on the stage, as I've heard. There is a discipleship. There is no doubt that Hofmann has made a large number of highly significant contributions to drug research from a natural scientific point of view. But let's compare him to, for example, Martin Schwab [a renowned neuroscientist at the University of Zurich] since I did an internship in Schwab's department. I can take any neuroscience textbook covering the regeneration of the spinal cord and I will find his name. When it will be possible to cure paraplegia he will have contributed a lot to that. But are there people dancing for him at a congress or

kissing his feet? No, that doesn't happen. Why? Because these groups with mystical leanings need a god whom they can adore. They need a leader. But if you work as a natural scientist you don't need this kind of thing. Hofmann and Schwab—they are both doing research on neural systems, but their followers are completely different. Mystification makes drug research look fishy.

In the Vollenweider group, Philipp is well known for his outspokenness. But his bold statements are symptomatic of a bigger complex of ideological tensions prevalent in the lab and the hallucinogen research community as a whole dividing those accused of “drug mysticism” from those denounced as “materialists.” Against the background of their disparate worldviews, these two camps interpret the effects of the drugs they study in the lab differently. At the same time, their members explain these interpretatory differences by providing accounts of themselves and their antagonists. These second-order observations are also informed by the groups or rather: the individuals' worldviews—since everybody in the lab has their own distinct perspective on hallucinogens and the experiences they give rise to.

Another purported materialist in the lab is the aforementioned pharmacopsychologist Boris Quednow. There is an anecdote about him according to which he exploded during a discussion over a neo-shamanistic ayahuasca clinic in Peru exclaiming: “Why don't you stop this esoteric jabbering! We're nothing but senseless [*sinnentleert*] bio-automatons!” However, as indicated above, Boris is a complex figure. As a neuroscientist he thinks of the mind as a function of the brain and has little sympathies for the evocation of power animals and supernatural forces. But having studied psychology and having undergone psychoanalysis himself his way of thinking about himself and

others owes more to his socialization in the “psy disciplines” than to brain research. When I asked him about his skepticism with respect to hallucinogen consumption he provided a highly self-reflective account of his own distance toward these substances (which I need to omit here) and a psychological theory of why others seek meaning in psychedelic experiences.

As you know, I resist drug mysticism. I think that a lot of people attribute a kind of significance to their drug experiences that is completely inapt. That is not to say that these aren’t interesting experiences and that they can’t be integrated fruitfully into one’s life. In this respect, I’ve changed my mind in recent years. I’ve come to think that hallucinogens actually can help. My reservation, however, might be due to the fact that I tend to be rather self-centered, partly because I’m introverted, partly for narcissistic reasons. Therefore, I’m more concerned with myself, with who I am and why I am the way I am than the average citizen. Of course, this is also because of my field of study. Others, who are less motivated to constantly scrutinize themselves, might have a hallucinogenic experience and suddenly they are confronted with themselves, with unfamiliar facets of their personality, with their past, undigested episodes, etc. Then they are forced to reintegrate these experiences. I don’t want to deny that this can be very valuable. But basically I think that drug mysticism is based on the overestimation of an experience, which you can also have—maybe not as intensively and over a longer period of time—when you deal with yourself and your past, when you’re able to allow for certain fears and to look at particular aspects of your identity without being afraid. I also think that—as always—people tend to attribute a deeper meaning to experiences, which they don’t understand. And why should a hallucinogen trip be received any more fruitfully? Most people neither understand themselves nor their environment. Why should that be any different under hallucinogens? Only because it feels so much more intensive and immediate? I can’t believe that. Unfortunately, I have to talk about something here that I have never experienced myself. I have never taken any hallucinogens. By now, I would very much like to try though. I’m planning to do so in the near future, if I feel like it, in the next twelve months. Maybe I talk differently then, but I can’t

imagine. I'm convinced that most people taking hallucinogens are simply consuming these drugs, just like alcohol. Often, this whole talk about self-experience is nothing but a cover-up for a completely oral satisfaction of a hunger for experience.

Modern and Counter-modern Disappointments

The statements against so-called drug mysticism quoted above are forward. Partly, this is due to the idiosyncratic characters involved. Boris and Philipp are no pussyfooters. But, of course, their habitus has also been shaped by the social conditions of their field. Researchers with a spiritualist agenda have found some niches in recent years, but their stance continues to be marginal in the neurosciences. Their subjective accounts (e.g., Rael's reference to his own unitive experience) carry little weight when it comes to hard-hitting discussions with unbelieving colleagues. As the pharmacologist Felix Hasler puts it: "They think only because they experienced something like this it needs to be true. But when you see God on a trip you cannot simply conclude that he exists." The brain can delude the subject all too easily. Given the predominance of this form of sober rationalism the proponents of mysticism do not speak out as loudly as their adversaries. They voice their resentments against such "reductionism" less openly. They frequently do criticize the pettiness and futility of certain experimental paradigms though (most prominently the filter paradigm PPI).

But often these are the very paradigms with which they have to work themselves—if only because Vollenweider insists on employing well-established approaches producing scientifically sound data that can be published in high-ranking journals. Despite his personal reservations against the pathologization of

the psychedelic experience as an experimentally induced psychosis Cahn refers to the model psychosis paradigm throughout his dissertation.⁴⁶ It seems as if his worldview and values had only determined the choice of the subject matter, but neither the form of the investigation nor the interpretation of the data it generates. Such concessions might simply be the product of academic hierarchies. After all, Vollenweider and Cahn's dissertation advisor Geyer have both embraced the model psychosis paradigm as a strategy of presenting hallucinogen research, which is even tolerated by many of those opposing the use of psychedelic drugs. However, as Cahn wants his work to make a difference inside as well as outside of science he also has an interest in framing it in a widely acceptable way by using conventional methods of cognitive neuroscience.

Nevertheless, it would be wrong to explain the use of these experimental paradigms in research on consciousness and altered states by social restrictions alone. In a way, people like Vollenweider and Hasler share the dissatisfaction of those colleagues who are unhappy with the current modus operandi of hallucinogen research. But, as Hasler points out, the current problem is not that the royal road to the scientific investigation of (altered states of) consciousness is blocked for political reasons, but that there is no royal road in the first place—just a maze of side paths, many of which turn out to be dead ends. Vollenweider complains that so far the psychedelic experience has remained elusive:

It's extremely difficult to capture this inner truth or subjective reality. It can be mapped with rating scales and neuropsychological experiments, but these

⁴⁶ Rael Cahn, "Neurophysiological Correlates to Sensory and Cognitive Processing in Altered States of Consciousness" (Ph.D. thesis, University of California, San Diego, 2006).

experimental interventions make these states collapse. There is something like Heisenberg's uncertainty principle in hallucinogen research: When you're observing the neurophysiology the experience escapes you and vice versa. That's somewhat disappointing.

Additionally, what is measured neurophysiologically often does not correspond with the frequently reported experience of enhancement of certain sensory or cognitive capabilities: In performance test, inebriated subjects fare badly. Most of the time, scientific scrutiny makes drug-induced revelations appear to be mere misperceptions and delusions. This disenchantment and pathologization of altered states of consciousness makes those who unshakably believe in the overwhelming truth of their own experience quarrel with the abstract results of scientific inquiry. The discrepancy between science and experience has led many in the psychedelic field to turn their back on science holding on to the enchanted world they experienced first-hand. In some ears, Timothy Leary's emphatic farewell to academic research—"We're through playing the science game!"—must still be lingering on.

Disenchantment and Spiritualization of the Brain

So far my account of hallucinogen research in the Vollenweider lab has been consistent with the grand narrative of the disenchantment of the world [*Entzauberung der Welt*], a story originating from late eighteenth and early nineteenth century Germany, which Max Weber turned into the master trope of his account of modernity as a process of gradual rationalization: Disenchantment is man's tragic emergence from the spell of magic, inebriation, and superstition

for the price of loss of cosmological orientation.⁴⁷ Weber defines disenchantment as the belief “that principally there are no mysterious incalculable forces that come into play, but rather that one can, in principle, master all things by calculation.”⁴⁸ Adolf Dittrich presents his study of altered states of consciousness with the tools of quantitative psychology against the background of this matrix: “If the work in hand—as many before it—demonstrates that the ‘irrational’ can be examined rationally in the sense of a Western understanding of science then it has fulfilled its primary goal.”⁴⁹ In the passage already quoted at the very beginning of this book Heffter founder Dave Nichols also presents contemporary hallucinogen research—including Vollenweider’s project—in terms of rationalization and disenchantment: “The tools of today’s neuroscience, including in vivo brain imaging technologies, have put a modern face on the hallucinogens. Scientists can no longer see them as ‘magic’ drugs but rather as 5-HT_{2A} receptor-specific molecules that affect membrane potentials, neuronal firing frequencies, and neurotransmitter release in particular areas of the brain. One can now begin to speculate in reasonable ways about how these cellular changes transform our perceptions of reality and produce ASC.” And Vollenweider’s own perspective on drug-induced visions is also characterized by a psychoanalytically oriented sobriety. During one of his own trips he was transformed into various kinds of animals, including fish swimming in the sea, and relived the whole evolution of life. Once, he also experienced a state of ecstasy feeling love and bliss diffusing

⁴⁷ The narrative of disenchantment is rooted in the writings of Christoph Martin Wieland, Friedrich Schiller, and August Wilhelm Schlegel, for example.

⁴⁸ Weber, “Science as a Vocation,” 139.

⁴⁹ Dittrich, *Ätiologie-unabhängige Strukturen veränderter Wachbewußtseinszustände*, 213 (my translation—NL).

himself and the entire universe. But he interprets these experiences as pipe dreams rather than revelations of a higher spiritual realm: "It was real in my experience, but it was self-created, and it also satisfies my wishes. I cannot expand it into an intelligence that just wants everybody so happy."⁵⁰

Such disillusionment entails sorrow. Accordingly, the Weberian account of disenchantment is ambiguous: The emancipation from dark and uncontrollable forces is paid for with a hollowing of the universe. Whereas familiarity with a cosmos manifesting a divine order also provided normative guidance on the way to happiness and a good life scientific knowledge about a world represented as mere matter and mechanism does not offer any meaning nor can it legitimate any course of action. "Ought" ceases to follow from "is," facts and values are unbridgeably separated. Science can tell you how to technically achieve a certain goal, but not whether this goal is also worth pursuing. Weber identifies the resulting problematization of the relationship between science and the conduct of life as a major challenge to anthropos today.

Long-standing problematizations as this one always engender a multitude of responses. Hence, it is no surprise that the rationalization and disenchantment of the world institutionalized in science and bureaucracy has also given rise to a counter-modern reaction. In fact, Weber's famous exposition of the problem in his 1917 talk "Science as a Vocation" addressed an academic youth increasingly disappointed by science as "an unreal realm of artificial abstractions, which with their bony hands seek to grasp the blood-and-the-sap of true life without ever

⁵⁰ Quoted in: John Horgan, *Rational Mysticism. Dispatches from the Border between Science and Spirituality* (Boston: Houghton Mifflin Company, 2003), 154.

catching up with it.” Consequently, they were prone to the cult of lived experience, especially mysticisms of every shade and color, all too willing to follow prophetic “personalities” pretending to have “experienced life” and offering unequivocal orientation.⁵¹ Weber perceived this craving for experience in general and spiritual experiences in particular as an immature backlash against the complex of science and secularization, which he saw as the backbone of modernity. But note that this reaction is a modern phenomenon itself. As Dirk Baecker suggests: Since religious norms have been established as contingent—being subjected to second-order observation—the dominant forms of religious life are defiant fundamentalism and an experientially oriented spirituality withdrawing into the unobservability of an “oceanic feeling.”⁵² This uncoupling of spiritual experience from the life-orders of specific denominations is a historically recent phenomenon. And yet, in Weber’s eyes, it is incompatible with its equally modern counterpoint. Any attempt to capitalize on science to further a religious or diffusely spiritual agenda is bound to fail:

And finally, science as a way “to God”? Science, this specifically irreligious power? That science today is irreligious no one will doubt in his innermost being, even if he will not admit it to himself. Redemption from the rationalism and intellectualism of science is the fundamental presupposition of living in union with the divine. This, or something similar in meaning, is one of the fundamental watchwords one hears among German youth, whose feelings are attuned to religion or who crave religious experiences. They crave not only religious experience but experience [*Erlebnis*] as such. The only thing that is strange is the

⁵¹ Weber, “Science as a Vocation,” 137, 141. For a historical contextualization of Weber’s “Science as a Vocation,” see Wolfgang Schluchter, *Unversöhnte Moderne* (Frankfurt/M.: Suhrkamp, 1996).

⁵² Dirk Baecker, *Wozu Kultur?* (Berlin: Kulturverlag Kadmos, 2000), 52.

method that is followed: the spheres of the irrational, the only spheres that intellectualism has not yet touched, are now raised into consciousness and put under its lens. For in practice this is where the modern intellectualist form of romantic irrationalism leads. This method of emancipation from intellectualism may well bring about the very opposite of what those who take to it conceive as its goal.⁵³

Almost a century later, the verdict on Weber's assessment is still pending. Much of what has happened in the history of hallucinogen research seems to support Weber's decidedly modern perspective on the irreconcilability of religion and science. Walter Pahnke's "Good Friday experiment," which was supposed to demonstrate that hallucinogens could elicit genuine religious epiphanies that theologians were now meant study empirically with the tools of pharmacology, remained scientifically inconsequential after the cutback of research on psychedelics around 1970. Despite their ongoing informal use as "entheogens," as drugs revealing the "god within," the trickle of academic research that continued after the prohibition focused on their mechanism of action and usually implicated a pathologizing interpretation of their effects. If they decided to stay in science even investigators who had originally been drawn into hallucinogen research by the magic or spiritual quality of their own drug experiences usually ended up contributing to the disenchantment of their adored substances. Confessing to one's belief in a supernatural realm disclosed by the use of illegal drugs was not conducive to one's scientific career. Even without drugs one was better off keeping science and religion apart.

⁵³ Weber, "Science as a Vocation," 143.

In recent years, however, the climate has changed. A number of cognitive neuroscience laboratories have begun to study the neural correlates of the altered states of consciousness induced by meditation and other spiritual practices. The growing attention paid to this area has two roots. On the one hand, meditation is looked at as a work on the self leading to increased concentration, heightened cognition and awareness, as well as emotional control. As such it is part of a broader interest in enhancement technologies (also comprising so-called cosmetic psychopharmacology) embedded in a culture of self-improvement. On the other hand, the burgeoning neuroscientific interest in spiritual practices in the last decade has to do with the changing role of religion in certain corners of the life sciences. Some of the brain scientists who came of age during the “fourth great awakening” in American religious life following the turn toward unchurched forms of spirituality have now become powerful figures in their fields setting their own research agendas.⁵⁴ Unlike ten to twenty years ago, saying that one believes in a “spiritual reality” and questioning the materialism inherent in traditional neuroscience does not necessarily make a brain researcher *persona non grata* in academic circles anymore. In fact, it can even help obtain funding from private organizations such as the Mind and Life Institute financing experiments and conferences that explore the mental activities of Buddhist meditators or the John Templeton Foundation run by an evangelical philanthropist promoting efforts to bridge the gap between science and religion.⁵⁵

⁵⁴ Cf. Fuller, *Stairways to Heaven*, 84-89.

⁵⁵ Richard Monastersky, "Religion on the Brain," *The Chronicle of Higher Education* 52, no. 38 (2006). Christian Schüle, "Geld lehrt beten. Wie die amerikanische Templeton Foundation ihren Reichtum einsetzt, um die Wissenschaft auf den Weg des Glaubens zu

In an academic milieu providing hospitable niches to those interested in the scientific investigation of religious experiences, a number of researchers have come to apply the tools of cognitive neuroscience, especially neuroimaging technologies and EEG, to spiritual practices such as meditation and praying finding increased frontal lobe activation and intense and spreading gamma oscillations. Such studies of the neural correlates of the *unio mystica* rescue spiritual experiences from the realm of the subjective (or even imaginary) endowing them with some kind of reality, which is interpreted in two contradictory ways: either as reducing spirituality to an epiphenomenon of neural processes or as proof that the brain can be turned into a sense organ capable of perceiving the immaterial, but nonetheless real dimensions revealed in such altered states. The camp maintaining the second position (also held by Cahn) stands in the tradition of William James' radical empiricism presuming that there is a reality to the subject matter of any experience.⁵⁶

This mutual embrace of science and religion has also entered the approximately contemporaneous resurgence of hallucinogen research. Around 2005, Roland Griffiths, a professor of psychiatry at Johns Hopkins Medical School, took up Pahnke's project and conducted a study to demonstrate that psilocybin can occasion mystical type experiences. The study design self-consciously exploited set and setting as two major factors shaping hallucinogen-induced experiences: The 36 test subjects carefully selected out of 135

bringen," *DIE ZEIT*, 4 May 2006. However, it must be noted that the first EEG field recordings of Yogis were conducted in India in the 1950s.

⁵⁶ See William James, *Essays in Radical Empiricism* (New York: Dover Publications, 2003).

applicants all indicated “at least intermittent participation in religious or spiritual activities such as religious services, prayer, meditation, church choir, or educational discussion groups.” These “religiously musical” volunteers were given psilocybin (or methylphenidate (Ritalin®) as active placebo) in a living room-like environment where they were encouraged to lie down and direct their attention inwards while listening to classical music. Unlike in Rael Cahn’s experiment no instrumental measurements were recorded. The data collected was based on two study monitors’ observations and ratings of the subjects’ behavior as well as subjects’ introspective accounts registered psychometrically by way of a whole battery of questionnaires and self-rating scales (including Dittrich’s APZ). The reported results were striking: 22 of the 36 participants were said to have had a “complete” mystical experience and

67% of the volunteers rated the experience with psilocybin to be either the single most meaningful experience of his or her life or among the top five most meaningful experiences of his or her life. In written comments, the volunteers judged the meaningfulness of the experience to be similar, for example, to the birth of a first child or death of a parent. [...] [T]he volunteers often described aspects of the experience related to a sense of unity without content (pure consciousness) and/or unity of all things.⁵⁷

Looking back at their experiences after two months “[s]eventy-nine percent of the volunteers rated that the psilocybin experience increased their current sense of personal well being or life satisfaction “moderately” (50%) or “very much” (29%), in contrast to 17 and 4%, respectively, after methylphenidate.”

⁵⁷ Roland Griffiths et al., "Psilocybin can occasion mystical-type experiences having substantial and sustained personal meaning and spiritual significance," *Psychopharmacology* 187, no. 3 (2006): 276-277.

The results of Griffiths' study have received much attention. It was published in the renowned journal *Psychopharmacology* accompanied by an editorial titled "Towards a Science of Spiritual Experience" and several approving commentaries by eminent figures in the field of neuropsychopharmacology including Solomon Snyder who discovered the opiate and serotonin receptors, Dave Nichols presenting Griffiths' work as a watershed for more clinical studies, and Charles Schuster, the former director of the National Institute of Drug Abuse who praised the study as a "landmark paper" expressing hope that it would "renew interest in a fascinating and potentially useful class of psychotropic agents." Of course, these presentations were eagerly taken up by science journalists now periodically trumpeting a "revival" of hallucinogen research: "Breaking of taboo in lab: US researchers dared experiments with psychedelic drugs again. Their test subjects ventured into a mystical dreamland."⁵⁸ This sensationalism did not fail to trigger some of the well conditioned prohibitionist reflexes. In the popular science journal *The Scientist*, for example, a bioethicist worried about the return of psilocybin to mainstream clinical research: "When it comes to hallucinogens, if the research sends the wrong message, drop it. Or rather, don't."⁵⁹ However, the fact that the study was approved by the FDA and the medical school's institutional review board and that it not only received permission, but even financial support from the National Institute of Drug Abuse indicates a remarkable increase in acceptance of hallucinogen research in the

⁵⁸ Günther Stockinger, "Pille zu Gott," *Der Spiegel*, 14 August 2006. Ron Winslow, "Go Ask Alice: Mushroom Drug Is Studied Anew," *The Wall Street Journal*, 11 July 2006.

⁵⁹ Glenn McGee, "Shroom Science: Safe and Effective? Fifty years after its introduction to science, psilocybin returns to mainstream clinical research," *The Scientist* 21, no. 2 (2007).

United States—despite or possibly: because of the religious framing of Griffiths' study.

Its spiritual impetus also gained the project a second source of funding: the San Francisco-based Council on Spiritual Practices, “a collaboration among spiritual guides, experts in the behavioral and biomedical sciences, and scholars of religion, dedicated to making direct experience of the sacred more available to more people.”⁶⁰ The organization was founded in 1994 by Bob Jesse who, for this purpose, left his position as vice president of business development at Oracle, the world's second largest software company after Microsoft. As in the examples of Wright and Wallace discussed in chapter 3, private money originating from the economic boom of information technology in late twentieth century California (most notably in Silicon Valley) was used to finance hallucinogen research at a prestigious academic institution. Likewise, Rael Cahn's comparison of psilocybin inebriation with meditation is supported by another private foundation: The aim of the Fetzer Institute is “to foster awareness of the power of love and forgiveness” assuming “that efforts to address the world's critical issues must go beyond political, social, and economic strategies to their psychological and spiritual roots.”⁶¹ Even though the motivations differ—a libertarian politics in Wright's case or spiritual agendas in the cases of the

⁶⁰ *Council on Spiritual Practices* ([cited 28 February 2007]); available from www.csp.org.

⁶¹ The Fetzer Institute, *Mission Statement* ([cited 8 May 2007]); available from <http://www.fetzer.org/AboutUs.aspx?PageID=About&NavID=7>.

Council and Fetzer—these kinds of patronage constitute a novel form suffusing scientific research with explicitly stated values and worldviews.⁶²

At first glance, the formation of such assemblages of neuropsychopharmacological research facilities, new economy fortunes, and religious sentiments runs counter to the grand narrative of disenchantment. Instead of generating a strictly materialist and mechanistic account of the world science—or rather: certain scientists, but by no means outsiders to the scientific community and its institutions produce an image of the human brain as a spiritual organ capable of experiencing supernatural realms and forces ignored or dismissed by the promoters of disenchantment. Instead of being a unilinear path of rationalization modernity seems to have broken up into disparate trajectories not only bringing about disunity between different “value-spheres” (Weber) such as art, politics, and science, but even dividing science internally (in this case, hallucinogen research as a particular subfield within the discipline of neuropsychopharmacology). In his 1979 report on knowledge *The Postmodern Condition*, the French philosopher Jean-François Lyotard diagnosed the loss of credibility of “grand narratives” such as the tale of disenchantment (and the concomitant political emancipation from the authority of shamans, priests, and other masters of those “mysterious, incalculable forces” exorcized by Enlightenment science). These stories legitimate the universalistic ambitions of modern science and give meaning to this endeavor, which itself is perceived as undermining the inherent meaningfulness of the cosmos. But despite this twofold

⁶² I speak of the emergence of a new “form” in the sense of Paul Rabinow, *French DNA. Trouble in Purgatory* (Chicago: University of Chicago Press, 1999).

erosion of meaning through scientization and the end of the grand narratives Lyotard's postmodern world is "a stranger to disenchantment."⁶³ It has not lapsed into a blind means-ends pursuit of material interests, but is animated by a multitude of conflicting "little narratives" making sense of and justifying different, often antagonistic enterprises in the field of knowledge production. As shown above, the current relegitimation of hallucinogen research has been going along with the making of several such stories—including the tale of the re-enchantment and spiritualization of the brain—helping to gain approval from authorities and publics and to secure funding.

Even though this reading calls into question whether the grand narrative of disenchantment is an accurate description of modernity at large it remains true to Max Weber's account. Weber's conception of the disenchantment of the world is not an ontological one, but the ideal-typical portrayal of a certain way of looking at the world that has gained currency in the historical process of rationalization.⁶⁴ Weber wrote about disenchantment from the perspective of a second-order observer and was critical of it (as the complex evaluative undertones of the term already indicate). The fact that we find agonistic interpretations of drug action in the field of hallucinogen research (but comparable cases could easily be made for other classes of psychotropic drugs as well) is not surprising considering that scientific thought has never been purged of values and worldviews altogether, which is especially true for a field so deeply concerned with human life and well-

⁶³ Jean-François Lyotard, *The Postmodern Condition. A Report on Knowledge* (Minneapolis: University of Minnesota Press, 1984), xxiv.

⁶⁴ Joachim Vahland, *Max Webers entzauberte Welt* (Würzburg: Königshausen & Neumann, 2001), 144-145.

being as psychopharmacology. According to Weber, the process of rationalization gave rise to a profusion of starkly contrasting, radically subjective points of view. If normative orientation cannot be derived anymore from a supposed divine or cosmological order transcending man the conduct of life becomes a matter of contingency entailing a pluralization of life forms. "If one proceeds from pure experience one arrives at polytheism," Weber remarked.⁶⁵ The internalization of the divine set in train by the Reformation, the metamorphosis from the infinitely distant *deus absconditus* of the Middle Ages to a "god within" revealed by "entheogenic" drugs anchors religiosity in the subjectivity of spiritual experiences not everybody has (even under the influence of psychedelics). Unavoidably, the emphasis on experience produces dissonances: a "struggle that the gods and the various orders and values are engaged in," which cannot be decided scientifically, as Weber maintained.⁶⁶ Regaining orientation in the disenchanted world of science requires interpretation informed by inevitably perspectival perceptions, subjective assessments, and personal value judgments. The realm of scientific practice is not sufficiently autonomous to remain untouched by the agonism of modern life. In hallucinogen research, this has produced inconsistent accounts of the effects of psychedelic drugs: One man's mystical revelations are another woman's psychosis-like hallucinations or unconscious desires. Unchurched spirituality, biological determinism, psychoanalytic convictions, and many other outlooks mingle and conflict producing heterogeneous and at times contradictory interpretations of

⁶⁵ Weber, "Science as a Vocation," 147.

⁶⁶ *Ibid.*, 148.

hallucinogenic drug action. But how do these inconsistencies affect scientific practice? What difference does it make whether one researcher thinks of psilocybin as an entheogen while his colleague regards it as a psychotomimetic?

On the level of scientific experimentation, worldviews and images of man inform the questions asked: the questions to nature materializing in the study design and the questions to test subjects entering into questionnaires and rating scales. On the level of study designs, different understandings of what hallucinogens do determine what researchers decide to look at and how they eventually interpret the data they generate. Testing whether an antipsychotic drug alleviates the effects of psilocybin only makes sense against the background of the hallucinogen model of psychosis while comparing its effects with those of a spiritual practice such as meditation implies that these techniques engender states of mind, which are sufficiently alike to serve as objects of comparison. Clinical trials examining the therapeutic efficacy of LSD in a psychoanalytically oriented psychotherapy or of ayahuasca in a shamanic healing ceremony are based on different preconceptions again. But the discrepant interpretations of drug action underlying these applications do not affect the effects of hallucinogens on the molecular or cellular level. By now there is widespread consensus about the fact that psilocybin activates 5-HT_{2A} receptors whereas ketamine serves as antagonist at NMDA receptors. What is subject to such distinct construals are the experiences induced by hallucinogenic drugs. Accordingly, the self-rating scales designed to document subjects' experiences in a standardized form are infused with more or less predetermined

understandings of what hallucinogens do. Registering psychotomimetic effects requires asking for a number of psychiatric symptoms such as hallucinations, derealization, and depersonalization, while it takes a different set of items to establish the mystical quality of a hallucinogen-induced experience (the APZ, for example, asks subjects to rate statements such as “I experienced past, present, and future as a unity” or “I experienced an all-embracing love”). As a quantitative analysis necessitates standardization open descriptions of drug experiences cannot be processed. Subjects need to answer to the point. Hence, the choice of questions and questionnaires predetermines the introspective accounts collected.

Weber described quantification and the production of calculability as key features of the disenchantment of the world. Numbers allow bringing down qualitatively different phenomena to a common denominator. Quasi-literary accounts could not be correlated with the numerical data generated by neurophysiological measurements. Even in purely psychological studies such a Griffiths' what counts is statistical analysis, not eloquent experience reports. But the transformation of experience into numbers entails a change, not a complete loss of signification. The choice of items compiled in a self-rating scale is guided by certain preconception of the epistemic object. However, to be “significant” it is not enough that they are charged with meaning (values, worldviews, interpretations, etc.). They also need to pass the test of statistical significance. For example, items ticked off too rarely (by less than 5% of all test subjects) or almost always (by more than 95%) are regarded as insignificant and must be

excluded from a questionnaire. For a correlation between a certain state of mind thus quantified and a particular neurophysiologically measured brain state to be telling the chance that their concurrence occurred merely accidentally must be less than 5%. This arbitrarily determined standard “significance level” demarcates the correlation from the buzzing noise of overall cerebral and psychic activity. The price for drawing from the current prestige of the neurosciences is that the spiritualization of the brain has been inseparably entwined with subjecting the singularity of spiritual experience to the rule of numbers. As Weber prophesied: By appropriating the intellectual tools of science, romantic irrationalism runs the risk of destroying what it has set out to preserve.⁶⁷

Nevertheless, the transformation from qualitative to quantitative significance is far from total. After all, the items are still charged with meaning. But their mathematization helps to steer clear of ideological conflicts. One might sympathize or not with the use of psychedelics to model psychoses, with the comparison of drug intoxication and meditation, or the use of a “mysticism scale” to rate the effects of a hallucinogen, but whether study results are acceptable scientifically depends primarily on the statistical significance of the data. In a way, the standardized questionnaires respect the impenetrable subjectivity of experience: If a test subject marks on a questionnaire that he or she felt an all-embracing love or connected to a higher power there is no way of contesting these statements scientifically. What matters is that they are collected significantly more often under the influence of the drug than under a control

⁶⁷ Cf. Vahland, *Max Webers entzauberte Welt*, 150.

condition like placebo administration, for example. And if that is the case there will probably be a neural correlate as there must be a corresponding brain state for every mental phenomenon provided that “mind is what the brain does.” Everything beyond the confines of the so-called mind-brain is ignored. The anchoring of meaning attributed to drug experiences in socio-cultural formations and the controversial content of these experiences are bracketed off. Investigating neural correlates of altered states of consciousness with the tools of psychopharmacology does not require deciding whether their referents are imaginary or real. Methodologically, brain research on spiritual experiences neither presupposes nor demonstrates the existence of any divine realms or entities. In a newsmagazine article on neurotheology, Felix Hasler cites neuroscientist Andrew Newberg who examined meditating Tibetan monks and Franciscan nuns to support his claim that brain experiments neither prove nor falsify the existence of God:

[Newberg's] cogent culinary comparison: Eating an apple pie produces certain mental phenomena—for example, the enjoyment of the little raisins sprinkled in—going along with certain brain processes, which the neurologist can observe (“This is your brain on apple pie”). But, of course, the fact that these brain processes exist does not mean that the apple pie is a delusion. (To be even more pedantic: We cannot demonstrate the existence of the apple pie with absolute certainty either.)

The biggest of all big questions, whether God exists or not, cannot be answered by way of biotheological studies. Whether God created our brain—and, thereby, our ability to recognize him—or whether our brain created God will remain a matter of faith. Once again, the ontological sixty-four thousand dollar question leads to a dead end—but at least keeping with the times using the high-tech

methods of brain research. And, after all, the atheist acting enlightened also only believes that God does not exist.⁶⁸

Despite the clash of values and worldviews that can be observed in the field of hallucinogen research at large permeating the microcosm of the Vollenweider lab these conflicts do not automatically force the exclusion of actors from the scientific field. Their divergent and at times incommensurable outlooks on life and the consequent differences in interpretation of hallucinogen-induced experiences do not necessarily thwart collaboration between researchers. Articles by scientists of very different attitudes are published in the same neuropsychopharmacology journals. Of course, this does not level out disparate interpretations, but these are situated within the same episteme. As I have already indicated in the previous chapter, the agonism pervading research on psychedelic drugs is a homoepistemic struggle. In a field strained by tensions between the proponents of disenchantment and those working toward the spiritualization of the brain, scientific practice embodies a salutary agnosticism preserving the possibility of an ongoing exchange between adherents of conflicting worldviews. Having given special emphasis to the use of hallucinogens in the context of “experimental mysticism” in this chapter I will now turn to model psychosis research as a case in point to further examine the remarkable pragmatism pervading the ideologically rugged terrain of contemporary hallucinogen research.

⁶⁸ Felix Hasler, “Ein Gefühl, schöner als Glück,” *Weltwoche*, no. 50 (2005).

5. Modeling Psychosis I: What Kind of Model?

A Theatrical PET Scan

The experiment takes place in the PET Center located in the basement underneath the Zurich university hospital. At 8:30 am, I meet with Honza Samotar, the neuroscientist from the Vollenweider group running the study, and today's test subject. Daniel Wetzel is a German theater director in his late thirties usually living in Berlin and Athens. He is in town for a production at Zurich's main playhouse. *Blaiberg und sweetheart19* is a theatrical performance without actors. The people on stage are laymen who do not play roles, but themselves: presentation instead of representation. Wetzel and his two partners from *Rimini Protokoll* look at them as "specialists" out of their particular spheres of life. Involved are, on the one hand, a heart transplant patient and an assistant medical technician concerned with organ transplantations, and, on the other hand, the manager of a dating agency hooking up Russian women and Swiss men as well as an organizer of so-called speed flirting events. *Blaiberg and sweetheart19* (titled after the first cardiac transplant patient and a typical screen-name of a user of matchmaking websites) explores associations between these two contemporary economies of hearts. *Rimini Protokoll* has been a driving force in the recent revival of documentary theater in Germany. Each of their projects requires a significant amount of para-ethnographic research to identify potential performers and to develop and entwine their stories in collaboration with them.¹

¹ The concept of para-ethnography has been coined by Douglas Holmes and George Marcus, "Cultures of Expertise and the Management of Globalization: Toward the Re-Functioning of Ethnography," in *Global Assemblages. Technology, Politics, and Ethics as Anthropological Problems*, ed. Stephen Collier and Aihwa Ong (London: Blackwell,

In the course of such research, Wetzel met Samotar whom he interviewed about the neurobiology of love. He became interested in the suffusion of our self-conceptions with medical knowledge after meeting the heart transplant patient from his play who has come to conceive of herself largely in medical terms. Wetzel hopes to gain a better understanding of such forms of subjectivity by serving as a test subject in a medical experiment himself. That is how he got here. He looks around the PET Center and follows what is happening to him curiously. In his eyes, the neuroimaging facility is an alternative stage—in accordance with the *Rimini Protokoll's* basic idea to look for theatricality in reality.

The rationale of the experiment is based on the hallucinogen model of psychosis. In his doctoral research, Samotar examines to what extent the antipsychotic drugs ketanserin and haloperidol can alleviate the psychosis-like deficits induced by the hallucinogen ketamine in a manner that is neuropsychologically quantifiable and that changes brain perfusion as measured by positron emission tomography. Wetzel is first injected with haloperidol and only in the second half of the experiment, when he has already been lying in the PET scanner for 45 minutes, ketamine is added through an intravenous drip. Eventually, the results will be compared with those of a ketamine-only session, which Wetzel has already undergone. The whole measurement takes one and a half hours during which he has to lie still in the tube. During this time, he does neuropsychological tests on a computer screen built into a bulky pair of goggles fixed to his forehead. What is assessed repeatedly is his so-called Rapid Visual

Processing, a measure of sustained attention. For this purpose, Wetzel has to follow a stream of fast changing digits pressing a button whenever certain three figure sequences have appeared—a task which requires a significant degree of concentration. The ketamine, however, induces an attention deficit comparable to that suffered by schizophrenic patients. The study examines whether this hallucinogen effect can be counteracted by antipsychotic drugs. Furthermore, it correlates these findings with the PET measurements of metabolic activity in different brain areas known to be involved in the pathogenesis of schizophrenia.

In the short intervals between scans and neuropsychological tasks, I take photos of Wetzel in the brain scanner. I walk around this massive machine trying out different angles. Shortly after the ketamine began running into his veins this motion becomes part of Wetzel's trip. He is firmly fixed in the tube and has to stare at the ring of detector units enclosing the upper part of his body. But from the corner of his eye he can see me whirling around the room. Then he is out there, too, and we are dancing together through a green space. In this synthetic phantasmagoria, my movements are transfigured into an elaborate choreography involving the two of us.

To also evaluate Wetzel's subjective experience he is asked to rate itemized questionnaires before the administration of haloperidol as well as before and after the additional infusion of ketamine. The alteration of his state of consciousness is quantified with the help of the 5D-APZ self-rating scale. This is a lengthy and painful procedure as the test subject needs to respond to 94 items. With a loud, solemn, and monotonous voice Samotar reads out the whole

questionnaire, point by point, while Wetzel has to use a trackball to assess each statement on a scale on the computer screen in front of him: "I felt like I was in a wonderful other world." "I felt like a doll on a string or a marionette." "A voice commented on everything I thought although no one was there." "I saw strange things, which I now know were not real." "I observed myself as though I were a stranger." "Worries and fears of everyday life felt irrelevant." "I felt connected to higher powers." "My experience had a religious character." All of a sudden, after the last of this extensive list of items, we hear Wetzel crying out of the PET scanner: "Heiner Müller! ... This language! A great performance!"

At long last, Wetzel is released from the interior of the machine. He seems shaky. The ketamine will continue to affect his motor coordination for a few minutes and his speech is still slurred. But soon he begins to answer our questions concerning his drug experience. I ask him about his curious exit from the scanner. Samotar's voice, he says, reminded him of the way the East German dramatist and stage director Heiner Müller used to read texts, especially his own or those of Bertolt Brecht. Later on, Wetzel provides a detailed explanation:

I believe I exclaimed "Heiner Müller!" because the researcher had a very peculiar manner of reading out the questions from the 5D-APZ questionnaire. It reminded me how you could always hear the line break in Müller's readings. Thereby, the spoken language was broken by the written text. His speech did not follow interpersonal discourse, but vehemently called attention to the fact that it was reading. Probably, the researcher did not make these short, weird pauses at every line break like Müller, but tried to sound neutral. I think I called out "Heiner Müller!" to make a desperate joke, to produce a comic relief (unsuccessfully so) because being exposed to the vehemence of such a text-like speech in the

experimental setting also had an unpleasant military feel to it. In contrast to Müller who always read softly and calmly the researcher spoke as if he had been implanted with a megaphone. That was my impression during the trial. There was something comical about that since it sounded stilted, unnatural, forcedly neutral. And if you described the researcher's speech as a performative in Austin's sense then it was a speech emphasizing its textuality. With every word, even with every syllable it stressed the elaborateness, the official character marking the sentences from the questionnaire. Far off from any spontaneous communication. A certain gesture of abstraction, a depersonalized speech, which you could often hear in Müller's productions in direct continuation of Brecht's aesthetics and theory of theater. There, the text was supposed to become audible as a completely independent parameter, cut off from techniques of empathy and the actor's desire for identification. For this purpose, it had to be depsychologized, formalized, and spoken on the basis of a structure contrary to psychological (bourgeois) semantics. In the experiment, the researcher sounded similar to that, making an exaggerated effort to provide expressions for my state of mind ("I had a religious feeling") far beyond any empathy.

By looking at the performative dimension of the experiment, Wetzel reads one of the leitmotifs of modernist art—the break with representation—into the scientific setting. It was one of Heiner Müller's credos that on stage the text had to be worked with not as a mere representation of reality, but as a reality of its own. Any understanding had to be preceded by a sensual perception of the text's materiality.² In the attempt to objectify his subjective experience with the help of an itemized self-rating scale Wetzel finds a distant echo of Brechtian alienation effects in twentieth-century theater preventing the audience from losing itself in the character created by the actor. By calling attention to the theatrical practice of representation, Brecht wanted to break its illusionism.

² Theresia Birkenhauer, "'Der Text ist der Coyote. [...] Und man weiß nicht, wie er sich verhält.'" in *Der Text ist der Coyote. Heiner Müller. Bestandsaufnahme*, ed. Christian Schulte and Brigitte Maria Mayer (Frankfurt/M.: Suhrkamp, 2004), 11-16.

But, in the conversation with Wetzel following the experiment, the problem of representation also manifests on a second level. Samotar asks him how he experienced the simultaneous ingestion of both psychotomimetic and antipsychotic in comparison with the previous session when he had received the hallucinogen alone. He says that qualitatively the experiences were not very different from each other. Under the influence of haloperidol the visions were even more pronounced, he claims, and he cannot imagine that they resembled the experience of schizophrenia. Samotar admits that most test subjects report that subjectively the antipsychotic haloperidol hardly makes a difference. Nevertheless, the hallucinogen intoxication is supposed to serve as a model of psychosis. How, then, is this pharmacologically induced deviation from everyday consciousness used to represent schizophrenia and what do neuropsychopharmacologists gain from this application of hallucinogenic drugs?

Beringer's Experiential Model of Psychosis

The idea of mimicking a mental disorder by administering a drug goes back to the French psychiatrist Jacques-Joseph Moreau de Tours. In the 1840s, he experimented with psychoactive substances, mostly with hashish, at the Hôpital de Bicêtre and in the Club de Haschischins in Paris. In his study *Du haschisch et d'aliénation mentale: études psychologiques* (1845), Moreau described the effects of hashish on healthy subjects (among them poets such as Charles Baudelaire, Honoré de Balzac, Théophile Gautier, and Gérard de Nerval as well

as painters like Eugène Delacroix).³ He wrote: “In the way in which it affects the mental faculties, hashish gives to whoever submits to its influence the power to study in himself the mental disorders that characterize insanity, or at least the intellectual modifications that are the beginning of all forms of mental illness.”⁴ He wanted to make use of the consciousness-altering properties of the drug in order to allow physicians and artists to acquire personal insights into the “lived experience” of psychopathological phenomena. However, Moreau’s approach did not gain currency. As the historian of psychopharmacology David Healy puts it: “Despite the widespread use of a variety of consciousness-altering agents during the nineteenth century, Moreau’s idea was too radical. It was a century before it was picked up again.”⁵

When the German psychiatrist Kurt Beringer took up Moreau’s approach in 1921, he used the alkaloid mescaline, which had been isolated from the Mexican peyote cactus in 1896 and synthesized in 1919 by German chemists. Beringer proposed that mescaline intoxication could serve as a model of psychosis.⁶ Beringer was also hoping that he could use mescaline as a probe to explore a subject’s personality. He expected the contents of the psychotic

³ Healy, *The Creation of Psychopharmacology*, 180. Mike Jay, ed., *Artificial Paradises. A Drugs Reader* (London: Penguin, 1999), 253. Sadie Plant, *Writing on Drugs* (New York: Farrar, Straus and Giroux, 1999), 72.

⁴ Quoted in: Jay, ed., *Artificial Paradises*, 20.

⁵ David Healy, *The Antidepressant Era* (Cambridge (Mass.): Harvard University Press, 1997), 113.

⁶ Unlike Beringer, Moreau de Tours had conceived of the hashish intoxication as an artificial delirium, not as a psychosis. The delirium was regarded as the exemplary mental disorder in the first half of the nineteenth century. Healy, *The Creation of Psychopharmacology*, 180. Jay, ed., *Artificial Paradises*, 19. The concept of psychosis was introduced by Karl Friedrich Canstatt and Ernst von Feuchtersleben in the 1840s, i.e. at about the time of Moreau de Tours’ experiments, but he did not make use of it.

experiences provoked by the drug to reveal something about a subject's individual constitution as well as his or her unconscious processes. Although he did find that the momentary psychological condition influenced the effects of the drug, he could not identify any stable relationship between the individuality of a certain person and his or her drug experiences.⁷ No inner truth came to the fore. Instead Beringer reported a variety of misperceptions of reality. Mescaline induced disturbances of perception, illusions and visual, but sometimes also acoustic hallucinations and synesthesias; profound alterations in time perception; psychomotor inhibition; and variable alterations in affect and thought.⁸ In his eyes, this symptomatology was sufficiently similar to that of acute schizophrenia to justify the employment of mescaline-induced states as an artificial "model of psychosis" [*Modell einer Psychose, künstliches Psychosemodell*]. Such a model would allow studying psychoses under controlled experimental conditions on the level of phenomenology as well as objective psychopathology.⁹

Beringer gave Moreau's self-experimentation a pedagogical turn: The majority of the participants in Beringer's trial were medical students and doctors, often Beringer's residents. By serving as test subjects they not only contributed to the methodical production of psychiatric knowledge, but the induction of an artificial psychosis also allowed them to learn about one of the conditions they were meant to treat by way of personal experience. In *General Psychopathology*, Karl Jaspers wrote: "Since we can never perceive the psychic experiences of

⁷ Beringer, *Der Meskalinrausch*, 105.

⁸ Ibid., 35-97.

⁹ Ibid., IV.

others in any direct fashion, as with physical phenomena, we can only make some kind of representation of them.”¹⁰ In Beringer’s model of psychosis, the medium of representation was the self-experimenting subject’s own mind. The experience of the mescaline inebriation served as a model of the experience of the acute stages of schizophrenia. This, Beringer hoped, would allow the (future) physicians participating in his trial to share and understand the experience of their schizophrenic patients, which would improve their clinical skills.¹¹

But from the 1950s onwards, the similarity of hallucinogen experience and schizophrenia was called into question. In 1957, the British psychiatrist Humphry Osmond noted: “It is curious that in the lengthy and sometimes heated discussions about the relationship of model psychoses to schizophrenia that smoldered for nearly 50 years, not until 1951 was the difference between a transient, artificially induced, experimental state in a volunteer under laboratory conditions and the prolonged, insidious, creeping illness in an unsuspecting victim whose social life progressively atrophied, clearly recognized.”¹² According

¹⁰ Karl Jaspers, *General Psychopathology*, trans. J. Hoenig and Marian Hamilton (Manchester: Manchester University Press, 1963), 55.

¹¹ Beringer, *Der Meskalinrausch*, 31-32. Although the training model proposed by Moreau de Tours and Beringer was a subject of discussion throughout the twentieth century and was practiced informally, it has never been developed systematically. Humphry Osmond stated in 1957: “I know of no study dealing specifically with the application of these substances to the training of the workers engaged in many different disciplines who work together in psychiatry. Such training has resulted from experimental work, but only incidentally. Hyde and others have used these substances to enlarge the sympathy of members of a psychiatric staff for patients in their care. Such a journey of self-discovery may one day be obligatory for those working in psychiatry. Although it might not always be pleasant, with care and understanding this experience would be very useful to the trainee.” Osmond, “A Review,” 424.

¹² Osmond, “A Review,” 421. Osmond refers to Humphry Osmond and John Smythies, “Schizophrenia: a new approach,” *J. Mental Sci* 98 (1952). A systematic argument disputing the comparability of hallucinogen-induced and endogenous psychotic states

to Osmond, both, the hallucinogen experience as well as the experience of schizophrenia are not only determined by the biology, but also by the given circumstances. Historically contingent factors such as the subject's assumptions about his or her condition, social relations, and their situation in the laboratory shape the experience. The French historian of science Georges Canguilhem has emphasized the artificiality of the laboratory setting as a more general problem of experimental pathology.

[W]e must not forget that the laboratory itself constitutes *a new environment* in which life certainly establishes norms whose extrapolation does not work without risk when removed from the conditions to which these norms relate. For the animal or for man the laboratory environment is one possible environment among others. Certainly, the scientist is right in seeing in his apparatus only the theories which it materializes, to see in the products used only the reactions they allow; he is right in postulating the universal validity of these theories and these reactions, but for the living being apparatus and products are the objects among which he moves as in an unusual world. It is not possible that the ways of life in the laboratory fail to retain any specificity in their relationship to the place and moment of the experiment.¹³

From a historicist point of view, Beringer's experiential model of psychosis can be analyzed as what Michel Foucault called a "historically singular form of experience." Foucault proposed to study the historical conditions and consequently also the limits of possibility of particular experiences by attending to three axes: types of understanding, forms of normativity, and modes of relation to

can also be found in Leo Hollister, "Drug-induced psychoses and schizophrenic reactions, a critical comparison," *Annals of the New York Academy of Sciences* 96 (1962).

¹³ Canguilhem, *The Normal and the Pathological*, 148-149.

oneself and to others—or knowledge, power, and ethics.¹⁴ Such an analysis allows demarcating the experiences of Beringer's colleagues serving as test subjects from that of his schizophrenic patients. The psychopathologically and pharmacologically literate self-experimenting physicians and medical students had a significantly different understanding of their situation than laymen suffering from the unexpected and alienating onset of psychosis. The former were—at least most of the time—well aware of the fact that they had ingested a mind-altering substance and could rely on the limited duration of its effects. To them, the occurrence of psychopathological symptoms was not unsettling and excruciating, but the desirable outcome of a deliberate intervention to be studied with curiosity. A symptom perceived as pathological in a patient appeared as a normal reaction to the given pharmacological stimulus and was interpreted against the background of psychiatric conceptions. The test subjects encountered the medical personnel examining them as colleagues engaged in a common scientific enterprise, not as therapists in a mental institution. And instead of having to comply with the role of patient their self-experimentation was part of a heroic professional ethos.

These profound differences called Beringer's experiential model of psychosis into question. Since the 1950s, the influence of the conditions under which hallucinogens were taken or administered on the drug experience has been problematized repeatedly. Even though the effects of other drugs, alcohol for example, have been known to depend on the circumstances of consumption

¹⁴ Foucault, "Preface to The History of Sexuality," 199. See also Jay, *Songs of Experience*, 390-400.

as well, no other class of drugs has been regarded as that contingent on “set and setting” as hallucinogens.

The current generation of researchers acknowledges the difference in experience between “naturally” occurring psychoses and experimentally induced high. As they are primarily interested in objectifiable neurobiological and neuropsychological aspects of the model psychoses, their claims are significantly less curbed by this difference than Beringer’s experiential model. Moreover, they have managed to turn it into an argument *supporting* their hallucinogen model of psychosis. If only set and setting of the drug experience and the onset of psychosis were identical, then, they suggest, the experiences would also be identical:

[I]f somebody is given psychedelics without his knowledge, then he cannot recognize the artificial nature of his state. When such experiments were performed, the effects were sometimes indistinguishable from acute paranoid-hallucinatory psychoses. The situation of a patient with initial acute psychosis is comparable with that of somebody who has ingested psychedelic drugs unknowingly. Both experience pervasive alterations of perception, thinking and affectivity and know nothing about the origin of these alterations. Knowledge of the artificial nature of the state is therefore not a valid criterion for distinguishing between acute endogenous psychoses and psychedelically induced altered states of consciousness.¹⁵

¹⁵ Euphrosyne Gouzoulis-Mayfrank et al., “Effects of the hallucinogen psilocybin on habituation and prepulse inhibition of the startle reflex in humans,” *Behavioural Pharmacology* 9, no. 7 (1998): 66. See also Leo Hermle, Godehard Oepen, and Manfred Spitzer, “Zur Bedeutung der Modellpsychosen,” *Fortschritte der Neurologie, Psychiatrie* 56 (1988): 55.

From the Experiential to a Descriptive and on to an Explanatory Model of Psychosis

But Beringer's model of psychosis was not merely an experiential model. Based on the firsthand experiences of his test subjects he also established a descriptive model of psychosis. Following Karl Jaspers' psychiatric phenomenology Beringer attached great importance to the description of the soul "from inside," drawing from self-observations rather than a psychiatrist's observations of a subject's behavior alone.¹⁶ The participants of the mescaline trial were supposed to produce written reports of their experiences. By collecting and analyzing these reports (which have been published in the appendix of *Der Meskalinrausch*) Beringer produced an ideal-typical phenomenological account of the psychosis-like effects of mescaline. Following Rachel Ankeny's article *Fashioning Descriptive Models in Biology*, such a description can itself be regarded as a pre-explanatory or descriptive model of mescaline inebriation, which, in turn, served as a model of psychosis.¹⁷ Hence, the descriptive model can be said to function as a second-order model of psychosis. In order to fulfill this function, the description had to emphasize those properties, which the intoxication had in common with psychotic, particularly schizophrenic episodes.

As a descriptive model Beringer's phenomenological account was arrived at by means of abstraction. What was presented as the prototype of mescaline inebriation is, in fact, an ideal-typical construct. It presents a certain pattern of recurring symptoms, which Beringer brought out by analyzing the reports from

¹⁶ Karl Jaspers, *Allgemeine Psychopathologie* (Berlin: Springer, 1923), 35.

¹⁷ Rachel Ankeny, "Fashioning Descriptive Models in Biology: Of Worms and Wiring Diagrams," *Philosophy of Science* 67 (2000).

approximately sixty experiments. From these he tried to extrapolate what mescaline did as such—independent of the individual subjects and situations. The multitude of responses the drug provoked in different individuals at different points in time made it particularly difficult to identify the properties that were to be attributed to the drug itself. However, Beringer claimed that by looking at a sufficiently great number of experiments he had been able to extract a recurrent set of symptoms, which he identified as effects of the drug (as opposed to those produced by the states and traits of the test subjects).¹⁸ Andreas-Holger Maehle describes a very similar approach for self-experiments with opium in the eighteenth century, in which a form of scientific objectivity was achieved by way of collectivization of subjective experiences: “Overall, the example of opium research shows how different, at first contradictory observations in self-experiments contribute to the development of a kind of collective subjective experience eventually condensed to a profile of action of the drug. Thereby, subjectivity is elevated to a new form of scientific objectivity.”¹⁹

The object of this objectivity was subjective self-observations. But Beringer anticipated that eventually his description of analogies between mescaline inebriation and acute stages of schizophrenia would serve as a basis for an investigation of the physical foundations of the psychopathological phenomena, which these conditions have in common. He hoped that one day biochemical research on the effects of mescaline might “reveal to us the

¹⁸ Beringer, *Der Meskalinrausch*, III.

¹⁹ Andreas-Holger Maehle, “Selbstversuche und subjektive Erfahrung in der Opiumforschung des 18. Jahrhunderts,” *Würzburger Medizinhistorische Mitteilungen* 13 (1995): 294 (my translation—NL).

disorders of intermediary metabolic processes (autointoxication process, endocrine metabolic toxins, etc.) in the acute phase” of schizophrenia.²⁰ But his own approach did not provide the means to directly examine the biological substratum of the psychoactive effects of mescaline. The life processes underlying the effects of mescaline and the existence of hypothetical endogenous psychotogens remained purely speculative. As a phenomenological psychiatrist following Jaspers, Beringer was neither eager to push this kind of theorizing much further nor did he make an effort to study the biochemistry of mescaline intoxication and schizophrenia himself. But other researchers used his account as a framework for the exploration of explanatory questions.²¹ The shift from Beringer’s descriptive, pre-explanatory model to explanatory models of psychosis took place in the 1950s. At the time, several groundbreaking discoveries and innovations in the field of psychopharmacology initiated a process of reorientation of psychiatry toward the life sciences.

Especially important were the discoveries of the antipsychotic chlorpromazine by the French company Rhône-Poulenc in 1951 and of lysergic acid diethylamide (LSD) by the Swiss pharmaceutical company Sandoz in 1943. LSD temporarily became one of the most important research tools in psychiatry. Against the background of Beringer’s work on mescaline, its hallucinogenic effects were also interpreted as a model of psychosis. But unlike mescaline, LSD turned out to be effective in extraordinarily low doses. Therefore, it did not make sense to assume that it affected all cells in the brain and in the rest of the body

²⁰ Beringer, *Der Meskalinrausch*, 114 (my translation—NL).

²¹ Cf. Ankeny, "Fashioning Descriptive Models," 262, 267.

alike. Instead, a specific target mechanism was postulated, which eventually led to the concept of specific receptors on the surface of neurons that interact with molecules such as LSD as well as endogenous substances. Chlorpromazine not only helped to alleviate some of the symptoms of schizophrenia, but it was also capable of inhibiting the effects of LSD. With these two substances an experimental system seemed to emerge that would allow exploring causes as well as potential treatments of psychosis in healthy volunteers in controlled settings. Psychiatry, it was hoped, would finally get the chance of meeting some of the scientific standards already governing other medical subdisciplines and the life sciences.²² Its molecularization had begun.²³

This constituted the contemporary form of what Nikolas Rose—following Ian Hacking and Ludwik Fleck—has called “the ‘style of thought’ of biological psychiatry.” This new way of thinking entailed a reconceptualization of the causes, and consequently the therapies, of mental illness. Instead of focusing on the patients’ subjectivity—their dreams, memories, associations, etc. in psychoanalysis and their abnormal ways of experiencing the world in phenomenological psychiatry—their suffering was now attributed to a neurochemical disorder of the brain, to psychopharmacologically correctable molecular errors. “In this process, psychiatry claims to have overcome, at last, the Cartesian dualism of body and soul. The deep psychological space that opened in the twentieth century has flattened out. In its new ‘neurochemical’

²² Healy, *The Creation of Psychopharmacology*, 107, 163.

²³ The expression “molecularization of psychiatry” has been coined by Nikolas Rose, “The Neurochemical Self and its Anomalies,” in *Risk and Morality*, ed. R. Ericson (Toronto: Toronto University Press, 2003).

account of personhood, psychiatry no longer distinguishes between organic and functional disorders, with only the former being thought of as somatic. It no longer concerns itself with the mind or the psyche. Mind is simply what the body, what the brain, does."²⁴

In 1949, the Swiss psychiatrists Roland Fischer and F. Georgi took up the analogy of hallucinogen intoxication and schizophrenia described by Beringer while introducing a differentiation. Mescaline, they claimed, produced a state resembling the catatonic form of schizophrenia while LSD provoked a hebephrenic variant. From this they inferred a toxic genesis of schizophrenia. An error in the metabolism of the liver, they postulated, produced an "endogenous autotoxin" triggering schizophrenic episodes. Beringer's descriptive model of psychosis led them to propose an explanatory model based on the hypothesis that different forms of schizophrenia were caused by different toxic metabolites.²⁵

While Beringer had only speculated about this, Fischer and Georgi tested their assumption experimentally by examining metabolic disorders provoked by mescaline and LSD, especially the effects of these drugs on liver functions. In a similar vein, a number of researchers, especially in the United States and Canada, hypothesized various metabolites as potential agents in the pathogenesis of schizophrenia. The most elaborate and prominent postulate was the transmethylation hypothesis by Abram Hoffer, John Smythies, and Humphry

²⁴ Ibid.

²⁵ Roland Fischer, F. Georgi, and P. Weber, "Psychophysische Korrelationen. VIII. Modellversuche zum Schizophrenieproblem. Lysergsäurediäthylamid und Mescaline," *Schweizer medizinische Wochenschrift* 81 (1951). Vannini and Venturini, *Halluzinogene*, 191.

Osmond who suspected an erroneously methylated hallucinogenic derivate of adrenaline to be the cause of schizophrenia.²⁶ The emergence and consolidation of this explanatory model of psychosis entailed not only the production of hypotheses, but also of experiments to verify them. It thereby triggered a significant amount of scientific activity, which aimed at finding psychogenic metabolites resembling mescaline and LSD.

Being based on the assumption of congruence of phenomenology and mechanism this step from a descriptive to an explanatory model was daring. Canguilhem refers to a debate over sleeping pills, in which A. Schwartz argued that “[i]t would be wrong to believe that sleep brought by pharmacological means and normal sleep necessarily have an *exactly similar phenomenology*” adding that “[i]t must be admitted that artificially inducing sleep by interfering with the nerve centers does not enlighten us as to the mechanism by which the hypnotic center is naturally put into operation by the normal factors of sleep.”²⁷ What is being problematized here is the relationship between phenomenological description and biological explanation. An analogous problematization has occurred in the context of model psychoses. LSD and mescaline, it turned out, pharmacokinetically induce tolerance. If an LSD-like substance was indeed responsible for schizophrenia, the disease should subside within a few days—

²⁶ Healy, *The Creation of Psychopharmacology*, 182-191. Abram Hoffer and Humphry Osmond, "The adrenochrome model and schizophrenia," *The Journal of Nervous and Mental Disease* 128, no. 1 (1959). Abram Hoffer, Humphry Osmond, and John Smythies, "Schizophrenia: A New Approach. II. Result of a Year's Research," *Journal of Mental Science* 100, no. 418 (1954). Especially for Canada, see Erika Dyck, "Flashback: Psychiatric Experimentation with LSD in Historical Perspective," *The Canadian Journal of Psychiatry* 50, no. 7 (2005).

²⁷ Canguilhem, *The Normal and the Pathological*, 148.

which it does not.²⁸ However, as Healy indicates, the quest for metabolites involved in hallucinogen intoxications as well as schizophrenia might also have been given up for lack of economic incentive: Unlike the dopamine hypothesis of schizophrenia, which will be discussed below, the transmethylation hypothesis did not help to market any drugs.²⁹ For whatever reason, the first explanatory model derived from the descriptive model of psychosis did not produce the expected results and was abandoned.

The Interruption of Model Psychosis Research

Throughout the 1950s, hallucinogens attracted much scientific attention. By 1961, more than 1000 articles had been published in medical journals on LSD alone.³⁰ The newly developed antipsychotics significantly reduced the rate of institutionalization among schizophrenic patients and enabled them to live in their communities receiving outpatient treatment. However, most of them suffered from distressing and stigmatizing side effects.³¹ Model psychosis research promised to find the causes of schizophrenia and to develop more specific medications sparing patients the severe side effects of the first generation of antipsychotic drugs. Notwithstanding, only a decade later, model psychosis research had virtually come to an end.

²⁸ Vannini and Venturini, *Halluzinogene*, 207.

²⁹ Healy, *The Creation of Psychopharmacology*, 192.

³⁰ Dyck, "Flashback," 383.

³¹ Sue Estroff, *Making It Crazy. An Ethnography of Psychiatric Clients in an American Community* (Berkeley: University of California Press, 1981). Healy, *The Creation of Psychopharmacology*, 233, 343-344.

There were two reasons for this surprising twist: the tightening up of regulations described in chapter 2 and an impasse in the research agenda explaining why so many scientists felt that taking the bureaucratic hurdles raised around any scientific application of hallucinogens was not worth the hassle. Only a decade earlier, studies of hallucinogen action had been perceived as one of the most promising directions of psychiatric research. But all attempts to substantiate evidence that one of the supposedly schizophrenogenic metabolites was actually playing a significant role in the pathogenesis of schizophrenia had failed. In the meantime, the metabolic model had been replaced by another explanatory model—that of neurotransmission as a chemical process between nerve cells. As Rose put it:

Initially, it had been thought that although nerves themselves transmitted signals by chemical means, transmission across the synapse was electrical. By the 1960s, largely as a result of work on the new psychiatric drugs—first the antipsychotics such as chlorpromazine, then the antidepressants such as imipramine and iproniazid—not forgetting the experiments with lysergic acid diethylamide—it had been accepted that neurotransmission was carried out by chemicals [such as dopamine, serotonin, or glutamate].³²

Hence, the molecular errors to which mental disorders like schizophrenia were attributed changed in nature. Now a lack or a surplus of certain neurotransmitters or their receptors and a resulting overstimulation or decreased activity of certain neurotransmitter systems were held responsible. The concept of neurotransmission brought together the realm of (pathological) life processes and that of (erroneous) information processing. Disorders of perception, cognition,

³² Rose, "The Neurochemical Self and its Anomalies."

and affect, which schizophrenia and hallucinogen-induced states have in common, could now be explained as errors in neural information processing.³³ As the German psychiatrists Leo Hermle, Godehard Oepen, and Manfred Spitzer would write two decades later: "A neurobiochemical disorder might also explain the known impairment of information processing, of selective filtering, and decoding of experiences from long-term memory, which can be grasped psychopathologically as so-called basic syndrome [*Basisstörungen*]. A similar biochemical and neuropsychological functional disorder might underlie the so-called model psychoses."³⁴

The explanatory model of schizophrenia changed accordingly. The idea that schizophrenia was caused by a toxic metabolite was replaced by the so-called dopamine hypothesis. In the 1960s, the work of Arvid Carlsson, Margit Lindqvist, Jac van Rossum, and others had suggested that schizophrenia was the direct consequence of an overactivity of dopaminergic neurons in the brain. But only in the 1970s, when the first receptors had been isolated and the pharmaceutical industry began to advertise its antipsychotic drugs by pointing out

³³ In terms of information theory, psychotic states were now characterized by "a gross flaw in the filtering, matching, and correlating of sensory inflow, which some believe to be the primary defect. If the accurate computation of sensory information broke down, or if the normal overload of incoming data failed to be eliminated, a schizophrenic state could result." Sidney Cohen, *The Beyond Within. The LSD Story* (New York: Atheneum, 1972), 88. At the intersection of molecular biology and information theory, the concept of error became a central element of our understanding of life. In the second half of the twentieth century, Canguilhem argues, there is "no difference between the error of life and the error of thought, between the errors of informing and informed information." Canguilhem, *The Normal and the Pathological*, 277. Interconnections between the concept of information in molecular biology and the exploration of the mind with the help of hallucinogenic drugs are discussed by Richard Doyle, "LSDNA: Rhetoric, Consciousness Expansion, and the Emergence of Biotechnology," *Philosophy and Rhetoric* 35, no. 2 (2002).

³⁴ Hermle, Oepen, and Spitzer, "Zur Bedeutung der Modellpsychosen," 53.

that all known antipsychotics bound to dopamine receptors, did the dopamine hypothesis of schizophrenia gain more widespread support.³⁵ Neither the classical hallucinogens like mescaline, LSD, or psilocybin nor a newly discovered group of substances comprising phencyclidine (PCP) and its congener ketamine (which, on the phenomenological level, was said to model schizophrenia even better) fit into this scheme. The hallucinogenic effects of mescaline, LSD, and psilocybin were found to be primarily mediated by a particular subtype of serotonin receptors (5-HT_{2A}), while PCP and ketamine were shown to possess an anti-glutamatergic activity at NMDA receptors.³⁶ None of them demonstrated a predominant dopaminergic activity. Hence, when the dopamine hypothesis of schizophrenia became paramount in the 1970s, the use of hallucinogen-induced states as models of schizophrenic psychoses stopped making sense. The model psychosis researchers affected by the severe regulatory constraints on hallucinogen research did not have enough confidence in their research agenda anymore to resist the political and regulatory pressure on their work. The human experimentation with hallucinogens died down in scientific institutions. Those who had always doubted the analogy between hallucinogen inebriation and psychosis took this development as an affirmation of their criticism. The use of hallucinogens as a means of modeling psychoses appeared to be an impasse.

³⁵ Healy, *The Creation of Psychopharmacology*, 207-219.

³⁶ Dopaminergic pathways could be activated by stimulants such as amphetamines and cocaine, which were also known for their (unreliable) potential to provoke psychoses when administered repeatedly and in high doses. In fact, their psychotogenic potential served as one of the main arguments in favor of the dopamine hypothesis. However, because of the harmful effects the required doses had on test subjects and because of the unpredictable outcomes of such experiments, amphetamine intoxications did not gain currency as a model of psychosis in experimental psychiatry. Cf. *Ibid.*, 119.

The Current Renaissance of Model Psychosis Research

However, during the 1980s, the dopamine hypothesis of schizophrenia was relativized by more and more psychiatric researchers when it became clear that schizophrenia could not be explained by hyperactivity of the dopaminergic system alone.³⁷ Eventually, it was supplemented by two other postulates: the serotonin and the glutamate hypotheses. There was evidence that, apart from the dopamine system, these neurotransmitter systems were also involved in the pathogenesis of schizophrenia. All of a sudden, hallucinogen-based models of psychoses seemed to make sense again. As the dopamine hypothesis had not been refuted altogether, the claims had to be articulated in a more modest fashion now. On the one hand, 5-HT_{2A} agonists like psilocybin could be used to model certain aspects of schizophrenia related to the putative underlying disorder of the serotonergic system (especially so-called positive symptoms such as hallucinations and disorganized thought, speech, and behavior). The effects of anti-glutamatergic hallucinogens like ketamine, on the other hand, could serve as models of supposedly glutamate-related deficits in schizophrenia (also comprising negative symptoms like emotional blunting, apathy, and attention abnormalities).³⁸

³⁷ Especially, research on the effects of atypical antipsychotics such as clozapine produced evidence that the dopaminergic system could not be the only neurotransmitter system involved in the pathogenesis of schizophrenia. Ibid., 219-224.

³⁸ Euphrosyne Gouzoulis-Mayfrank et al., "Inhibition of Return in the Human 5HT(2A) Agonist and NMDA Antagonist Model of Psychosis," *Neuropsychopharmacology* 31, no. 2 (2006). Euphrosyne Gouzoulis-Mayfrank et al., "Psychological Effects of (S)-Ketamine and N,N-Dimethyltryptamine (DMT): A Double-Blind, Cross-Over Study in Healthy Volunteers," *Pharmacopsychiatry* 38 (2005).

After two decades, the political climate had changed as well. When the psychiatrists Leo Hermle, Manfred Spitzer, and Euphrosyne Gouzoulis-Mayfrank picked up model psychosis research in Germany at the end of the 1980s, they did not encounter much resistance. In fact, they had been encouraged by Rudolf Degkwitz, the director of the psychiatric clinic of the University of Freiburg, and received funding from the *Deutsche Forschungsgemeinschaft*.³⁹ From the very beginning, the revival of hallucinogen research in German biological psychiatry took place in a framework of well-established institutions rich in symbolic as well as financial capital. When Franz Vollenweider began to establish his own hallucinogen research project in Switzerland shortly afterwards he was also surprised how open the authorities were to his enterprise.

NL: I have the impression that it was helpful to you and the group around Hermle that you presented your hallucinogen studies as model psychosis research. It must have been more acceptable than using psychedelics for psychotherapy or consciousness research. The hallucinogen model of psychosis is of medical significance, but unlike therapeutic applications it can't be suspected of glorifying drugs.

FXV: Yes, I think this helped. But I have to say that my main concern was to come up with good, testable hypothesis to get grants. When I spoke to Dietschy [the government official in charge of research with controlled substances] I realized that they didn't take such a narrow view of the matter. At the time, the psycholytic therapists also submitted a new project and there were a lot of discussions about this with Dietschy. He told them that they needed a clear-cut design, a well-defined question or hypothesis, statistics, etc. On the side of the authorities, the

³⁹ Because of their thorough elaboration of the rationale of contemporary model psychosis research, I repeatedly refer to the argumentation of the German group in this chapter. But their explication of the logic of the hallucinogen model of psychosis equally applies to Vollenweider's project.

attitude was not that you could only get permission to work with hallucinogens if you sold this as psychosis research.

The problem was not political opposition to the use of hallucinogens in medical research, but scientific doubts concerning the validity of the hallucinogen model of psychosis. Systematically preparing the ground for the resuscitation of model psychosis research, the group around Hermle, Spitzer, and Gouzoulis-Mayfrank published a series of historically oriented review papers on model psychosis research.⁴⁰ Between 1988 and 1989, they also ran a pilot study, in which they administered mescaline (still from Beringer's stock) to twelve healthy volunteers to explore the psychopathology induced by this substance. These papers served two purposes: First, they mapped the territory providing orientation to the authors as well their scientific community. Secondly, in order to ensure support for their project of reviving model psychosis research among their peers, it was particularly important to refute the criticism by Osmond, Hollister, and others that had called into question whether the symptoms of hallucinogen intoxications and schizophrenia were sufficiently similar. The Hermle group pointed out that visual hallucinations were not uncommon among schizophrenics while acoustic hallucinations could also be provoked by hallucinogens. Furthermore, they had to respond to the objection that schizophrenics who had already taken hallucinogens reported that their drug experiences had been altogether different from their psychotic experiences. With her article on

⁴⁰ Leo Hermle et al., "Zur Bedeutung der historischen und aktuellen Halluzinogenforschung in der Psychiatrie," *Der Nervenarzt* 64 (1993). Hermle, Oepen, and Spitzer, "Zur Bedeutung der Modellpsychosen." Leo Hermle et al., "Beziehungen der Modell- bzw. Drogenpsychosen zu schizophrenen Erkrankungen," *Fortschritte der Neurologie, Psychiatrie* 60 (1992).

psychedelic experiences in the early stages of schizophrenic episodes, Gouzoulis-Mayfrank went to the heart of the matter of the conflict of worldviews, which had been sparked off by the hallucinogens. By demonstrating that the ecstatic and transcendental experiences reported by many users of hallucinogens could also occur in the early stages of schizophrenia, Gouzoulis-Mayfrank asserted the phenomenological similitude of early and acute stages of psychosis and hallucinogen effects.⁴¹

But the new generation of model psychosis researchers did not content itself with psychopathological descriptions. By applying the tools of contemporary cognitive neuroscience to the old concept of model psychosis they also hoped to advance the understanding of the biology of schizophrenia. In 1988, Hermle et al. concluded:

The remarks above have shown that so-called model psychoses indeed resemble so-called "endogenous" schizophrenias on the level of psychopathology. They are also comparable with respect to genesis although caveats apply. Principal differences asserted in the past cannot be maintained or need to be called into question. Therefore, it is desirable that experimental psychosis research is continued with the methods of neurophysiology, biochemistry, and psychopathology available to us today. For this reason, neuropsychology will become particularly important, with its dynamic tachistoscopic techniques and correlated neuroradiological (PET, SPECT) and neurophysiological (EEG techniques, BEAM) methods: Neuropsychology can detect psychotic alterations "prephenomenally" between biochemistry on the one hand and psychopathology on the other hand closest to the substrate.⁴²

⁴¹ Euphrosyne Gouzoulis-Mayfrank, Leo Hermle, and Henning Sass, "Psychedelische Erlebnisse zu Beginn produktiver Episoden endogener Psychosen," *Der Nervenarzt* 65 (1994).

⁴² Hermle, Oepen, and Spitzer, "Zur Bedeutung der Modellpsychosen," 56 (my

On the neurobiological level, the breakthrough in bringing the hallucinogen model of psychosis back into biological psychiatry was eventually achieved when a serious discrepancy between brain images of hallucinogen intoxications and schizophrenia could be cleared up in the course of the 1990s. In their neuroimaging studies, both the Hermle group and Vollenweider found that different types of hallucinogens cause a metabolic hyperactivation of the frontal cortex. Studies of schizophrenic patients, however, showed a significantly decreased metabolism in this area. The contradiction between the model and its object was eventually resolved when it was realized that only patients suffering from chronic schizophrenia had been examined. Brain scans of acutely psychotic patients, on the other hand, revealed the same marked hyperfrontality that had also been found in hallucinogen trials. Now the use of hallucinogen-induced states as models of psychosis appeared to be particularly useful because they provided the possibility of intraindividual comparisons and eliminated the impact of prolonged courses of mental illness on the symptomatology (e.g., the development of coping mechanisms).⁴³ It seemed as if the hallucinogen inebriation allowed to observe psychoses *in statu nascendi*.

Neuro- and pharmacopsychology as practiced in contemporary model psychosis research emerged from the tradition of Wilhelm Wundt's experimental psychology. Wundt proposed to study the mind by using the methods of physiology to find answers to well-defined questions under carefully specified

translation—NL).

⁴³ Leo Hermle et al., "Mescaline-Induced Psychopathological, Neuropsychological, and Neurometabolic Effects in Normal Subjects: Experimental Psychosis as a Tool for Psychiatric Research," *Biological Psychiatry* 32 (1992): 976-977.

conditions.⁴⁴ His student, the psychiatrist Emil Kraepelin, employed his teacher's experimental techniques to study the effects of drugs on psychological functioning. In his 1892 study *Ueber die Beeinflussung einfacher psychischer Vorgänge durch einige Arzneimittel*, he described the psychophysiological or "pharmacopsychological" effects of alcohol, tea, morphine, ether, and other drugs on "simple psychic processes" in test subjects.⁴⁵ What is characteristic of Kraepelinian experimental pharmacopsychology is that it takes simple, easily operationalizable, and quantifiable mental functions as its objects measuring reactions to systematic presentations of well-defined external stimuli under the influence of drugs. Contemporary neuropsychopharmacology has remained true to these principles. By returning to Kraepelin's experimental approach today's psychopharmacologists have replaced or supplemented the meticulous psychopathological description of experience that had been the focus of Beringer's model of psychosis by the measurement of clear-cut neuropsychological and neurobiological parameters. Experimental pharmacopsychology produces quantitative results, which allow for further statistical processing. This refashioning of the technologies of psychiatric truth has established a form of psychiatric research, which meets the standards of biomedical knowledge production helping psychiatry to overcome its image as a pseudoscience and to obtain research funds.

⁴⁴ Wilhelm Wundt, *Principles of Physiological Psychology* (London: Swan Sonnenschein, 1904), 1-38.

⁴⁵ Emil Kraepelin, *Ueber die Beeinflussung einfacher psychischer Vorgänge durch einige Arzneimittel. Experimentelle Untersuchungen* (Jena: Gustav Fischer, 1892). Werner Pieper, ed., *Kurt Beringer und die Heidelberger Drogenforschung der 20er Jahre* (Löhrbach: Edition RauschKunde, 1999), 80.

The “simple psychic processes” which have been the focus of attention in the latest episode of model psychosis research are different aspects of “sensorimotor gating.” The term sensorimotor gating refers to filtering mechanisms in the processing of sensory information by the central nervous system, which are meant to protect the organism from being overwhelmed by the amount of information constantly being registered by its sense organs. The most widely studied measure of sensorimotor gating is prepulse inhibition (PPI). The concept of PPI describes the following phenomenon: Sudden and intense sensory stimuli trigger a startle reflex, which comprises nictation as well as a jerk of the whole body. If a weak, non-startling stimulus (e.g., a low noise referred to as prepulse) precedes the stimulus (e.g., a loud noise referred to as pulse), it inhibits the startle response. The amplitude of the electromyographically registered blink reflex is reduced. This is called prepulse inhibition or PPI.⁴⁶ PPI serves as an operational measure for sensorimotor gating. In *Dementia praecox or The Group of Schizophrenias* (1911), Eugen Bleuler described an impairment of attention in schizophrenic patients postulating that this might lead to a reduced ability to filter out irrelevant stimuli.⁴⁷ In the 1970s, the American neuroscientists Mark Geyer, David Braff, and others began to employ PPI to examine the attentional and information processing dysfunctions of schizophrenics psychometrically. They interpreted the reduction of PPI in schizophrenic patients as the prephenomenal correlate of the phenomenologically described impairment

⁴⁶ F. Graham, “The more or less startling effects of weak prestimulation,” *Psychophysiology* 12 (1975).

⁴⁷ Eugen Bleuler, *Dementia Praecox or The Group of Schizophrenias* (New York: International Universities Press, 1950 [1911]).

of attention reported by Bleuler. A breakdown of the hypothetical perceptual filter and the subsequent overload of information and sensory stimuli has been presented as an explanation for a number of symptoms of schizophrenia such as distractibility, misperceptions, and formal thought disorders.⁴⁸

Certain “simple psychic processes”—PPI among them—turned out to be based on aspects of neural information processing elementary enough to be shared by all mammals. Since psychiatry has begun to concentrate on the brain instead of the human mind as its primary scientific object, it has become reasonable to use animal brains as models of human brains presupposing that human neurobiology does not differ fundamentally from that of other mammals. If a reduced PPI is regarded as a neural correlate of schizophrenia, a rat displaying a reduced PPI can be taken as an animal model of this mental illness. From the mid-1970s onwards, Geyer and others studied the startle response in rats that had been administered hallucinogens. They found that it augmented the startle response and impaired its habituation. Based on this finding, rodents on hallucinogens are now used as an animal model of psychosis.

Transplanting the biologized concept of model psychosis into the realm of animal experimentation has been presented as particularly promising because hallucinogen-based animal models of schizophrenia might facilitate the discovery and development of new antipsychotic drugs. For ethical reasons, new pharmacological agents need to undergo extensive testing before they can be applied to humans even in preclinical experimental settings. The research and

⁴⁸ Ulrich Meincke, Euphrosyne Gouzoulis-Mayfrank, and Henning Sass, “Der Startle-Reflex in der Schizophrenieforschung,” *Der Nervenarzt* 72, no. 11 (2001).

development process is too expensive and time-consuming if there is no indication that a new drug might work. But how can one tell as long as it is not permissible to test a new drug in humans? A drug's potential to reverse hallucinogen-induced filtering deficits and similar parameters in animal models enables researchers to screen novel compounds and to identify those, which might have antipsychotic effects. As Vollenweider has pointed out, these hopes and promises to find novel treatments to alleviate the suffering of schizophrenics have contributed significantly to the recent revival of hallucinogen research: "[T]he similarity of PPI deficits in animal studies and schizophrenic patients, in combination with other findings, has revitalized interest in hallucinogens in the 1990s and prompted a concerted search into the neurotransmitter systems involved in modulating PPI in rodents."⁴⁹

However, further research on PPI has qualified the applicability of findings in laboratory animals to human patients. When measuring the PPI of healthy human subjects on psilocybin Gouzoulis-Mayfrank et al. found—against their expectations—that unlike schizophrenics and rats on psilocybin their test subjects showed an *increased* PPI.⁵⁰ In this puzzling case, the animal model of psychosis adequately represents its object, i.e. schizophrenia, whereas its human counterpart fails to do so. Before pursuing the problem of animal models further in the next chapter I would like to conclude by asking: What kind of model is the hallucinogen model of psychosis?

⁴⁹ Vollenweider, "Recent Advances and Concepts," 29.

⁵⁰ Gouzoulis-Mayfrank et al., "Effects of the hallucinogen psilocybin on habituation."

A Generative Model

Several months after the experiment with Daniel Wetzel, the pharmacopsychologist Boris Quednow and I go to see *Rimini Protokoll*'s latest production: Friedrich Schiller's drama *Wallenstein*. So far their trademark has been a novel kind of documentary theater. Whereas German documentary theater in the 1960s was based on carefully researched true incidents eventually put on stage with professional actors its renaissance since the late 1990s has been characterized by a radical break with such relationships of representation. Instead of playing the roles of historical or contemporaneous real-life figures *Rimini Protokoll*'s "specialists of everyday life" are real-life figures themselves. They are exhibited as theatrical ready-mades, but they also contribute significantly to the production of the performance. In the case of *Wallenstein*, however, *Rimini Protokoll* experiments with an alternative to both representationalist 1960s documentary theater and their previous "presentationalist" works. To stage Schiller's drama about the betrayal of the seventeenth-century politician and general Albrecht von Wallenstein *Rimini Protokoll* casted the play with people who have experienced different forms of treachery in their own lives: At the time of the German Democratic Republic, today's head of the Weimar police department was degraded by his colleagues because of a love affair with one of his coworkers. A young conservative politician tells the story of how he was chosen and then dropped as his party's candidate to run for the mayor's office of Mannheim. And a Vietnam veteran now living in Heidelberg recounts how his unit blew up its own inhuman commander. In a way, these people all play the parts of Wallenstein or his traitors. But instead

of reciting Schiller's text, they talk about their own lives bringing fragments of reality onto the stage. Through their dramatic recontextualization, these records of everyday theatricality serve less as a *mise en scène* of Schiller's historical material, but produce new insights into the contemporary world from which they have been extracted.

Similarly, in model psychosis research, the hallucinogen inebriation—a quite wayward piece of biological life—is brought into the laboratory to stand for an equally opaque phenomenon, namely, schizophrenia. But the relationship of representation between these two psychophysical states is broken. Beringer had already been cautious not to overextend his assertion that there was a phenomenological resemblance between the mescaline intoxication and schizophrenia. He did not want to claim an identity between the “intoxication psychosis” induced by the drug and schizophrenia proper unless the biochemical substrates of the two states had been identified. From the 1950s onward, the experiential identity of schizophrenia and hallucinogen high was repeatedly called into question. After almost a century of model psychosis research, there seems to be a consensus today that from a neurobiological point of view hallucinogen intoxications and schizophrenia are distinct phenomena.

However, hallucinogen intoxication does not have to be identical with the mental disease to serve as a model of schizophrenia. In fact, the definition of a model requires that it *cannot* be identical with its object. Hence, from a purely epistemological point of view, the distinctness of hallucinogen inebriation and schizophrenia does not refute the conception of the hallucinogen model of

psychosis. In his book *Models*, the philosopher of science Marx Wartofsky writes: “The business about degrees of approximation is also a shabby complaint, if one keeps in mind a simple constraint on models, which we take as a definition (or part of one), or as a convention: nothing which is a model is to be taken as a model of itself, nor of something identical with it.”⁵¹ Wartofsky reminds his readers that they need to “keep in mind the metaphorical nature of [...] models, and remember to distinguish the model from what it is a model of.” Emphasizing the “metaphorical nature” of models raises the question: “Are models ever ‘true’, i.e. is a model ever a true representation of its object?”⁵² Wartofsky answers this question by elaborating his concept of representation:

- (1) *Anything* (in the strongest and most unqualified sense of ‘anything’) can be a representation of anything else. Therefore, there are no intrinsic or relational properties which mark one thing off as a representation of something else; or [...] everything has infinitely many properties in common with everything else, and so anything can be taken as a representation of anything else in terms of some of these shared properties.
- (2) It is we who constitute something as a representation of something else. It is essential to something’s being a representation, therefore, that it be *taken* to be one.
- (3) From (1) and (2) it follows that a representation is whatever is taken to be a representation; that representing is something *we do*, and that nothing *is* a representation except insofar as we construct or construe it as one; and in this, it is precisely the representation we make it, or take it to be.⁵³

⁵¹ Marx Wartofsky, *Models. Representation and the Scientific Understanding* (Dordrecht: D. Reidel Publishing Company, 1979), 4.

⁵² *Ibid.*, xx.

⁵³ *Ibid.*, xx f.

But Wartofsky also argues that “the essential feature of the modelling relationship [...] is that, although it is the case that anything may be taken as a model of anything else, it is *being taken as a model* which makes an actual out of a potential model; and every case of *being taken as a model* involves a restriction with respect to *relevant properties*. Not everything has the relevant properties which permit it to be taken as a model of something else, if relevance has to do with our *purposes* in taking something as a model.”⁵⁴

Thereby, Wartofsky shifts the argument from a discussion of “what representations *are* to the consideration of the human activity of *representing*.”⁵⁵ Modeling entails that the person making and using the model interprets the relationship between the model and its object in a certain way. Unlike all the other things, which have properties in common with the object, the model is considered to be a good model because it shares a *particular* set of features with the object. The choice of these features—and, hence, of the model itself—is a normative act presupposing a certain practical orientation or aim.

Considering that models of psychosis serve a certain purpose, the relationship between these models and their object is regarded as contingent, but not arbitrary. Sidney Cohen, an American physician who had been involved in model psychosis research in the 1950s wrote:

The debate about whether LSD brings forth a model psychosis is rather futile; undeniably, it can induce a model of psychosis, but for the reasons mentioned it cannot duplicate schizophrenia. A model need not reproduce every aspect of the

⁵⁴ Ibid., 6.

⁵⁵ Ibid., xxi. See also Ronald Giere, “How Models Are Used to Represent Reality,” *Philosophy of Science* 71 (2004).

thing modeled. For example, a model of a bridge, in addition to its difference in size, is also of different material and construction. Nevertheless, it is possible to learn much about the actual bridge from it. Just so, much can be learned about schizophrenic symptoms from a study of LSD phenomena.⁵⁶

Or, as Mark Geyer writes in his 1998 article “Why study hallucinogenic drugs in animals?”: “It is not necessary to argue that hallucinogens mimic all the symptoms of a complex disorder such as schizophrenia to believe that they affect some of the brain systems that can be disturbed in psychiatric illnesses. Thus, an understanding of hallucinogen actions may be relevant to specific aspects of schizophrenia rather than the entire complex syndrome.”⁵⁷ In a different context, Manfred Spitzer articulates this genuinely pragmatist understanding of models: “If models did not simplify matters, they would not be models but, instead, reality itself. Models have a right to exist insofar as they are simple. A good model represents only those aspects of a complex data set that are essential from a certain perspective. [...] Models are therefore neither true nor false. Instead, they are useful or not.”⁵⁸

The project Gouzoulis-Mayfrank has been pursuing persistently—by now, her colleagues Hermle and Spitzer have changed course—is a comparison of the effects of different hallucinogens to evaluate and differentiate their usefulness for the purpose of modeling different kinds and aspects of psychoses.

The pharmacological models, which we have, are models of different quality for different syndromes. The two main models are the serotonergic and the anti-

⁵⁶ Cohen, *The Beyond Within*, 92-93.

⁵⁷ Mark Geyer, “Why Study Hallucinogenic Drugs in Animals?,” *The Heffter Review of Psychedelic Research* 1 (1998).

⁵⁸ Manfred Spitzer, *The Mind within the Net* (Cambridge (Mass.): The MIT Press, 1999), 295-296.

glutamatergic model, which model different psychotic syndromes. Therefore, it is reasonable to examine and compare the different models. Supposedly, the neurobiological mechanisms of psychoses play different roles in the different models as well as syndromes. By examining a serotonergic as well as an anti-glutamatergic – and, if you like, also a dopaminergic – model we can test whether certain neurobiological parameters can be found in different models of psychosis or only in a single one. This produces clues concerning the connections between neurobiological parameters and types of psychosis. [...] For this reason, it is very reasonable to use different models. One can say: "With this substance we model this syndrome and with that substance another one."

Even though Gouzoulis-Mayfrank is convinced that the "model psychosis paradigm is potentially valuable as a way of validating basic neurobiological concepts thought to be related to schizophrenia,"⁵⁹ she does not assume that schizophrenia and its drug models were based on an identical neurobiological substrate. The commonalities between the two are not presupposed, but investigated. Moreover, what is found in the hallucinogen models is not believed to prove anything about the nature of psychoses, but can only serve as a hint inspiring further research in schizophrenic patients. In Gouzoulis-Mayfrank's eyes, the purpose of these models is the following: "They are meant to give interesting clues, which then need to be verified in patient populations. However, the models only serve as supplements. Based on model psychoses alone nothing can be demonstrated. There is no way of safely extrapolating from the results of model psychosis research to mechanisms of psychosis. Hence, I need to check whether a model fits and if it does, then I have only gained another argument."

⁵⁹ Euphrosyne Gouzoulis-Mayfrank et al., "History, Rationale and Potential of Human Experimental Hallucinogenic Drug Research in Psychiatry," *Pharmacopsychiatry* 31 (1998): 67.

What is peculiar about these models as models is that they do not function as transparent representations of their object. Although object and model are distinct, they are situated on the same ontological level. In Beringer's experiential model of psychosis, it is an experience, which serves as the model of another experience while its neurobiological remake presents a brain on hallucinogens as the model of a psychotic brain. In comparison to other kinds of models, this seems remarkable. Mathematical models of economic development, wiring diagrams of the nervous system of *C. elegans* (which Ankeny presents as an example of descriptive models), or three-dimensional models of molecules are qualitatively different from their objects in the "real world." The latter are formal, not material models. They are independent of their physical embodiments. The representations are not made of the same stuff as what they represent. In the case of the model psychoses, on the other hand, this ontological difference has been eradicated. Possessing a distinct materiality and depth model psychoses function as scientific objects in their own right. They have a certain opacity calling for research on the model itself (while it is not necessary to chemically investigate the materials from which the model of a molecule has been built). This opacity allows of surprises like the increased PPI in human subjects on hallucinogens and, at times, it thwarts the purposes, which the scientists had in mind for their model.

As a scientist taking something as a model of something else has a particular end in view, Wartofsky argues, a model is oriented toward a certain achievement in the future. Therefore, he claims, a model is a "technology for

creating the future.” By the phrase “creating the future” he means “*acting* in such a way as to make the future conform to some present vision of it.”⁶⁰ However, the hallucinogen intoxications are phenomena, which have turned out to be too complex to meet all expectations of those using them for the purpose of modeling psychoses. The model psychosis can be looked at as what Hans-Jörg Rheinberger has called an experimental system. Experimental systems are “the basic, functional units of scientific activity.”⁶¹ An experimental system needs to be stable enough to maintain and reproduce itself while being flexible or loose enough to promote unpredictable events. As a research system, it can only keep going if it generates not only knowledge, but also “the unknown,” which requires further research to be explained.⁶² Following the molecular biologist François Jacob, Rheinberger has characterized such setups as “‘machines for making the future.’ They are not simply experimental devices that generate answers: experimental systems are first and foremost vehicles for materializing questions.”⁶³ Thus, Rheinberger’s characterization of experimental systems is highly reminiscent of Wartofsky’s branding of models as “technologies for creating the future.” But unlike Wartofsky, Rheinberger has an open future in mind, a future that cannot be foreseen and that, almost by definition, will not “conform to some present vision of it.” As Gouzoulis-Mayfrank has pointed out,

⁶⁰ Wartofsky, *Models*, 142-143.

⁶¹ Hans-Jörg Rheinberger, “Experimental Systems. Historiality, Narration, and Deconstruction,” in *The Science Studies Reader*, ed. Mario Biagioli (New York: Routledge, 1999), 418.

⁶² A similar argument can be found in Niklas Luhmann, “Die Soziologie des Wissens: Probleme ihrer theoretischen Konstruktion,” in *Gesellschaftsstruktur und Semantik. Studien zur Wissenssoziologie der modernen Gesellschaft* (Frankfurt/M.: Suhrkamp, 1999), 177-178.

⁶³ Rheinberger, *Toward a History of Epistemic Things*, 28.

hallucinogens cannot answer any questions about psychoses. As a model of psychosis they can only produce more questions to be answered in another experimental system, which involves schizophrenic patients. Its future being undecided, it remains to be seen whether this generative model will keep what its practitioners have promised—insights into the neurobiology of schizophrenia and the development of better antipsychotics.⁶⁴

In any case, it is a pragmatist view of models that informs the concept of model psychoses in contemporary biological psychiatry. Like *Rimini Protokoll's Wallenstein* production it introduces a dense and hazy reality of its own into the space of scientific representation. Even though it has broken with naïve representationalism it maintains a relationship of select correspondences between the model and its object. Hence, both the unreserved equation of the effects of hallucinogens with schizophrenia as well as the outright rejection of the use of hallucinogenic drugs to model psychoses miss the point. But it might well be in the nature of things that the hallucinogen model has often been misperceived.

⁶⁴ As Mark Geyer pointed out to me, so far at least one antipsychotic has come out of model psychosis research: risperidone. Its forerunner pipamperone and possibly risperidone as well were found by screening for drugs that would block the effects of both amphetamines and tryptamines such as LSD. Pipamperone was discovered in the Janssen laboratories in 1961, risperidone in 1984. See Healy, *The Creation of Psychopharmacology*, 251-254.

6. Modeling Psychosis II: Animalization of the Mind

Psychiatric Drug Discovery: From Self-Experimentation to Animal Research

I had met Mark Geyer at the LSD Symposium in Basel in honor of Albert Hofmann's 100th birthday in January 2006. I expressed interest in visiting his laboratory in San Diego and he invited me. When I arrive in San Diego a few months later, I come right on time for the public seminar "Chemistry of the Mind," which Mark has organized together with the small start-up company Acadia Pharmaceuticals—in part, to draw attention to Acadia's currently most promising compound, a potential atypical antipsychotic called ACP-103. They have invited the Oxford professor of pharmacology and former director of the neuroscience drug discovery program at Merck Les Iversen, the Nobel Prize laureate Arvid Carlsson, one of the grand old men of neuropsychopharmacology, as well as Sasha Shulgin who—since quitting his job as a research chemist at Dole Chemical Company in 1966—has dedicated his life to developing new psychedelic drugs in a private lab on his farm in Lafayette, California. Each of the speakers gives a lecture. Carlsson and Shulgin reminisce their achievements and indulge in anecdotes, but no dialogue emerges. Even though the symposium's announced goal is to discuss "the future direction of research and discovery in the field" its participants seem more concerned with the past. The following morning, during a question and answer session with Carlsson and Shulgin, which Mark has arranged for students from the Departments of Neuroscience, Pharmacology, and Psychiatry, Shulgin explains his reliance on

self-experimentation as the royal road to drug discovery by pointing out that animal testing is of no value in defining the subjective effects of a psychoactive drug in humans. As he puts it elsewhere: “I believe totally that assays such as nest building among mice, disruption of conditioned response, grooming, maze running, or motor-activity have no value in determining the psychedelic potential of a compound.”⁶⁵ Mark Brann, the founder and president of Acadia, sitting in the audience comments:

I think there is an interesting context to put Sasha and Arvid into. Being in the pharmaceutical industry, I've met and interacted with many of the pioneers of the field of their age group. What people don't realize is that what Sasha did was extraordinarily common in the 1960s and 70s. When people were testing compounds to investigate drug structure/activity relationships, particularly when they were testing compounds where the animal correlates weren't extremely obvious, they would taste the drugs themselves. For example, I know people doing eye care research. [All the drugs they developed] until about 1975 were tested by the chemists making them on their own eyes to see if they worked and whether they had any side effects. The pharma industry, up until the mid 70s, knew this was occurring and that it was very facilitating of the drug programs [...]. But by the mid 70s, this was stopped because of the liabilities. You have to look back at the time to realize that what Sasha is doing seems very outrageous when you look at it from the perspective we are all trained in now. But at that time, it was the norm. [...] The perception until the mid 1970s was that people knew they were taking a risk; they were curious about the results; they were dedicated scientists who wanted to see progress, and they did it.

When I ask Brann why self-experimentation had lost its legitimacy since, he answers: “I would say that it's an outcome of the liability culture and the fact that the research individuals are doing at a pharma company is a collective

⁶⁵ Shulgin and Shulgin, *PIHKAL*, xxii.

responsibility. If someone did that in my company we would immediately terminate them because of the exposure they would create for our efforts. Now that we are in an environment where each step in drug development is hyper-regulated, if such an activity occurred, it would expose the company.”

To learn about the psychoactive effects of the latest compound in its drug development pipeline, Acadia gave ACP-103 to Mark Geyer’s lab for preclinical testing in animals. In the model psychosis paradigm, it turned out to be a powerful 5-HT_{2A} inverse agonist reversing hallucinogen-induced deficits in prepulse inhibition in rats. ACP-103 is currently being tested in humans.

The Geyer Lab

Mark Geyer’s laboratory is part of the medical school of the University of California, San Diego (UCSD). It is located 13 miles away from the main campus at the UCSD Medical Center in Hillcrest, a lively residential area serving as the center of San Diego’s gay and lesbian community. Unlike the Zurich lab, which apart from the EEG room and a second room equipped with a computer for neuropsychological testing mostly consists of tidy office space, the Geyer lab is crammed with glassware, chemicals, scales, a big microscope, computer equipment, discarded rat cages, motion tracking boxes, startle chambers, and Plexiglas boxes full of mice, rats, or guinea pigs that have been brought up from the vivarium for experimentation. It is a space for bench work. This reflects the fact that the easy availability of laboratory animals—in contrast to human test subjects—allows experiments to take place much more frequently. Often several

experiments are conducted at a time. Usually, they are run by the five technicians while the four scientists sit in front of their computers processing data, writing papers, and designing new experiments. This does not mean that the scientists are not doing any practical work at all or that the technicians are largely excluded from the reflective part of the research process. But the division of labor is structured hierarchically: The higher the rank, the less hands-on work and the less contact with animals (an organization which also has a practical justification: over the years, animal researchers not only rise up in the hierarchy, but frequently also develop allergies complicating their handling of animals).

As lab head Mark Geyer has ceased to do technical work. He spends his time writing articles and rushing from meeting to meeting and from conference call to the airport and back again. A man in his early sixties he now is a senior figure in the field of behavioral neuropsychopharmacology: current president of the Serotonin Club (an umbrella organization of serotonin researchers), fulfilling editorial functions for various neuropsychopharmacology journals, serving as consultant for a number of pharmaceutical companies, and actively engaged in science policy programs of the National Institutes of Mental Health. For Geyer, the Heffter Research Institute, which he co-founded with Dave Nichols and others to promote hallucinogen research, is one project among others. Unlike Vollenweider he does not conceive of himself as a “hallucinogen researcher” in the first place. The focus of his career is prepulse inhibition (PPI) and related measures closely associated with, but not at all restricted to schizophrenia research. In this enterprise, hallucinogenic drugs have come to serve as an

important tool to manipulate and investigate PPI. Undoubtedly, these investigations have produced much valuable knowledge about psychedelics. But the way in which Mark's project and the lab are organized attracts few people who are first and foremost fascinated by psychedelic drugs—even though Mark himself is highly interested in these pharmacological agents and their effects.

Hence, it comes as no surprise that drug experiences do not play a prominent role in the Geyer lab. When one of the technicians asks me what exactly I am interested in in their work and I tell him that it is their research on and with hallucinogenic drugs such as LSD he shrugs: „It's just another drug.“ The dominant view in the lab is that psychedelics are research tools that allow altering the brain chemistry of laboratory animals in specific ways. That is not to say that Geyer's collaborators are generally ignorant of the powerful effects their tools have on the human mind. Some have personally experienced how “magic mushrooms” or LSD can radically alter the way we think, feel, and perceive the world. But these experiences failed to play a decisive role in the formation of their personal and professional identity. And in the lab, drug experiences are usually not spoken about openly. There seems to be some degree of uneasiness based on the concern that admitting first-hand knowledge of the substances one is working with might have a negative effect on one's reputation as a psychopharmacologist. The norms governing the discipline of psychopharmacology have gone a long way since Beringer expected his residents to self-experiment with mescaline.

Ethics: The “Iron Cage” of Animal Research

For someone or other in the lab drug experiences are a precarious detail of his or her past, but unless a nosy anthropologist starts digging around they are not a major cause of concern (or fascination). What the inhabitants of Geyer lab worry about is not so much their experimentation with drugs, but animals. During my first days in the lab I watch how the youngest technician is taught implanting cannulas into the brains of mice. After the animals have recovered from this minor surgery, this allows infusing drugs directly into specific parts of their brains instead of administering the pharmacological agents globally. Such an anatomically differentiated approach appears to be one of the most promising venues of contemporary neuropharmacology. However, for ethical reasons it can only be pursued in animals. I took a number of photos of the surgery, of mice that had already been operated on and were now running around in their cages with little tubes sticking out of their heads, as well as of the subsequent killing (or “sacrificing,” as they say⁶⁶) of these “practice animals.” The fact that I photographed scenes likely to stir up public sentiments soon gave rise to speculations and concerns that I might be a clandestine animal rights activist infiltrating the lab to bring it into disrepute—a strategy that had been employed successfully by the most prominent American animal rights organization *People for the Ethical Treatment of Animals* (PETA).

⁶⁶ For a critical analysis of the usage of this term, see Michael Lynch, “Sacrifice and the Transformation of the Animal Body into a Scientific Object: Laboratory Culture and Ritual Practice in the Neurosciences,” *Social Studies of Science* 18, no. 2 (1988).

Although animals have been used in medical experiments since antiquity such practices have only been problematized ethically since the seventeenth century.⁶⁷ At the end of the eighteenth century, the animal protection movement arose in Great Britain. Its agitation led to the *Cruelty to Animals Act* of 1876 mandating government surveillance of animal experiments through annually renewed licenses granted to experimenters.⁶⁸ Ever since, antivivisectionism has been a powerful force in British politics—strong enough to not only threaten single academic labs, but even transnational pharmaceutical giants such as GlaxoSmithKline. During my fieldwork, after an aggressive campaign against animal experimentation in the United Kingdom, Glaxo's chief executive felt bound to stress that his company had no plans to leave Britain because of the protests and urging other businesses to resist pressure from the animal rights movement as well. "This is not the time to flee the battlefield," he said.⁶⁹ Across the Atlantic, antivivisectionism and animal rights activism only gained ground much later and overall less firmly. In the United States, the first laws regulating animal experimentation were passed in the 1960s, almost a century later than in Britain. In part, the enactment of the Laboratory Animal Welfare Act in 1966 was a response to the public outrage caused by a photo essay entitled "Concentration

⁶⁷ Anita Guerrini, *Experimenting with Humans and Animals. From Galen to Animal Rights* (Baltimore: Johns Hopkins University Press, 2003). Anita Guerrini, "The Ethics of Animal Experimentation in Seventeenth-Century England," *Journal of the History of Ideas* 50, no. 3 (1989). Andreas-Holger Maehle, *Kritik und Verteidigung des Tierversuchs. Die Anfänge der Diskussion im 17. und 18. Jahrhundert* (Stuttgart: Franz Steiner Verlag, 1992).

⁶⁸ Harriet Ritvo, "Plus Ça Change: Anti-Vivisection Then and Now," *Science, Technology, & Human Values* 9, no. 2 (1984): 58.

⁶⁹ Alan Cowell, "Oxford Seeks More Curbs on Protests to Aid Animals," *New York Times*, 19 May 2006.

Camps for Dogs” published by Life Magazine. In the early 1980s, undercover PETA activists gained access to two laboratories experimenting on primates, documented their treatment, and released video footage from head injury experiments conducted at the University of Pennsylvania. This led to a suspension of federal research funds and termination of the experiments. A few years later, in the late 1980s, Mark Geyer’s lab became the target of a PETA campaign as well. Two of Geyer’s grants were subpoenaed under the *Freedom of Information Act* and he was nominated twice as “Vivisectionist of the Year.” Notably, PETA focused on his use of the hallucinogen PCP.

MG: I was at a *Biological Psychiatry* meeting in Washington, D.C., and got a call from the Dean’s Office of the School of Medicine saying that the animal rights activists had announced their program for Animal Liberation Week and that they were going to have a candle light vigil on campus to make known my treatment of some animals in a particular study that involved 92 rats treated with phencyclidine (PCP) and put into startle chambers. Out of those 25 pages of grant proposal that was what they focused on as the thing they wanted to protest against. There were neurotoxin studies and burning holes into brains, i.e., making lesions, but that didn’t bother them. What seemed to upset them was giving rats PCP and startle them. We can get humans to volunteer for that kind of study. Franz [Vollenweider] does it all the time using ketamine instead of PCP. On the other hand, you couldn’t get humans to volunteer for neurotoxin studies.

NL: This sounds like a curious association of animal rights activism with a Puritan agenda.

MG: Whether this was a reflection of a projective anxiety that made the PETA people anxious or whether they were strategic thinking that this is something that people can relate to as being horrible, I don’t know. I would rather have thought that the neurotoxins would have been something that people imagine as being horrible. So that mystified me. [...] Another year, Matt from my lab went to a protest to find out what they were saying. They described our work in locomotor activity as

rodents walking around in a box after we broke their legs, which, of course, we had never done. That was a bit of a distortion. [...]

NL: I heard that they burned your figure in effigy on campus?

MG: They may have done something like that. Matt went there and reported, but I never got any official description other than what Matt told me. I don't remember hearing about burning me in effigy, but they said some nasty and somewhat untrue things. In other cases, they said not so nasty—even though they considered them to be nasty—and true things. I did publish a paper on 92 rats, which had been given PCP and which had been startled. I freely admit that.

Unlike PETA's early operations against the primate labs their protests against Geyer's work did not impede his research. However, his work had already been affected by the consequences of PETA's first campaigns, which conducted to a revision and tightening of the Animal Welfare Act in 1985 shaping animal research in the United States until today. This is not to say that the animal rights activists' demands were fully implemented by the American government. The regulations put in place at the time do not grant animals any "rights." Rights continue to be an exclusively human domain. Rather, the management of laboratory animals is based on the principle of animal welfare, a form of responsible stewardship aiming at a "humane" use of animals, not the abolishment of their scientific and agricultural utilization. The gradual institutionalization of animal welfare since the 1960s has been inextricably entwined with the emergence of "the ethical" as a significant public space carved out between the legal and the political.⁷⁰ The resulting ethics apparatus is a composite of several regulatory bodies and practices.

⁷⁰ Cf. Paul Rabinow, "Toward an Anthropology of the Contemporary Moral Terrain," (2004 [unpublished manuscript]). At the same time, the moral authority of physicians and

First, there is federal law, i.e. the Animal Welfare Act, which, over the years, has been expanded by amendments and additional federal regulations. By now it covers provisions about adequate housing, food, cage size, transportation carriers, the handling of animals, oversight responsibilities, etc. Additionally, the Public Health Service policy separately requires every institution that receives federal funding and conducts animal experiments to establish an Institutional Animal Care and Use Committee (IACUC). Like the ethics committees that have proliferated in American medical and research institutions since the 1960s to protect the well-being of human subjects, the IACUC is an institutional review board (IRB) charged with the formal assessment of research protocols involving animals. Its task is to reduce, replace, and refine animal use and to minimize “animal suffering”—a category not always easy to judge as the members of such review committees do not know any better what it is like to be a rat than philosophers of mind do.⁷¹ In the case of rodents, i.e., the vast majority of laboratory animals, this is particularly difficult because as prey species they mask overt signs of pain as much as possible (to avoid being singled out by predators). In the *Orientation to Animal Research* class, which everybody (including faculty) beginning to experiment on animals at the University of California, San Diego, has to take, a veterinarian advises animal researchers to assume that “if something is painful or distressful to us most likely it is painful or distressful to the animal we work with.” However, such an anthropomorphizing inference from

medical researchers began to be questioned. In response to a series of scandals, regulatory bodies were established to oversee their work. See Rothman, *Strangers at the Bedside*.

⁷¹ Cf. Thomas Nagel, “What is it like to be a bat?,” *The Philosophical Review* 83, no. 4 (1974).

human experience to the experience of other species is disputed. An ethics textbook assigned to Animal Science students states:

Different empirical assumptions are at work in current literature about the degree to which animals suffer, including whether they suffer *more* or *less* than humans do. In the scientific literature, there is a tendency to assume that animals have different forms of pain reception and cannot anticipate or remember pain—and therefore suffer less than humans. A contrasting view is that animals suffer more, not less, because they have less understanding of the origin, nature, and meaning of pain. That is, an animal may be a captive of the momentary experience of pain, and without the capacity to deal with danger, injury, and the like. What can be processed and put in context by a human may be experienced as terror by a captive animal.⁷²

The IACUC and similar review committees sidestep such slippery philosophical questions by defining a formal process for review of research protocols. Such a procedural and principle based Kantian form of ethical reasoning is compatible with the functioning of the IACUC as a bureaucratic body managing animal research in a large-scale institution such as a university. Only a strictly formalist procedure allows to administer the ethicality of an enormous number of scientists and the well-being of an even greater number of lab animals.

Besides processing protocols the IACUC is mandated to police and audit laboratories and vivaria. Laboratory staff is expected to keep records on everything they do in relation to animals—from medical checkups to experiments and from purchase to euthanasia. This produces a significant amount of paperwork. However, the bookkeeping requirements differ from species to

⁷² Barbara Orlands et al., *The Human Use of Animals. Case Studies in Ethical Choice* (New York: Oxford University Press, 1998), 40-41.

species. The US Department of Agriculture (USDA), which oversees the uses of animals on the federal level alongside the Public Health Service, does not regard birds, mice, and rats as “animals”⁷³ and therefore does not require researchers to account of them. Hence, 85% (according to other estimations even 95%) of all research animals in the United States are unprotected by the USDA regulations. Nevertheless, their uses are still supervised on the institutional level by the IACUC. Animal rights groups have recently identified the inconsistency of the USDA definition of the term animal and the resulting blank space in “audit culture”⁷⁴ as a weak spot of contemporary American animal research: the more bookkeeping, the less animal experimentation.

MG: We know that there are motivations in the institutionalization of these external strictures by components of society that are not driven by realistic concerns about animal welfare, but by conscious attempts to diminish the use of experimental and in some cases even food animals. Now, the animal rights activists would say—in fairness to them—that these constraints are real concerns about animal welfare because their fundamental belief is that these are sentient living beings and that we should not take species priority over them: We have no right to eat them or use them in medical research. When I say they are not genuinely motivated by concerns about the welfare of an animal I mean: Given that an animal is in the laboratory, given that you accept that premise, they have imposed restrictions on that that are above and beyond realistic needs in order to price that work out of the market. But that’s just my opinion.

NL: What kind of restrictions do you conceive of as exaggerated?

MG: I’m told that PETA, the *People for the Ethical Treatment of Animals*, has as part of their game plan the institutionalization of as much bureaucracy, paperwork, reporting, as much procedural checks and balances as possible—explicitly to

⁷³ Ibid., 41.

⁷⁴ Marilyn Strathern, ed., *Audit Cultures. Anthropological Studies in Accountability, Ethics, and the Academy* (London: Routledge, 2000).

increase the cost of doing this research. This is based on the correct belief that every time we spend a hundred dollars on processing forms those one hundred dollars can't go into buying a rat. Given their agenda, that's very reasonable and quite an accurate approach.

NL: Overall, their strategy seems to have been quite successful. There were the PETA campaigns in the early 1980s and by the mid 80s the legislative apparatus protecting animals expanded significantly.

MG: Right. A few years ago, they tried to get birds or some other species to be considered as food animals as well. If they could get any of the additional research animals to be considered food animals then they come under the auspices of the USDA. Like guinea pigs. We're doing some work in guinea pigs. Because they are classified as food animals...

NL: Who eats guinea pigs?

MG: In South America, the guinea pig is a very popular thing on the menu in the restaurants. Enough to be considered a farm animal. There is a whole additional set of reporting required for farm animals.

NL: In Southeast Asia, they eat rats.

MG: If PETA could get rats to qualify as food animals they would because it would multiply the bureaucracy. It's a reasonable strategy for them. It's certainly better than bombing us. When I was a Fogarty Fellow in Cambridge (UK), they blew up a cosmetics store in town and we were afraid that they would also bomb the lab at the experimental psychology building.

NL: How are the ethical regulations perceived in the animal experimentation community? Do you see them as a hassle?

MG: Yeah. I think I'm fairly representative of our field and I believe that it has been overkill. Some regulation was certainly needed because there were people who didn't have sensitivities to the health of animals. I don't think these people came as much from psychology as from other medical disciplines. But that's just a bias. Or it reflects an interest in behavior [among psychologists] while people in biochemistry or toxicology are relatively oblivious to behavior and therefore they don't watch their animals as closely. They wouldn't notice [if something was wrong with their health]. So some measures were appropriate. But I think it was overkill. Many of the controls that are required now don't add to the well-being of

the animals. And they certainly are considered to be inconveniences, irritations, and nuisances when all these forms have to be processed. But that's human nature. Even if you agree that taxes are necessary, you still get irritated when filling out your tax form.

NL: Even though there are practically useful requirements and not so useful requirements. For my protocol, the Office for the Protection of Human Subjects (OPHS) asked me to provide a list of questions that I would ask subjects. I gave them five questions as an example of what kind of questions I would like to pose. The OPHS came back to me saying that I wasn't supposed to provide examples, but to state the exact questions that I would ask subjects. So I claimed that I would simply ask those five questions. What was I supposed to say? Their response reveals a total ignorance of how anthropological fieldwork is done. You cannot foresee the questions that will come up. You go to the field to find new questions as much as new answers. My interest in the ethics of animal experimentation, for example, only arose after I came here, when I became aware of the fact that it is a major cause of concern for people in your lab. Besides, fieldwork also means that you spend a considerable amount of time with your subjects. Mostly, you are not doing formal interviews. You're just chatting. Imagine I spent half a year in Zurich and asked the same five questions over and over again, at every single lunch. Before long, they would have thrown me out, I guess. The researchers in Franz' lab kept joking that it's easier for them to dose human subjects with drugs than it was for me to watch them doing it. The fact that the OPHS has this completely unrealistic requirement makes me wonder what this is about. To me, it seems to be primarily about shifting liabilities away from the university to the individual researcher.

MG: That's right. Exactly.

NL: That seems to be the driving force behind it. Not some genuine ethical concern about me asking you or Franz the wrong questions.

MG: No, by and large, it's CYA—cover your ass—behavior of the institutions. So, yeah, the ethical regulations just got overboard. A lot of my peers lament that the requirements for animal facilities are greater than the requirements for human facilities: the number of air exchanges per hour, etc. I don't want to go there because at the same time as we are putting all these institutionalized controls for

the protection of animals, there are all these environmental health and safety directives about where you can eat food and drink water and whether we can have a shelf that doesn't have a lip on it because a book might fall down on you when we have an earthquake. If we make the complaint that the animal regulations are more stringent, they won't cut them back; they will just increase the human regulations. I guess that's where I've gotten to the point of being more on the management or employer side. I don't want my employees to be at great risk, but—give me a break! How much we can be regimented here!

Ethos: Care and Method

The irritation caused by the regulatory framework indicates that researchers have not fully internalized the norms the animal welfare apparatus imposes upon them. However, this is not to say that they are unscrupulous and free of ethical concerns. In fact, they have developed an attitude slightly at odds with, but also complementary to the audit culture monitoring their work. Unlike the procedural ethics institutionalized in a bureaucracy, which ideally proceeds in a formalistic and impersonal manner this kind of ethos is embodied by individual researchers. The regulatory bodies rely on the fact that those scientists and technicians who are actually working with animals handle them conscientiously. They are expected to develop a certain sensibility in accord with the practice and principles of animal welfare as well as animal experimentation. In the *Orientation to Animal Research* course, the representative of the Institutional Animal Care and Use Committee urges the participants “to take time to think about and develop a personal code of ethics that emphasizes animal welfare. [...] We ask that you design research protocols that pay attention to the animals' well-being and to be an advocate about your research, to talk to your friends, your neighbors, your

colleagues about the value of your research and what good it will do society because that's how you change minds and how people gain a balanced view." The veterinarian who explains in detail how different laboratory animal species are to be housed, handled, and killed, proclaims: "Doing research with live animals is a privilege, not a right. It's not a given that anyone who wants to do it can do it. Therefore, these animals need to be treated with utmost compassion and respect because obviously they are sentient beings sacrificing their lives to advance science and knowledge."

The cultivation of affects such as compassion and respect is key to the animal welfare apparatus because it inspires the kind of substantive ethical deliberations, which no ethics committee can achieve. When asking people in the lab where they draw the line in what they are willing to do to an animal Jared, a new Postdoc from Scotland, tells me that he would never do pain experiments. Some of his colleagues at home worked on anesthetics examining what effect potential painkillers had on an animal's response to painful stimuli. Jared thinks that their work is highly valuable, as it will help to alleviate human suffering. Even though such research does not transgress any moral limits in his eyes, he would not be willing to do it himself. Maybe, he says, it has to do with the fact that he personally avoids taking painkillers because he does not like to be dependent on drugs. If he had a family member suffering from a chronic pain syndrome he might feel different about it, he believes. When I bring up his attitude in a conversation with his colleagues Emily Davis and Olivia Siskin they say that they

would not rule out conducting pain experiments categorically. But they are only willing to engage in such work if they were convinced that it was a “good study.”

NL: What is a “good study,” which is worth sacrificing animals?

ED: That’s not something you know right off the bat because you never know where science will lead you.

OS: Generally, it’s about doing good science, making sure that you’re not doing any experiments half-assed, not having proper controls, etc. An experiment needs to be interpretable. No matter what the outcome is you should at least have some answer to one aspect of your question. You see a lot of sloppy stuff being done, which, at the end, doesn’t really answer your question. Sometimes you see studies, which make you feel that they were a waste of animals because they weren’t properly designed. But I don’t know what questions are worth pursuing if that’s what you are aiming at.

NL: Does a “good study” necessarily have a clinical impact?

OS: I don’t think that each study has to have a clinical impact. That would be asking too much. A study can provide building blocks for basic science. It’s difficult to know what will be clinically relevant twenty years down the road. You certainly need to decide whether the question you’re interested in more generally is worth asking. For example, I might decide to do certain things to animals in the context of cancer research because I think cancer is worthwhile to study. Or, in our case, mental illness. You have to start at that level because individual experiments are sometimes difficult to evaluate. Of course, you always have to ask yourself whether an experiment is just intellectual masturbation. Sometimes we get caught up in this. You do an experiment and you think “It looks as if that was a 1A effect, let’s pursue it!” It’s fun, but you need to take a step back and ask yourself: Is this really getting at a bigger question?

ED: What’s worth doing in terms of good science is a question, which probably most scientists could come to a consensus on. But then there is also the personal question: What am I willing to do to sacrifice animals? Each person has a different threshold. Some people might say: Yes, I’m doing animal research, but only if it has an obvious clinical application that manifests quickly.

NL: Would you personally subscribe to this criterion of clinical applicability?

- ED:** Yes.
- OS:** If I were to do real basic research I would do it in a system, in which you wouldn't have to sacrifice animals. Most in vivo work ends up having some more direct clinical impact though. But I haven't thought as much about the applications that I'm comfortable with than about the species. I don't know whether I wanted to do primate work. I don't know whether I could. Right now, I would say that I wouldn't want to.
- ED:** But you wouldn't necessarily judge others. It's your own threshold, what you can do without getting depressed.
- NL:** It probably also depends on the method. PPI is not as bad as pain experiments, is it?
- ED:** But then again animal models of pain are among the most predictive in terms of finding clinical applications. While PPI has been a little bit sketchy, hasn't it? [Laughs.]
- OS:** I haven't thought that much about pain work. But, Emily, you have actually done it, right?
- ED:** Yes, I did some pain work at a pharmaceutical company. We were screening compounds there. In a lot of the models used in early phases of screening you look for a pain response in the animal. For example, you put the animal on a hot plate and you look at its latency to lick its paw because it's feeling the heat. It doesn't burn right away. It takes them a little while to get hot enough. The problem is if the drug—and these are totally unknown compounds that you're screening through—has sedative or motor inhibitory qualities. As the technician that was running these experiments I could see that it was not necessarily that they couldn't feel the heat, but that they weren't giving me the expected response. They couldn't pick up their paw and lick it, but they kept changing positions. Or they may try to turn over. There were arguments about how to interpret this behavior because the animals weren't doing what everybody wanted to see, which is a paw lick. One should have done a motor response task first. If they are feeling it but they can't tell you that's pretty bad. That is how I got out of this project because I felt that this isn't good. I think those experiments shouldn't have been done.

This interview excerpt as well as Jared's resolution not to engage in pain experiments provide good examples of the kind of "personal code of ethics," which animal experimenters are expected to develop—even though this ethos is ambiguous. On the one hand, they oppose what they perceive as an excess of bureaucratic constraints. On the other hand, individual researchers lay down their own norms, which are often more restrictive than the official regulations. Their ethos is complementary to the formal regulations structuring their work, as it comprises a kind of practical wisdom that is the product of a process of ethical self-formation, but also of an intimate familiarity with scientific knowledge and practice as well as animal behavior. Emily's choice to quit the pain experiments was based on a simultaneously ethical and scientific evaluation of the study: As she came to think of it as poorly designed, she was no longer willing to expose animals to the distress it caused them. Such a judgment requires both virtue as well as practical and intellectual orientation in a particular situation, which an ethics committee on the other side of campus lacks.⁷⁵

Experiment 1: Guinea Pigs on Angel Dust

32 inbred and therefore genetically almost identical albino guinea pigs are sitting in their cages, most of them cuddled up while two animals are squabbling noisily. Some of them have already been injected either with the presumably inactive vehicle (roughly equivalent to placebo in a human trial) or with a novel compound from a major pharmaceutical company to be tested. The pharmaceutical

⁷⁵ Cf. Andrew Lakoff and Stephen Collier, "Ethics and the Anthropology of Modern Reason," *Anthropological Theory* 4, no. 4 (2004). Alasdair MacIntyre, *After Virtue. A Study in Moral Theory* (Notre Dame: University of Notre Dame Press, 1984).

company's lawyers and their colleagues from the University of California have drafted a service contract for the Geyer lab to screen the drug for potential antipsychotic action. None of the results can be published without the company's permission. Cathrine, the lab manager and head technician running the trial, suspects that the company has already received some promising hints, but wants an independent academic lab to reproduce their results.

This is the second time that this compound has been tested in the Geyer lab. On the first go, the trial was discontinued by the Institutional Animal Care and Use Committee (IACUC) when several guinea pigs had been found dead after the second day of the experiment. The Committee ordered an autopsy, which showed that the animals had died of an allergic reaction to the vehicle methyl cellulose. The experiments could only be resumed after a non-allergenic form of methyl cellulose had been substituted as vehicle for the test compound.

50 minutes after the first injection the animals get a second one. They meet this intervention with loud squeaking. While continuing unswervingly Cathrine speaks to the guinea pigs comfortingly: „It's ok, baby. You're almost done. I'm sorry I made you bleed. You will be ok soon.“ This time, she administers either vehicle or the hallucinogen phencyclidine (PCP).

PCP was originally developed and marketed in 1956 by the pharmaceutical company Parke-Davis as an anesthetic. But its medical application was terminated in 1965 after it had been found to induce psychoses. Nevertheless, in the following years, it was popularized under the street name Angel Dust and, after a sensationalist series of media reports, became infamous

for provoking acts of irrational violence against oneself and others.⁷⁶ Its mostly antiglutamatergic action is similar to that of ketamine, but due to its bad reputation PCP cannot be administered to human test subjects. However, in animal experimentation it serves as a popular psychotomimetic agent as it consistently provokes PPI deficits in rodents and primates and as NMDA antagonists are said to model positive and negative schizophrenia symptoms alike. This is of particular importance as the already available antipsychotics efficaciously reduce positive symptoms like hallucinations and delusions, but fail to treat negative symptoms such as cognitive deficits. Thus pharmaceutical companies are currently racing to fill this gap in the market as well as in psychiatric treatment. Antiglutamatergic hallucinogen models of psychosis play an important role in screening for potential compounds. The rationale of the present experiment is to see whether the pretreatment with the novel compound will cancel out the PPI deficit induced by PCP indicating antipsychotic potential in humans.

Ten minutes after the second injection, four animals per run are put into startle chambers in a separate soundproof room. Startle chambers are pressboard boxes containing a Plexiglas tube big enough to fit a guinea pig or a rat and a loudspeaker emitting white noise. A so-called Startle Response Monitor manufactured by Geyer's company San Diego Instruments occasionally interrupts this murmur by generating sonic bursts at 120 dB referred to as "pulses" (alternatively, light flashes and air puffs can also be triggered to affect

⁷⁶ Jenkins, *Synthetic Panics*, 54-75.

other sense modalities than hearing). Usually, a pulse is strong enough to elicit a startle reflex, which comprises a jerk of the whole body. However, if a weak, non-startling stimulus, e.g., a low noise, referred to as prepulse precedes the pulse it inhibits the startle response. This phenomenon is called prepulse inhibition or PPI. The amplitude of the startle response is registered by a piezo crystal under the Plexiglas tube measuring the intensity of the animal's twitches. These measurements as well as the intensity of pulse and prepulse are recorded by a computer in the lab.

A run takes about twenty-five minutes. From time to time, Cathrine checks the succession of numbers scrolling across the screen to see "how the pigs are doing." When she realizes that one of the four animals continuously produces very low startle response amplitudes she begins to worry that its vital functions might be affected. Has she punctured an organ when giving the intraperitoneal injection? Is it yet another unexpected side effect of the new drug or vehicle? Or is there a technical problem impairing the measurements? She puts on ear muffs and walks into the room, where the startle chambers are set up. A peephole in the door allows her to look into the box. The guinea pig breathes normally and jumps at each pulse. Cathrine is relieved. The animal seems to be ok. After the run the guinea pigs return to their cages. Before the next round, the startle chambers need to be cleaned as the animals have defecated in response to the stress of continuous startling. The ethos of animal experimentation is characterized by a peculiar, almost paradoxical blend of methodical ruthlessness and conscientious and empathic care.

Experiment 2: Lullaby for a Mouse

Jared is a sturdy bearded 27-year old Scot who recently finished his Ph.D. in psychology at the University of Edinburgh on an animal model of attentional performance (5-choice serial reaction time task). As a matter of principle, he never takes illegal drugs. But he loves to drink. No beer, but wine and shots. He jokes: "If I should ever end up at an Alcoholics Anonymous meeting I will get up and say: 'My name is Jared. I'm a Scotsman. Get over it!'" Jared is standing in a small PPI lab wearing a blue lab coat, purple gloves, and a breathing mask covering most of his face. During his thesis work he developed an allergy against mice and rats against which the mask protects him. He wants to test whether the PPI deficit induced by the antiglutamatergic hallucinogen PCP is related to PCP's effect on the dopaminergic system. For this purpose, he measures prepulse inhibition in genetically engineered dopamine-2 receptor (D2) knockout mice on PCP and compares the results to those of normal mice who have also received the drug. He picks up a mouse, holds it by the scruff of its neck, and injects a PCP solution into the cavity of its abdomen. While he is doing this he speaks to the mouse in a soft voice. The mouse squeaks and pees over his gloved hands. While administering one of two different doses or vehicle to the other mice for the first measurement those who have already been dosed are put into different compartments of a Plexiglas box. Here, they immediately start digging about in the litter. They look lively, but Jared explains to me that this is escape behavior, which indicates that they are stressed out. Those who got a high dose of PCP appear rather sedated though. During the fifth and last round, something

unexpected happens. The very last mouse which Jared injects with a high dose responds in a manner very different from everything we had seen before: It gets onto its hind legs and starts to rapidly bounce against the cover of the box, over and over again until it reels and falls to the side, only to get up again continuing to bounce against the transparent ceiling until it falls another time, and so forth. Jared says: "This is as drunk as I've ever seen a mouse." He watches this bizarre spectacle for a while and then, with a quiet and gentle voice, he begins to sing to the mouse:

Show me the way to go home
I'm tired and I wanna go to bed
I had a little drink
about an hour ago
and it's gone right to my head.
No matter where I roam
Through land or sea or home
You will always hear me singing this song:
Show me the way to go home.

When later on I ask Jared why he spoke and sang to the mice he says that he wants

to make it as comfortable as possible for them. You need to build up rapport with the animals. If you don't treat them well your experimental results won't turn out well. This does not apply so much to PPI, but it's definitely true for 5-choice where you need to train the animals every day. It's important that you are anal about this. I got my worst experimental results after I broke up with my ex. My life became rather disorganized for a while. I went out a lot and came to work at different hours. This might have interfered with the animals' circadian rhythm. I didn't treat the animals badly, but not with as much care as I usually do and they react very sensitively to this. Another reason for speaking to them is that patients in a clinical setting are treated gently as well and we do try to mimic all aspects.

Note the subtle shift from ethics to epistemology, from making lab animals comfortable to getting good experimental results. After Jared had brought this up

I realized that other people in the lab made very similar connections between method and care. One afternoon, Emily and Olivia were discussing that working with animals at the lab bench on a daily basis under the usual time pressure could easily lead to a desensitization to the ethical problems involved. But Emily remarked that she had recently grown more concerned again since she had started doing stress experiments. To study stress under controlled conditions she had to carefully identify and eliminate all unwanted stressors causing variance, especially for baseline measurements. Hence, she had to see after the well-being of the animals tested. Likewise, Mark Geyer recalled:

I think my sensibilities of animal welfare were formed during a time when we didn't have a lot of external guidelines or stricture on our behavior. Because of my interest in spontaneous behavior of a fairly healthy organism, I adopted such principles not so much out of concern for the welfare of the animals as concerns about the quality of the science. That incidentally meant that we wanted the highest quality of animal welfare. I don't mean to suggest that I was insensitive to those concerns, but that just wasn't the explicit motivation.

Even though ethical concerns are secondary to the actors it is as if there was a higher moral order governing the world of animal laboratories: To achieve good results the researcher needs to treat his animals well. This perspective on animal experimentation seems to defy what Michel Foucault called "the Cartesian moment" in the particular relationship between subjectivity and truth characterizing modernity. The principle of method as elaborated in the seventeenth century broke with the ancient idea that access to truth requires a certain ethical work on the self and shifted conditions of possibility of knowledge fully into the epistemological realm. No matter who you are you can get to the

truth if you only follow the rules of method (which, of course, might require a scientific background. certain technical instruments, funding, etc.).⁷⁷

Set and Setting

Modern scientists would not be modern scientists if they had not responded to this anachronism by trying to turn the kind of ethical care required into another method to achieve more consistent and reproducible results. The historian of science Otniel Dror describes how Anglo-American physiologists, especially those studying stress and other endocrinological phenomena related to feelings, worked hard to make the laboratory a place of controlled emotions (unlike nature as a site of perpetually changing states of affective excitement).⁷⁸ This necessitated attending to scores of different parameters. The presence of an observer, an animal's familiarity with this person and the stress of being handled by him or her were as important as the time of the day, the makeup of the experimental space, possible previous experiences in this environment, or pheromone containing excretions and other communications of fellow laboratory animals (of course, different species and members of those species respond differently to particular circumstances, which needs to be taken into account as well). This wide spectrum of factors can be broadly divided into two dimensions commonly discussed in, but not restricted to hallucinogen research: set and setting, i.e., the impact of preformed expectations and immediate surroundings

⁷⁷ Foucault, *The Hermeneutics of the Subject*, 18-25.

⁷⁸ Otniel Dror, "The Affect of Experiment. The Turn to Emotions in Anglo-American Physiology, 1900-1940," *Isis* 90, no. 2 (1999).

on an organism's experience and (psycho-) physiological response to a certain challenge.

Matt, one of the technicians now mostly taking care of computers in the lab, explains to me that setting is particularly difficult to handle in animal research as it is hard for us to imagine how a different species experiences its environment. He likes to read popular science books on the train while commuting and has just finished *Animals in Translation. Using the Mysteries of Autism to Decode Animal Behavior* by Temple Grandin, an autistic animal behavior expert specializing in the design of more humane slaughter systems.⁷⁹ Grandin, he summarizes the book, argues that animals—like autistic humans—can't see the wood for the trees. "They have less of an overview, they are awash in all the details and don't get the big picture. Coincidentally, this also seems to be true for schizophrenics. Hence, when you're dealing with rats you don't know what they are picking up on. Seemingly irrelevant parameters can change the outcome of the experiment." If results from a different laboratory cannot be reproduced it might well be due to something in the lab, but it is very difficult to determine whether it is the new paint or the whirring of a computer ventilation—especially if one has never been to the other lab.

The problem of set is addressed by establishing handling procedures for laboratory animals. Successful management of their expectations and affective states requires preparing them emotionally for the laboratory experience. To get them used to laboratory routine, manipulations, and the human beings working

⁷⁹ Temple Grandin and Catherine Johnson, *Animals in Translation. Using the Mysteries of Autism to Decode Animal Behavior* (New York: Scribner, 2005).

with them they are exposed to daily handling. Today, such handling procedures are standard practice in animal laboratories. When entering the vivarium (usually after shipment from the manufacturer) and before being enrolled in any study each new animal is handled for about five minutes. "It's almost like body massage," Geyer says. "We swing them around and rub them. It does tend to make them less reactive to handling in the future." Additionally, animals are picked up once a day for a brief medical checkup, which also allows them to get accustomed to humans.

It was probably no accident that the concepts of set and setting were coined in the context of hallucinogen research.⁸⁰ Although the effects of most, if not all psychoactive substances are influenced by the subject's mind-set and environment this dependence seems to be particularly pronounced in the case of psychedelic drugs. To address this peculiarity Geyer developed a special "hallucinogen handling procedure," which I first came to see in the context of a study on "pharmahuasca."

"Pharmahuasca" is the synthetic equivalent of the hallucinogenic tea ayahuasca (also known as yagé) used as a shamanic inebriant in the context of divination, traditional medicine, and religious ceremonies by certain indigenous peoples of South America.⁸¹ More recently, the originally Brazilian syncretic church União do Vegetal (UDV) made it its sacrament. Ayahuasca can be brewed from a number of different plants, one of which contains the extremely

⁸⁰ Leary, Litwin, and Metzner, "Reactions to Psilocybin Administered in a Supportive Environment."

⁸¹ Dobkin de Rios, *Visionary Vine*.

potent, but short-acting hallucinogen N,N-dimethyltryptamine (DMT) while a second plant adds a monoamine oxidase inhibitor such as harmaline that prevents the metabolic breakdown of DMT by the gut and liver enzyme monoamine oxidase (MAO) after oral ingestion. The more general scientific interest in ayahuasca comes from two very different directions. On the one hand, the psychiatrist Charles Grob from the University of California, Los Angeles, one of Mark Geyer's colleagues at The Heffter Research Institute, had conducted a study on members of the UDV suggesting that their use of ayahuasca in church ceremonies had helped them to overcome psychiatric problems they had suffered from prior to their entry into the ayahuasca church.⁸² At the time of my fieldwork, in February 2006, the US Supreme Court had just permitted the consumption of this otherwise illegal drug concoction in religious rituals in the United States (based on the principle of religious freedom)⁸³ while it continued to be used illegally in informal neoshamanic sessions (and "Plant Spirit Workshops") by spiritual seekers all over the Western hemisphere (with a certain concentration at the West Coast of the United States). The fact that ayahuasca is used in recreational, ritual, or religious contexts makes a study of its pharmacological properties and behavioral effects eligible to funding by the National Institutes of Drug Abuse, which is also paying most other hallucinogen projects at Geyer's lab (not the Heffter Research Institute). However, Mark was

⁸² Charles Grob et al., "Human Psychopharmacology of Hoasca, A Plant Hallucinogen Used in Ritual Context in Brazil," *The Journal of Nervous and Mental Disease* 184, no. 2 (1996). For a more general overview, see also Charles Grob, "The Psychology of Ayahuasca," in *Hallucinogens. A Reader*, ed. Charles Grob (New York: Jeremy P. Tarcher / Putnam, 2002).

⁸³ http://www.erowid.org/chemicals/ayahuasca/ayahuasca_law22.shtml

also interested in the ayahuasca ingredient DMT as a psychotomimetic agent because unlike LSD or psilocybin DMT is produced (in tiny amounts) by the human organism and does not provoke tolerance. Hence, it was—and in Mark's eyes still is—the closest hit in the search for an endogenous psychotogen that might be responsible for lasting psychotic episodes as in schizophrenia. The particular study now conducted at Geyer lab was motivated by evidence that—in contrast to what had been assumed so far—DMT's mechanism of action differed significantly from those of other serotonergic hallucinogens. After Vollenweider had established his claim that the psychedelic effects of serotonergic hallucinogens are primarily mediated by 5-HT_{2A} agonism Mark now suspects that DMT might mainly stimulate 5-HT_{1A} receptors. In order to be able to differentiate between the effects of DMT on 5-HT_{1A} and 5-HT_{2A} receptors (by either blocking the respective receptors pharmacologically or by administering DMT to genetically engineered 5-HT_{1A} and 5-HT_{2A} knockout mice) he first needs to define the unique behavioral profile of DMT—or rather pharmahuasca, a pharmaceutically clean combination of DMT and a MAO inhibitor (which, of course, might lack some of the additional pharmacologically active compounds, which the original plant extract of ayahuasca contains).

Geyer decided to focus on locomotor and investigatory behavior, which can be measured by Behavioral Pattern Monitors. The original impetus for the use of locomotor activity measures was derived from the psychostimulant model of psychosis based on the dopamine hypothesis of schizophrenia. The apparent similarity between symptoms of schizophrenia and the effects of high doses of

amphetamine in presumably normal humans aroused interest in cross-species studies in animals treated with psychostimulants. Among the most marked behavioral effects of this class of drugs was locomotor hyperactivity and stereotyped behaviors. Even though schizophrenics are usually not hyperactive they frequently show stereotypies.⁸⁴ This partial correspondence allowed looking at stereotypical behaviors in rodents as an animal model of psychoses. Exploratory locomotion, on the other hand, is usually not regarded as a model, but as a dimension of behavior, which different drugs affect in fairly characteristic ways. A comparison of the temporal and spatial patterns of movement recorded by the Behavioral Pattern Monitor contributes to an analysis and interpretation of behavioral correlates of different neurochemical drug actions.

One day before the actual experiment the white Sprague-Dawley rats are brought up from the vivarium to the laboratory to get used to the environment, in which they will soon receive the drug. The room containing the behavior tracker boxes, in which they will be tested is bathed in red light and the fans are running—"as if testing were imminent," as the protocol says. As nocturnal animals the rats are kept under reversed lighting conditions to adjust their circadian rhythm to that of the humans working with them. Tom, the technician running the experiment, quietly takes the rats out of their boxes and weighs them (the dosage will depend on the individual rat's body weight). He puts their head under a piece of cloth, which is supposed to calm them down, while gently

⁸⁴ Mark Geyer and Bita Moghaddam, "Animal Models Relevant to Schizophrenia Disorders," in *Neuropsychopharmacology. The Fifth Generation of Progress*, ed. Kenneth Davis, et al. (Philadelphia (PA): Lippincott, Williams, and Wilkins, 2002), 690.

pinching their back skin to simulate a subcutaneous injection. Finally, he briefly puts them into a large Plexiglas box resembling the actual behavior tracker boxes, which they will only get to know on the following day. After all rats have been handled in this manner, they are returned to the animal room in the basement of the building. In an interview, Mark explained how this strange ritual has come about:

It grew out of a very early study in 1976. In the National Science Foundation (NSF) summer program to train undergraduates we conducted a big study to examine the relationship between structure and activity of a number of hallucinogens including some of Sasha Shulgin's compounds with primitive versions of our startle paradigms and a holeboard [chamber with holes placed in the floor and/or walls serving as specific stimuli that rats readily investigate]. Despite Sasha's claims to the contrary, one can predict the effects of these substances by doing animal experiments. The normal procedure was to inject the animals in the carrying cages with drug or vehicle and ten minutes later you pick them up and put them in their test environment. We had the impression that when you took the LSD animals they were responding differently to being picked up than the control animals did. When they went into the chamber, first they weren't very active. They went into a corner and looked around and wouldn't venture out very much, which is characteristic of what a rat does on LSD. We wondered whether the drug made them hyper-responsive to being picked up. So we did a study in which we did the same thing except we exaggerated the handling. We picked them up and put them into the chamber taking the same amount of time, but we also held the animals upside down for 15-20 seconds, maybe even as long as 30 seconds, which is a long time to hold a rat upside down. They don't like that. That produced a significant effect, which again was significantly increased by LSD. Even the vehicle animals responded by being less exploratory if they had been handled this way on the way to the chamber, but in the LSD animals this effect was even more pronounced.

The day after the preparatory handling procedure, the rats are brought up to the laboratory again. This time they undergo the real experiment being injected with Pharmahuasca. The effect of the drugs manifests itself immediately. The rats look dazed. They lie around and only crawl short distances. At the same time they seem tense. The moment Tom reaches into an open cage to grab one of them it jumps out in a high arc falling on the floor. It tries to get underneath the boxes, but is too stupefied to escape. Placed inside the behavior tracker box, it sits in the corner staring at the wall until the door is closed and the measurement begins. The Behavioral Pattern Monitor contains several infrared photobeams building up a Cartesian coordinate system tracking the rat's patterns of exploratory locomotion in this new environment over the next 60 minutes. Unlike animals that have only been injected the vehicle they are more reluctant to explore their new environment right away. Their avoidance of open spaces is even more distinct. They stay close to walls and in corners, which they perceive as the safest places they can find. As Geyer said jokingly at the LSD Symposium alluding to the LSD experiments the Central Intelligence Agency conducted with unwitting American citizens in the 1950s and 1960s⁸⁵: "All you can do in animals in this kind of situation is a CIA experiment. They don't volunteer for this. So we can study 'bad trips' a lot better than any other response to psychedelics." Fear of the new (neophobia) and of open spaces (agoraphobia) has been identified as one of the most typical behavioral responses of rats to hallucinogens. Here, the decisive role of setting becomes evident.

⁸⁵ Martin Lee and Bruce Shlain, *Acid Dreams. The Complete Social History of LSD: The CIA, the Sixties, and Beyond* (New York: Grove Press, 1992), 19-35.

- MG:** The influence of setting is easily demonstrable in animals when we study spontaneous exploratory behavior. The effects of LSD or other indoleamine or phenethylamine hallucinogens on this kind of behavior are much stronger and more robust in a novel environment than in an environment that the rodent has been familiarized with. We interpret that as being an exacerbation of the natural neophobic behavior of rats. Rats are quite cautious and exhibit a lot of approach/avoidance conflict in novel situations or in relation to novel objects or foods.
- NL:** Is only the neophobia increased or also their curiosity about something new?
- MG:** The exacerbation of the avoidance, i.e. the neophobia, seems to dominate.
- NL:** But I understand that the result of the motion tracking experiments with LSD was that the exploratory behavior goes down initially, but increases in a second phase?
- MG:** That's right. We want to interpret that as something that I have always wanted to be able to explore, i.e., a presumed exacerbation of the approach part, the curiosity side.
- NL:** Once you have figured out that the new situation is actually not that threatening you start getting curious, which is a response that you can see in humans on LSD as well.
- MG:** I believe so, yes. But that's a fragile thing to study and you're always up against that difficulty of interpretation having to do with the fact that you have two competing forces: approach and avoidance. You're presumably always influencing both. I don't think of approach and avoidance as being on a continuum, as belonging to the same system, which is going up and down, but rather as potentially independent and competing neurobiological forces. When they are expressed in the behavior that we observe it is hard to know whether you've increased one or decreased the other. The whole approach/avoidance conflict literature is mired in the difficulty of knowing which side a drug has influenced. We have some ways of doing this, but the predictions are always a matter of degree rather than dichotomous outcomes. In terms of predictive power, it's tricky. The shifts are often subtle. We have seen some hints of what we believe to be an increase of exploration. As you said, later in an LSD session, as the presumed neophobia diminishes and the familiarity increases, there is

often an increase of exploration. One way of interpreting that would be as an expression of exaggerated curiosity. The other interpretation is that they are out there more than the control animal is because unlike the control they haven't explored the box yet. Is it really an exaggeration of curiosity or is it just a delay? Maybe each rat has to explore at some point and an LSD treated rat is too afraid to do so initially, but does so later. Maybe that's just normal exploration. How can you tell?

To gain a better understanding of the neophobia-inducing effect of hallucinogens Geyer tested rats on LSD in a "free exploration paradigm." Here, in contrast to the "forced exploration" setting described above, the rat's home cage was connected to an open field, i.e., the unfamiliar behavior tracker box. Geyer observed that

[w]hen rats were allowed to enter and leave the novel chamber at will, LSD produced dose-dependent reductions in the amount of time spent in the novel chamber without alteration in the overall rate of locomotor or investigatory responses while they were in the chamber. Hence, the effect is not attributable to sedation; rather it reflects an alteration in the responsiveness of the animal to the nature of the test chamber. In further studies, it was found that the initial suppression of activity induced by LSD was absent when animals were tested in a familiar environment.⁸⁶

This result is striking. Unlike psychostimulants or sedatives, hallucinogens do not determine a largely uniform behavioral reaction such as locomotor hyper- or hypoactivity. Instead they change the way, in which the organism responds to its environment. The drug provokes a different behavior in a familiar setting than in an unfamiliar one. Its effects depend on the setting. Geyer found that the effects of hallucinogens are

⁸⁶ Mark Geyer and Kirsten Krebs, "Serotonin Receptor Involvement in an Animal Model of the Acute Effects of Hallucinogens," in *Hallucinogens: An Update (NIDA Research Monograph 146)*, ed. G. C. Lin and R. A. Glennon (1994), 130-131.

demonstrably dependent on the size of the experimental chamber, the nature and degree of stimulation from the test environment, the animal's degree of familiarity with the test environment, and the manner in which the animals are handled prior to testing. Thus, the changes in locomotor activity or investigatory behavior produced by hallucinogenic drugs are critically dependent on the precise nature of the environmental context in which the animals are tested. Furthermore, this variability in the effects of hallucinogens on measures of locomotion suggests that locomotion *per se* is not directly affected by these drugs. Rather, the changes in locomotion appear to be secondary to the effects of hallucinogens on the animal's sensitivity to environmental stimuli. As in humans, hallucinogens do not lead to consistent effects on the level of arousal as reflected in motor activity; rather, hallucinogens alter the manner in which the organism's behavior is influenced by the environment.⁸⁷

For this reason, the scientists and technicians in Geyer's lab make every effort to standardize set and setting in the case of hallucinogen experiments. However, as has already been indicated, there are limits to this endeavor. The "tall blond left-handed effect," for instance. As already alluded to in the interview, one of Geyer's former collaborators had found that LSD initially induces a decrease of locomotor activity, which is then followed by an increase in the second part of the measurement. But when her colleagues tried to reproduce her findings they did not succeed—with the exception of another woman in the lab who, like the first researcher, turned out to be a tall left-handed blond. Beyond the obvious anthropomorphizations, it remained unclear what the rats had responded to. Matt concludes: "Behavioral work is an art. It is partly science, partly common sense, but it is also an art."

⁸⁷ Ibid., 125-126.

Identification: The Logic of Animal Models

Many of the discussions of animal research quoted above—from the question of animal suffering to the interpretation of the neophobic response of rats to hallucinogens—revolve around the problem of understanding the mental life of other species (if they have a mental life at all, which the philosopher René Descartes, for example, called into question). What is it like to be a rat? What is it like to be a rat on LSD? And if one looks at animals treated with hallucinogens as models of psychosis the question arises whether being a rat on LSD is anything like being a patient suffering from schizophrenia. Can there be animal models of so-called mental diseases?⁸⁸

Based on Donald Griffin's ethological research on the perception of bats, which, as Griffin had demonstrated in 1938, mostly perceive the external world through sonar, the American philosopher Thomas Nagel posed the question what it was like to be a bat. Nagel assumed that bats had experience, but he argued that the subjective quality of their experience was inaccessible to us. Even if I tried to envisage what it was like to be a bat by imagining that I spend the day hanging upside down by my feet in an attic, that I fly around at dusk and dawn catching insects in my mouth, and that I have very poor vision, and perceive the surrounding world by a system of reflected high-frequency sound signals, I would only get an idea of what it would be like *for me* to be a bat. However, discarding the point of view of an imaginative experiential subject and taking up a strictly

⁸⁸ See the chapter "Animal Psychiatry" in Samuel Barondes, *Better Than Prozac. Creating the Next Generation of Psychiatric Drugs* (New York: Oxford University Press, 2003), 113-127.

neurobiological perspective instead could not solve the problem either. Philosophy, Nagel concedes, at least when he wrote the essay in 1974, was conceptually ill equipped to explain how the subjective character of experience can be related to physical processes in the brain. The proposition that a mental state is a state of the body, he claimed, remains incomprehensible to us as long as we do not know what “is” might mean if it serves to identify such disparate terms as mental and physical states. As an analytic philosopher in the Anglo-American tradition, he did not believe that empirical neuropsychological research could help finding an answer to this question. In his eyes, the challenge was entirely conceptual.

It may be possible to approach the gap between subjective and objective from another direction. Setting aside temporarily the relation between the mind and the brain, we can pursue a more objective understanding of the mental in its own right. At present we are completely unequipped to think about the subjective character of experience without relying on the imagination—without taking up the point of view of the experiential subject. This should be regarded as a challenge to form new concepts and devise a new method—an objective phenomenology not dependent on empathy or the imagination. Though presumably it would not capture everything, its goal would be to describe, at least in part, the subjective character of experiences in a form comprehensible to beings incapable of having those experiences.⁸⁹

Neuropsychopharmacologists have developed a practical response to Nagel's philosophical problem. In the early 1980s, for instance, Mark Geyer used his findings concerning the LSD-induced neophobia in rats to explore structure-activity relationships of drugs. When administering lisuride, a drug structurally very similar to LSD, to rats it did not increase their avoidance of open and novel

⁸⁹ Nagel, "What is it like to be a bat?," 449.

spaces as LSD does. When given to humans lisuride does not produce the perceptual, cognitive, and affective changes that are characteristic of psychedelic experiences either. Hence, it seemed as if the neophobia observed in animals could serve as a behavioral marker capable of predicting hallucinogenic effects on humans. Geyer concluded that „the animal model of hallucinogenic activity was sensitive enough to discriminate between lisuride and LSD, two drugs that differ primarily with respect to their hallucinogenic effects.”⁹⁰ However, at about the same time, Jon Koerner and James Appel demonstrated that in drug discrimination tasks rats fail to recognize “hallucinogenicity” as a property shared by psilocybin, LSD, and mescaline. Their behavior seemed to indicate that their experience of mescaline differed significantly from that of psilocybin and LSD, which led the authors to suggest that the rats might detect something other than “hallucinogenicity,” some other property not shared by all so-called hallucinogens. They concluded that animals might experience the effects of hallucinogens in a very different way than humans and that the term “hallucinogen” might be a misnomer in the context of drug discrimination studies in nonhumans.⁹¹ After all, the term designates a group of chemically and neurophysiologically rather disparate substances, the effects of which human beings perceive as sufficiently similar to pigeonhole these compounds as one class of drugs.

⁹⁰ Geyer and Krebs, "Serotonin Receptor Involvement," 134.

⁹¹ Jon Koerner and James Appel, "Psilocybin as a discriminative stimulus: lack of specificity in an animal behavior model for 'hallucinogens'," *Psychopharmacology* 76, no. 2 (1982).

Whether or not such behavioral observations and biological findings teach us anything about “what it is like to be” a certain animal species philosophers have discussed controversially.⁹² In the Geyer group, a more pragmatic perspective prevails. When I ask Jared whether he believed that animals could suffer from mental diseases he says: “You shouldn’t anthropomorphize animals. All you can say is that a mouse displays an anxiogenic response in a test. But that doesn’t mean it actually experiences anxiety. You can only observe its behavior. Therefore, I wouldn’t say that there are mental diseases in animals, but that doesn’t mean you can’t model them in animals.” After all, the model and its object are not the same.

At the beginning of the twentieth century, the limitations of ethology to which Jared refers in the quotation gave rise to behaviorism as an approach shunning all speculation about mental states and focusing on observable behavior instead. Behaviorism is based on the assumption that there is no essential difference between humans and other animals. To study behavior under controlled laboratory conditions behaviorists introduced the rat as their prime model organism, which soon populated psychology departments across the United States (mostly due to their fecundity, rapid rate of development, small size, and ease of handling, housing, and feeding).⁹³ In 1938, the psychologist Edward Tolman expressed his conviction that “everything important in

⁹² For positions critical of Nagel, see, for example, Daniel Dennett, “Animal Consciousness. What Matters and Why?,” in *Brainchildren. Essays on Designing Minds* (Cambridge (Mass.): MIT Press, 1998). Daisie Radner, “Heterophenomenology. Learning about the Birds and the Bees,” *Journal of Philosophy* 91 (1994).

⁹³ Benjamin Bühler and Stefan Rieger, *Vom Übertier. Ein Bestiarium des Wissens* (Frankfurt/M.: Suhrkamp, 2006), 200-208.

psychology (except such matters as the building of a super-ego, that is everything save such matters as involve society and words) can be investigated in essence through continued experimental and theoretical analysis of the determiners of rat behaviour at a choice point in the maze”.⁹⁴

The inference from rat to human behavioral psychology and the corresponding neurobiology is based on the premises of a “general biology.” This is true for the use of model organisms in general, as the historian of science Hans-Jörg Rheinberger points out:

[O]rganisms used as models begin to play a central role in the biological sciences at the beginning of the twentieth century—a comparatively late point in time considering that model formation and modelling constitute an essential element of experimental practice and, hence, of the practice of all modern sciences. The fact that model organisms and their concept could emerge at all presupposed the idea of a *general* biology, the assumption that basic properties of life are characteristic of all living beings and can therefore be examined experimentally in a *particular* representative organism. In previous centuries, it was differences between living beings that interested researchers who—in the tradition of natural history—wanted to unfold the entire diversity of life forms. In relation to the new epistemic goal, these differences acquired an altered instrumental meaning: One could make use of these particularities to approach the general properties of living beings.⁹⁵

The most recent and currently most powerful rearticulation of the program of a general biology has emerged in the context of the genome projects of the 1990s. As part of the human genome project the genomes of a number of different species serving as model organisms were sequenced as well. The mouse, which

⁹⁴ Quoted in: Jonathan Burt, *Rat* (London: Reaktion Books, 2006), 100-101.

⁹⁵ Hans-Jörg Rheinberger, *Epistemologie des Konkreten. Studien zur Geschichte der modernen Biologie* (Frankfurt/M.: Suhrkamp, 2006), 13-14 (my translation—NL).

by now has replaced the rat as the most commonly used laboratory animal (in the Geyer lab as elsewhere because mice are cheaper to house and more suitable for genetic engineering), turned out to have a 99% genetic homology to humans.⁹⁶ This led an envious yeast geneticist to remark: "I don't consider the mouse a model organism. The mouse is just a cuter version of a human, a pocket-sized human."⁹⁷

In the case of behaviorist research in psychology and biology including behavioral neuropsychopharmacology,⁹⁸ the blurring of the human and the animal leads to an almost paradoxical situation: One painstakingly tries to avoid anthropomorphizing animals while using them as substitutes and models of humans.⁹⁹ However, the molecularization of biology and medicine including psychiatry and their advance toward the most basic processes of life has allowed to sidestep—or at least to defer—the intricacies of human and animal minds alike. For now, one focuses on elementary mechanisms, which all mammals share, instead of getting caught up in the overly complex convolutions of the brain and its higher faculties. Geyer's focus on the startle reflex is an excellent example of this recourse to the most basic neural functions to tackle problems as

⁹⁶ Mark Boguski, "Comparative genomics: The mouse that roared," *Nature* 420 (2002).

⁹⁷ Quoted in: Karen Rader, *Making Mice. Standardizing Animals for American Biomedical Research, 1900-1955* (Princeton: Princeton University Press, 2004), 267.

⁹⁸ Contemporary behavioral neuropsychopharmacology deviates from classical behaviorism insofar as it does not look at the organism as a "black box," which responds to a certain input (stimulus) by producing a corresponding output (behavior). In accord with the cognitive turn of the 1970s, neuropsychopharmacologists also try to elucidate what is happening in the interior of the black box by examining the neural mechanisms through which stimulus and response are connected. For a discussion of the cognitive turn in the study of animal behavior, see Dominik Perler and Markus Wild, "Der Geist der Tiere – eine Einführung," in *Der Geist der Tiere. Philosophische Texte zu einer aktuellen Diskussion*, ed. Dominik Perler and Markus Wild (Frankfurt/M.: Suhrkamp, 2005), 43-48.

⁹⁹ Cf. Bühler and Rieger, *Vom Übertier*, 252.

complex as schizophrenia and other mental diseases. The measure of prepulse inhibition has become particularly popular (and detested) among neuropsychopharmacologists and psychiatric researchers as it is conceived of as relatively simple and “robust.” When I ask Cathrine how strongly PPI is influenced by set and setting she answers: “The startle response is such a strong reflex to such a strong stimulus that it doesn’t make much of a difference.”¹⁰⁰ And yet it is supposed to serve as one of the cornerstones of neural information processing. If it malfunctions a psychotic breakdown might ensue.

NL: Do you see your animal work as reductionist?

MG: In some sense, yes. And in some sense I also see my attempts at human work as reductionist. For instance, my suggestion that we use prepulse inhibition assessment as a possible biomarker, as a tool for prediction of pharmacotherapies is a conscious attempt to reduce the complexity of symptom based assessment of therapeutic effects to something that is measurable acutely or in a shorter time frame, that might be predictive of, but is not the same as the hoped for therapeutic clinical outcome. That would have increased efficiency by virtue of its increased precision even though it has decreased meaning by virtue of its being more distant from the ultimate goal of treating the problems that the patient has. And patients don’t have problems with PPI. I have no illusions that this is a problem for patients. They never come in complaining about a PPI deficit. So it is quite distal to the real world problems that the patients have and that we are trying to treat. But those problems are very hard to quantify. And so is the alleviation of those problems. Hence, for me, consciously, it is a reductionistic approach to reduce that complexity at the cost of ultimate meaning. The success or failure of such an approach is in its predictive power. That’s what we’re here in science to do and really not much else. There is really only one proof of the

¹⁰⁰ However, the robustness of PPI is under debate. It is altered by stress or the conditions under which an animal was reared. But these effects are regarded as more subtle.

pudding in science and that is: Can you predict what's gonna happen next? The rest is all fluff and theory and opinion.

Anthropological Difference: The Crisis of Animal Models

Geyer's emphasis on prediction entails one significant problem: So far, the application of prepulse inhibition as a preclinical screening tool for novel antipsychotics has not led to the development of a single new drug. "[T]he jury is still out on its usefulness as a predictive tool in clinical therapeutics," as Mark says. One possible reason for this lack of success has only come to the fore since Gouzoulis-Mayfrank discovered an *increased* prepulse inhibition in healthy human subjects treated with psilocybin whereas schizophrenics as well as rats on psilocybin show a *decreased* PPI.¹⁰¹ This has stirred up lingering doubts concerning the hallucinogen model of psychosis. When shortly afterwards Vollenweider and Geyer conducted a study comparing the effects of the serotonin releaser MDMA (Ecstasy) on humans and rats they also found opposite effects in the two species: "As expected, MDMA decreased prepulse inhibition in a dose-related fashion in rats. In contrast, a typical recreational dose of MDMA (1.7 mg/kg, orally) increased prepulse inhibition in subjects experiencing robust psychological effects. This surprising disparity between the effects of the drug in rats and humans may reflect a species-specific difference in the mechanism of action of MDMA or in the behavioral expression of a similar pharmacological effect, or both."¹⁰² These discrepancies between humans and

¹⁰¹ Gouzoulis-Mayfrank et al., "Effects of the hallucinogen psilocybin on habituation."

¹⁰² Franz Vollenweider et al., "Opposite effects of 3,4-methylenedioxymethamphetamine (MDMA) on sensorimotor gating in rats versus healthy humans," *Psychopharmacology* 143, no. 3 (1999).

animals have given rise to an ongoing discussion between Geyer's lab and the labs of Vollenweider and Gouzoulis-Mayfrank in Switzerland and Germany. Further studies conducted in San Diego have complicated the picture even more. The discrepancies are not restricted to man and animal, but have turned out to be widely disseminated across species to the extent that even mice and rats do not always produce the same results. This conundrum has not been solved yet. The attempts at explanation are various, highly complex, and still inconclusive.

NL: What seems particularly difficult to make sense of is that the PPI deficits commonly seen in schizophrenics have also been observed in rats on psilocybin, but not in humans on psilocybin.

MG: Yes, across doses the psilocybin effect is a schizophrenia-like PPI deficit at the short intervals between prepulse and pulse, but not at long intervals while schizophrenia patients show the deficit at all intervals. However, in the animals, a different set of drugs was used. That's why I'm not so concerned about this disparity. We've never gotten psilocybin to work reliably in animals, mice or rats. What has been reliably demonstrated though is that the phenethylamine-derived hallucinogens such as mescaline, DOM, and DOI reliably disrupt PPI in mice and rats.

NL: Over all intervals?

MG: Interval hasn't been looked at very thoroughly in rodents. There is really only one paper on it. We have done some research on this, which is not published yet, and it doesn't seem to be terribly interval-dependent. But that hasn't been worked out thoroughly yet. So the mismatch between the 5-HT_{2A} story in animals and humans is confounded by differences in the drugs that were used to assess them.

NL: DOI in animals and psilocybin in humans.

MG: Exactly. And there are no published reports on psilocybin in animals in large part because—even though we have tried it many times—we can't get consistent repeatable results. We don't have this problem at all with DOI or DOM. That's

why I mean that the disparity between animals and humans is—in my mind—not as clearly a disparity yet.

NL: To clarify this you would need to get permission to administer DOI to humans.

MG: Yeah, but I wouldn't want to go there as I'm a little bit worried about DOI because of the halogen substitutions. Probably it's all folklore, but there are some reports that people who took DOB [another hallucinogen containing halogen atoms] experienced long lasting effects. But in principle you're absolutely right.

NL: What are possible explanations for those discrepancies concerning psilocybin and MDMA? You mentioned before that they might be dose-related. Emily said that it could also have to do with differences in metabolism between different species.

MG: Yes, it might be dose-related or it could be pharmacokinetic. Most of the indoleamine-based compounds are metabolized quite rapidly. My biggest speculation, the one I think is the most likely, is that 5-HT_{1A} contributions are opposite to 5-HT_{2A} contributions. This is based on the surprising finding that in the mouse we have very clearly opposite effects in 1A and 2A contributions, which again is not the case in rats. In rats, both 1A and 2A disrupts PPI. In the mouse, on the other hand, 2A reduces PPI as in the rat while 1A increases PPI opposite to the rat and opposite to the 2A effect. And this phenomenon can be provoked by more than one 1A agonist, it can be blocked by 1A antagonists, and it's absent in 5-HT_{1A} knockout mice. Thus, it looks like a reliable and consistent effect contrary to what we see in rats. That leaves open the question which rodent is more predictive of what happens in humans. My speculation is that in the 5-HT_{1A} system the mouse is a better predictor of the human situation. That would be consistent with the observations of Efi [Gouzoulis-Mayfrank] and Franz [Vollenweider] that MDMA and psilocybin increase PPI in humans. Because MDMA is dumping serotonin on all the receptors and presumably they are competing with one another. If the 5-HT_{1A} receptor is pushing prepulse inhibition up while 5-HT_{1B} and 5-HT_{2A} are pushing it down—we don't know about the contributions of 5-HT₃, 5-HT₄, 5-HT₅, 5-HT₆, and 5-HT₇—then it would be consistent that in humans a mixed agonist like psilocybin or an indirect agonist like MDMA might have two opposing influences which would cancel each other out depending on their ratios. And the difference between psilocybin and DOM, of

course, is in the 1A contribution because psilocybin has a much stronger effect on 5-HT_{1A} receptor than DOM.

NL: And this is why you're interested in the 5-HT_{1A} effects of DMT that you assume?

MG: Yes. And that's also why we're interested in getting our hands on a human-friendly toxicity-assessed 5-HT_{1A} agonist to test this model. We wanted to get hold of flesinoxan, which is a full agonist at 1A receptors that has been run through clinical trials that were aborted for reasons we don't quite know.

NL: And flesinoxan is not hallucinogenic?

MG: Well, there is a rumor that some of its side effects were psychotic side effects. That's not reported by the company developing it, but rumored by other companies. Unfortunately, they wouldn't let us have it.

NL: Basically the way in which you're looking at the difference between humans and animals is in terms of neurotransmitters. Anatomy is not in the picture.

MG: Anatomy could be. But I think of neurotransmitters first.

NL: Which is just the *deformation professionelle* of a neuropsychopharmacologist?

MG: Yes, but it's also the more attractive set of hypotheses to pose because it's more testable. It's hard to put drugs in particular parts of human brains. We can do that in animals, but not in humans. So I go where the easiest target of opportunity is first. If that fails then I would think more about anatomy.

NL: But it's very difficult to pin that down.

MG: Right. That said though we have some interesting opportunities to explore these disparities between rats and mice.

NL: In anatomical terms?

MG: No, in pharmacological terms. But in rodents, we could also pursue those things anatomically. For instance, we do have species differences with respect to the 5-HT_{1A} receptor. In systemic administration, we have a very clear-cut species difference in 1A effects. We see similar differences between mice and rats in their dopamine systems. And there we could more readily explore the possible anatomical explanations for those species differences. We use the same drugs, we use the same end points, and we get opposite effects cross-species. There are some differences, of course, in the anatomy. One could design some experiments that at least manipulate the same-labeled structures. Whether those

structures are really the same between mice and rats we don't know, but they are probably closer to each other than to those in humans.

NL: So you would manipulate specific anatomical structures pharmacologically by administering drugs locally through cannulas implanted in the animals' brains?

MG: Yes, in Poland and Australia, there are people working on it. We will be discussing this at the Serotonin Club meeting in Japan next month.

NL: From an anthropological point of view, your discussion of the differences in pharmacological modulation of PPI between humans and various animal species seems particularly interesting in the light of the discourse of genomics. One of the results of the Human Genome Project was that humans and mice share 99% of their genetic make-up. But if you look at how this works out beyond the level of DNA sequences it turns out that you can't even get their startle reflexes to match.

MG: Right. We chose such a simple behavior that a lot of people think it's not relevant to anything complex, but it's certainly complex enough for me to get frustrated about it.

The problems encountered in cross-species studies of hallucinogens point toward the more extensive problematization of generalizability in biology and the associated concept of general biology. Following the French physiologist Claude Bernard, Georges Canguilhem pointed out "that logical generalization in biology is limited unforeseeably by the specificity of the object of observation and the experiment. It is well known that nothing is as important for a biologist as the choice of his specimen [*Untersuchungsmaterial*]. He works selectively on this or that animal because of relative ease of anatomical or physiological observations, location or size of an organ, the slowness of a phenomenon, or, to the contrary, the acceleration of a cycle."¹⁰³

¹⁰³ Georges Canguilhem, *Das Experimentieren in der Tierbiologie (Preprint 189)*, trans. Henning Schmidgen (Berlin: Max Planck Institute for the History of Science, [1965, orig.]), 10 (my translation—NL).

Canguilhem even suggests to add the name of the species, in which a certain biological phenomenon has been observed, to the name of the phenomenon in order to prevent rash generalizations. Even though the use of model organisms does presuppose the idea of a general biology, as Rheinberger perceptively points out, the application of findings in one species to another often turns out to be problematic. Accordingly, Rachel Ankeny argues that model organisms are used to generate knowledge through a form of case-based reasoning.¹⁰⁴ Comparisons between different model organisms and attention to similarities and differences alike contributes to our understanding of the manifold manifestations of life. As Rheinberger contends, it is exactly the vagueness and imprecision of the match between model organisms and what they are a model of (in our case between rodents treated with hallucinogens and schizophrenic humans) that keeps the experimental system productive: “From the point of view of the research process, models maintain their function just as long this relationship of representation remains a little bit fuzzy, as long as we are not fully aware of what they stand for. When certainty is gained there is no need for a model anymore with respect to this particular question.”¹⁰⁵

However, the fact that the discrepancies between human and animal research might be about to give rise to a fruitful exchange between the laboratories in San Diego and Zurich cannot comfort Mark Geyer yet. Still hoping to be able to use PPI to go beyond basic research and to contribute significantly

¹⁰⁴ Rachel Ankeny, *Wormy Logic: Model Organisms As Case-Based Reasoning* (2006 [cited 5 July 2006]); available from <http://www.lse.ac.uk/collections/economichistory/>.

¹⁰⁵ Rheinberger, *Epistemologie des Konkreten*, 16 (my translation—NL).

to the development of new antipsychotic drugs he would prefer to see a successful generalization of the results obtained in preclinical animal studies in the form of accurate predictions of antipsychotic effects in patient populations. In the context of my nagging questions concerning the alleged crisis of PPI, Mark expresses his frustration with regard to the divergence of human and animal studies:

If there is anything like crisis, that's the crisis we have. But in a sense it is a bigger crisis than just for PPI. I tried not to emphasize this, but it's a crisis for animal models. And secondarily it's a crisis for the psychotomimetic drug-induced psychosis model. There are two mismatches: The first one is that some of the drug effects that we know are very robust in animals—in rodents, both mice and rats, and some in monkeys—but they don't seem to play out faithfully in humans. The best example is the NMDA antagonist model. Now Franz and I have seen the appropriate predicted results at particular parameters of PPI [...]. But there are examples in the serotonin system and in the dopamine system where it doesn't look as if the effects we see in animals were as robust in humans—if they are there at all. There are obviously ways to handwave and explain this away. The easiest is that we haven't pushed the dose in human research in the way we can readily do in animals. It is conceivable that most of these apparent disparities are dose-related. I take some solace in the notion that we have the power to address these cross-species disparities [...]. But it's really hard to have confidence that you're actually measuring the same behavior across species. This is a threat to animal modeling in general. In the case of the startle reflex, we have as close to a homologous behavior as one can really imagine from mice to humans. We have lots of reasons to believe that it's the same behavior and the same [neural] circuits across species. So if we can't do predictive psychopharmacology with that degree of homology, how do we expect that other, more indirect models of cognitive phenomena in a rodent predict anything in humans? That's one of the current challenges to the field.

The difference between humans and animals neuropsychopharmacologists are currently struggling with is not a qualitative or essential one as the *differentia specifica* in the tradition of philosophical anthropology. The reasons for the disparity between human and animal research discussed by Geyer and his colleagues involve quantitative differences in dose and speed of metabolism, differences in anatomical distribution of enzymes and neurotransmitter receptors, and consequently different effects of hallucinogenic agents on the measure of prepulse inhibition. As in other disciplines of the life sciences like genomics, life appears to consist of a limited number of basic elements such as the four nucleotides of DNA (A, C, T, G), different neurotransmitter receptor types and subtypes (dopaminergic, glutamatergic, serotonergic etc., with the latter subdivided into 5-HT₁ to 5-HT₇), different kinds of nerve cells, or reflex arcs, all of which evolution assembled and reassembled in innumerable permutations. In this discourse, man does appear to be different from other animals, but only as much as all species differ from each other (not to speak of within-species differences). Neuropsychopharmacology and biological psychiatry have also subjected the human mind, its pathologies, and their treatment to this “molecular” logic (to use the term in the sense of Gilles Deleuze). At present, the resulting animalization of the human (commonly denounced as reductionism) is a site of most vigorous contestation.¹⁰⁶

Giorgio Agamben has identified two kinds of “anthropological machines” at work in the borderland of humanity and animality. One acculturates animals to

¹⁰⁶ See, for example, Andrew Lakoff, *Pharmaceutical Reason. Knowledge and Value in Global Psychiatry* (Cambridge (UK): Cambridge University Press, 2005).

human life by taming them or, as in our example, by turning them into laboratory animals that can serve as substitutes and models of human beings. The other anthropological machine works in reverse assimilating our notion of the human to animal life. What Agamben is most concerned about is the “zone of indistinction” opening up between these two realms where life is reduced to “bare life” and bestiality reigns in an anomic no man’s land.¹⁰⁷ Animal rights activists are trying to rescue laboratory animals from this (in that case, hardly unregulated) zone by simultaneously advocating to return them to the wild (restoring their original animality) and to grant them “rights” (making them equal to humans). On the other hand, humanists (as well as certain anti-humanists¹⁰⁸) and representatives of various religious denominations are fighting to preserve what they regard as our humanity, which must not dissolve into mere biology. However one positions oneself in these biopolitical struggles, the emerging (re-)articulations of “the good life” with the concept of life as currently elaborated by the life sciences undoubtedly constitutes one of the most intriguing fields of inquiry for an anthropology of the contemporary.

¹⁰⁷ Giorgio Agamben, *The Open. Man and Animal* (Stanford: Stanford University Press, 2004).

¹⁰⁸ Cf. Nicolas Langlitz, *Die Zeit der Psychoanalyse. Lacan und das Problem der Sitzungsdauer* (Frankfurt/M.: Suhrkamp, 2005).

IV. FROM SPIRITUAL CRISIS TO PSYCHEDELIC MEDITATIONS

Preliminary Framework: Lifeworld and Crises

The animalization of the human in cognitive neuroscience can be read as the latest chapter of the modern epic of the naturalization of the mind. In his 1935 talk “Philosophy in the Crisis of European Man,” Edmund Husserl presented this development as one of the key symptoms of “Europe’s sickness.” The speeches were later on elaborated and published under the titles *The Crisis of European Sciences and Transcendental Phenomenology* and *Phenomenology and the Crisis of Philosophy*. In Husserl’s eyes, these three crises—of European Man, science, and philosophy—were identical. And universal for the telos of “spiritual Europe” (then comprising the United States, but not “the Eskimos or Indians of the country fairs”) would eventually lead the whole of mankind to Europeanize itself. Accidentally, Europe—or, to be more precise: Greece—happened to be the birthplace of the “cultural form that the Greeks called philosophy” as “universal science” or “science of the world as a whole.” Philosophical knowledge was supposed to give a new form to practical living by subjecting it to rational reflection. According to Husserl’s grand narrative, the spiritual crisis broke out at the onset of modernity when philosophy ceased to provide a unifying framework for the differentiating disciplines of modern science. These positivistic forms of specialist knowledge have as their object a world of brute facticity and do not provide any meaning to human existence. This abstraction from subjectivity has also come to pervade the humanistic sciences [*Geisteswissenschaften*] insofar

as they emphasize historical contingencies while reserving judgment. Even psychology as the science of subjective experience par excellence is based on the assumption that everything spiritual springs from physical corporeality and can be studied with scientific exactitude by applying the objective methods of natural science to the life of the mind. From Husserl's point of view, the objectification and, hence, elimination of human subjectivity hollowed out the original sense of philosophy and science as guides to a good rational life. The crisis of modern humanity is due to the fact that we have come to adopt science as a habitual manner of understanding the world and ourselves while the scientific disciplines have lost the original spiritual force of philosophy as a universal science rooted in the motivational nexus of subjective life. Thus Husserl.¹

Husserl's response to this crisis is an attempt to reconstruct the meaning of science by revealing its foundation in the subjective experience of the so-called lifeworld. The lifeworld is a world of immediate experience and practical orientation. As a case in point Husserl showed how geometry originated from the "art of surveying" thereby changing the world of perceived nature into an abstract mathematical world concealing its primordial sense. The production of scientific objectivity by human subjects is the blind spot of objectivism. In Husserl's eyes, the European sciences were not in crisis because the truths they establish were

¹ Edmund Husserl, *Die Krisis der europäischen Wissenschaften und die transzendente Phänomenologie. Eine Einleitung in die phänomenologische Philosophie*, vol. VI, *Husserliana. Gesammelte Werke* (The Hague: Martinus Nijhoff, 1976). See also James Dodd, *Crisis and Reflection. An Essay of Husserl's 'Crisis of the European Sciences'* (Dordrecht: Kluwer Academic Publishers, 2004).

false, but because they presented their abstractions as realities mistaking methodology for ontology. Only what can be rendered measurable and be subjected to mathematization counts as real. It is only for this reason that the world now appears to be a disenchanting aggregation of objective facts devoid of meaning.

A recurrent motif in the current problematization of experience is the concern that the cognitive neurosciences call into question or colonize the lifeworld. In a passage quoted at the outset of this book, a German journalist expresses his indignation at the fact that neuroscientists present “the self and its whole way of experiencing the lifeworld” as an illusion. Against the implicit conceptual background of phenomenology this diagnosis is worrisome. If the lifeworld serves as the origin of all meaning its neuroscientific subversion must shake the very foundations of our spiritual existence. Its latest turn potentiates this “Crisis of European Man” by not only temporarily obscuring the source from which his activities derive their significance, but by negating this significance altogether.

In the preceding chapters, I described and analyzed the socio-cultural conditions under which scientific knowledge about hallucinogens and the experiences they elicit is produced in neuropsychopharmacology today. When I now bring this book to a close by turning to a selection of significant links between hallucinogen researchers’ professional activities and their lives it is in response to Husserl’s diagnosis. In a first approximation, the subject matter of this chapter could be introduced as an attempt to look at the lifeworld of

hallucinogen researchers as origin and *telos* of their scientific activities. As individuals intimately concerned with the existential implications of recent developments in the cognitive neurosciences their reactions to a problem, which their own work has contributed to, could be particularly telling. Instead of arising from antiscientific resentments they have emerged from within science. But, as will become clear at the end of this chapter, a closer look at these practices also helps to gain a perspective on the problematization of experience in the context of brain research that differs from phenomenological accounts.

7. Self-Experimentation

Whereas self-experiments were part and parcel of scientific practice in the nineteenth century, today they are regarded with suspicion. But despite its marginalization, self-experimentation has not vanished altogether. In the gray area of contemporary science, some curious individuals are still seeking a more profound understanding of themselves and our kind by systematically manipulating their bodies and minds. Honza Samotar, for example. I would like briefly to introduce his work and the tradition from which it has arisen before you hear his own report.

Samotar is a Swiss physician of Czech descent in his mid-thirties. Wearing jeans, a checkered shirt tucked into his trousers, and sandals with socks, Samotar would almost look domestic if it were not for his bony face and shaved head. He is currently finishing his M.D./Ph.D. training, which involves two theses—one on insect navigation with respect to a potential application in robotics, the other one on the effects of hallucinogenic drugs on the brain. In the Vollenweider laboratory, he doses healthy volunteers like Daniel Wetzel with the NMDA-antagonist ketamine to provoke psychosis-like symptoms. During my fieldwork, I also served as a test subject in his study. While I was recovering from my first ketamine trip, we spoke about Samotar's work and how he came to do what he does. It turned out that before taking up academic model psychosis research on human subjects, Samotar engaged in extensive self-experimentation

with ketamine and a multitude of other psychoactive substances, mostly hallucinogens.

In the Footsteps of John Lilly

Coming of Age of a Self-experimenter

NL: Let's begin with your background. How did you get into drug research?

HS: I should start with my childhood. My father is a very logical and rational man with pronounced natural scientific interests. As a young man he wanted to study biology in former Czechoslovakia, but the Communist Party did not allow him to. Instead he had to study electrical engineering. Hence, he spent his whole life working in a job that was not his dream job even though he also had an interest in electrotechnology. But he continued to pursue his biological interests in his leisure time. That has shaped me a lot. This already becomes apparent in the fact that I follow the same combination of interests. On the one hand, I like to program, I like to work with computers, on the other hand I'm interested in medicine and the life sciences. Already as a child I mostly dealt with natural scientific topics, first with dinosaurs, then with astronomy. At the age of fourteen or fifteen, I was convinced that I would become an astrophysicist. That changed when I read a couple of books about consciousness and the human brain. Then I realized that everything I knew about the world was mediated by my own consciousness and that this is what I need to understand first if I want to understand the world. That led me to learn more about consciousness. At age fifteen, I got interested in hypnosis and started to experiment with it.

NL: What kind of experiments did you do?

HS: Autohypnosis and hypnotizing my friends. That worked pretty well and it was very interesting. But when I read certain books my interests turned more and more toward drugs. One of the reasons for this was that I realized that I could not understand my consciousness or what constitutes me as a human being unless I understand the hardware of my brain and my body. It seemed extremely interesting to me what one could learn about altered states of consciousness through drugs. For in such states an alteration of the brain corresponds to an

altered state of consciousness. At the age of sixteen, I began to conduct self-experiments with different substances.

NL: With friends?

HS: No, I did that on my own from the very beginning onwards. It was not the classical getting in with friends. I deliberately looked for particular substances and then I planned specific experiments, which I conducted alone—at the beginning still equipped with pen and ink, later on with a Dictaphone, which allowed me to record everything. The experiments began with rather harmless substances. For example, I intravenously injected things from the kitchen such as glucose. This was mostly about practicing different forms of applications. But, occasionally, that led to rather dramatic states—up to almost anaphylactic reactions. Then I switched to hashish. That was the first really inebriating substance I took. Interestingly, in my case, alcohol only came later. First I was stoned and then drunk. The first time I got drunk was in a self-experiment, completely on my own. I had drunk 2 dl of schnapps and, of course, I minuted everything. That is, briefly summarized, how I got interested in the brain and consciousness.

From 1992 to 1995, as a medical student in his early twenties Samotar had access to an isolation tank, which a friend of his operated in the back room of his bookstore. Samotar used the tank after closing time to test the effects of about a dozen psychoactive drugs on himself. From alcohol and cannabis to fly agaric, psilocybe mushrooms, LSD, ketamine, MDMA, dextromethorphan, trihexiphenidyl, and laughing gas. The isolation tank (also known by its popular name “Samadhi tank”—after the Sanskrit term for a state of “neutral bliss” or “consciousness without object”) was developed in the mid 1950s by the American physician John Lilly. But Samotar did not only make use of Lilly’s technology. Since he had read Lilly’s “autobiography of inner space” at age 17,

he also looked at Lilly's whole self-experimental approach as a model.² For Samotar, it is Lilly as an unconventional scientist with whom he identifies:

Lilly made a strong impression on me and has influenced my development significantly as he was akin to me insofar as he approached new problems with great openness. He did so with a high degree of scientific clarity instead of getting lost in esoteric blather and odd speculations. His approach consisted of examining the mind scientifically as a system by isolating it. This was his original idea, which led to the construction of the isolation or Samadhi tank. As little input, as little output as possible to allow grasping the mind as purely as possible and observing it as a scientific object. I found this very impressive because I am a critical and scientifically minded person by nature. For this reason, I have more or less taken over Lilly's approach to drug research and followed in his footsteps for quite some time.

As Lilly's work has had such a profound impact on Samotar, I will give a brief overview of Lilly's highly original project to provide a historical and conceptual framework for Samotar's self-experimental practice.

The Isolation Tank

John Lilly invented the isolation tank in 1954 while he was working as a brain researcher for the National Institute of Mental Health (NIMH) in Bethesda, Maryland. He was interested in research on the reticular activating system of the brain stem and the physiology of waking and sleeping. At the beginning of the 1950s, the neurophysiologists Horace Magoun (University of California, Los Angeles) and Frederic Bremer (Brussels) had suggested that the brain only stayed in a waking state due to outside stimulation. In Lilly's eyes, "the obvious

² John Lilly, *The Center of the Cyclone. An Autobiography of Inner Space* (New York: Julian Press, 1972).

experiment [to test this hypothesis] was to isolate the human from all external stimulation insofar as this was physically possible, and to see what the resulting states were.”³ To carry out this experiment he conceived of the isolation tank: Test subjects were to float for hours in a saline solution at 33.9–34.4°C in complete darkness and dead silence. Under such conditions the human body is deprived of almost all tactile, thermic, visual, and acoustic stimuli (apart from those it creates itself, for example through breathing, heart beats, or bowel movements⁴). When Lilly started to engage in extensive self-experimentation in the tank he found that not only did he not fall asleep, but his mind came to develop a rather animated life of its own:

I went through dreamlike states, trancelike states, mystical states. [...] I went through experiences in which other people apparently joined me in this dark silent environment. I could actually see them, feel them, hear them. At other times, I went through dreamlike sequences, waking dreams as they are now called, in which I watched what was happening. At other times I apparently tuned in on networks of communication that are normally below our levels of awareness, networks of civilizations way beyond ours. I did hours of work on my own hindrances to understanding myself, on my life situation. I did hours of meditation, concentration, and contemplation, without knowing that this was what I was doing. It was only later in reading the literature that I found that the states I was getting into resembled those attained by other techniques.⁵

³ Ibid., 41. Cf. John Lilly, *The Scientist. A Novel Autobiography* (Philadelphia: J. B. Lippincott Company, 1978), 98-103.

⁴ In his discussion of attempts to build sound- and light-proof experimental psychology laboratories in the nineteenth century, Henning Schmidgen emphasized the confounding role of the body: “After excluding every obvious sensation of sound and light, what remains is an encounter with the body; its eyes and ears, its lungs, and its blood. The consequence is that the subject of the experiment reveals him or herself to be a disturbing factor in the execution of the experiment.” Schmidgen, “A Roaring Silence,” 76.

⁵ Lilly, *The Center of the Cyclone*, 42-43.

By itself the isolation tank did not allow much more to be learned about the brain than the fact that its deprivation of most external stimuli did not lead to a significant reduction in vigilance. However, instead of changing the experimental system, Lilly changed his epistemic object. Having started off as a neurophysiologist studying the brain, he soon became more interested in the exploration of his own mind. In many self-experiments, “self-” refers to the use of one’s own body as a medium of experimentation with something else. For example, the self-experimenter tests the effects of a certain drug or vaccine on his brain or immune system. In Lilly’s case, the self was not only the medium, but also the object of his investigations. For this purpose, the isolation tank seemed to be a highly suitable device. Following the logic of the scientific method, it appeared to single out the epistemic object while minimizing external confounding factors: “A given mind seen in pure culture by itself in profound physical isolation and in solitude is the raw material of our investigation.”⁶ However, the self Lilly examined in the isolation tank was not so much a natural given, but a carefully constructed scientific object appearing as it did under highly artificial conditions. The tank had to be installed on several layers of rubber in a secluded and soundproof room protected from daylight, preferably in a basement. The temperature of the water had to be maintained through an almost silent heating device and the saline solution had to be filtered and circulated

⁶ John Lilly, *Programming and Metaprogramming in the Human Biocomputer. Theory and Experiments* (New York: The Julian Press, 1972), xxii. Here, solitude served to isolate the object of investigation. But at the beginning of the nineteenth century, scientists like Wilhelm von Humboldt also regarded solitude as a precondition of scientific access to truth more generally. U. Dierse, “Einsamkeit,” in *Historisches Wörterbuch der Philosophie*, ed. Joachim Ritter (Basel: Schwabe & Co., 1972), 410.

impalpably by a pump to prevent the formation of noticeable temperature gradients between skin and water.⁷ The air in the tank had to be renewed continuously as well, which required a second pump.⁸ Additionally, the test subject's solitude had to be guarded by locked doors and signs, while someone had to stay close-by to help in case of unexpected events. The self thereby produced is not a self defined by its relations, but a self constituted in radical retraction and detachment from the world.

Lilly continued to explore his own responses to the "solitude-isolation tank situation" for a decade before complicating the experimental setting by introducing drugs into his research.⁹ Between 1964 and 1966—by which time he had left NIMH and established the Communication Research Institute on the Virgin Islands, a center devoted to fostering human–dolphin communication—he conducted approximately twenty self-experiments with LSD in the tank before the substance was made illegal in the United States. Later on, he continued this line of research with ketamine. Despite his use of pharmacological agents, the object of Lilly's inquiry was still the mind, not drugs or the brain. In his eyes, LSD and ketamine only served as vehicles for his psychonautical expeditions.

⁷ Related efforts at keeping external disturbing noises out of experimental psychological laboratories in the nineteenth century are described by Schmidgen, "A Roaring Silence."

⁸ For Lilly's comprehensive list of recommendations concerning an "ideal tank environment," see John Lilly, *Das tiefe Selbst* (Basel: Sphinx, 1988), 168-170.

⁹ Lilly, *The Center of the Cyclone*, 7-36.

Pharmacologically Facilitated Thought Experiments

Lilly claimed that the special conditions of physical isolation were optimal for “exploring, displaying, and fully experiencing new states of consciousness.” The elimination of all stimulation from the “external reality” was supposed to allow a deeper penetration of the unconscious.¹⁰ Lilly regarded this new practice of introspection as a continuation of eight years of psychoanalysis, which he had undergone beforehand. His self-analysis in the isolation tank was based on the premise shared by all hermeneutics of the self: “The exploration of the inner reality presupposes that the inner reality contains large unknowns which are worth exploring.”¹¹ Yet the outcome of Lilly’s journeys into the realms of the unconscious differed in a slight, but decisive manner from the findings of Sigmund Freud’s self-analysis at the end of the nineteenth century: “After having been through some of the innermost depths of the self, a result is that they are only one’s own beliefs and their multitudes of randomized logical consequences deep down inside one’s self.”¹² While Freud conceived of the mental apparatus as a steam engine-like machine operating with charges of libidinal energy, Lilly looked at the mind as the software of the “human biocomputer” implemented in the brain.¹³ The basic elements with which this computer is supposed to operate and by which it is determined are propositional beliefs. Affects only play a minor role in this logocentric model of the psyche. Lilly’s self-analysis aimed at

¹⁰ Lilly, *Programming and Metaprogramming*, 14, 25.

¹¹ *Ibid.*, 61.

¹² *Ibid.*, 40.

¹³ *Ibid.*, 8. At about the same time, the French psychoanalyst Jacques Lacan also reinterpreted the Freudian model of the psyche in terms of information theory, cybernetics, and computer technology. See Langlitz, *Die Zeit der Psychoanalyse*, 157-199.

identifying the beliefs that he had unconsciously held ever since he was inculcated with them (“in a sense we are all victims of the previous metaprograms which have been laid down by other humans long before us”¹⁴). The goal was to go beyond the limits of thought and experience set up by these unexamined assumptions. From Lilly’s point of view, the altered states of consciousness occurring under sensory deprivation in the tank and under the influence of hallucinogens allowed one to become aware of and to understand those determinations.¹⁵ As for the effects of LSD, his interpretation was consistent with the use of hallucinogens in “psycholytic therapy” developed by Ronald Sandison and others in the 1950s. Their idea was to facilitate psychoanalysis and other forms of psychotherapy by administering comparatively low doses of LSD to improve the patient’s access to the unconscious. The knowledge gained through these forms of introspection had a practical purpose: Realizing one’s determinations was meant to be the first step towards emancipation from them.

But mere understanding of one’s conditioning does not suffice to change one’s life. For Lilly the psychoanalytic quest for an inner truth was only a beginning: to achieve greater autonomy he wanted to replace his old imposed beliefs with freely chosen new ones. As far as Freud’s “psychic reality” was concerned, Lilly was a radical constructivist: “In the province of the mind, what one believes to be true is or becomes true, within certain limits to be found experientially and experimentally. These limits are further beliefs to be

¹⁴ Lilly, *Programming and Metaprogramming*, 6.

¹⁵ *Ibid.*, 10-11, 68.

transcended. In the mind, there are no limits.”¹⁶ This almost boundless optimism concerning the malleability of the psyche combined the ideals and hopes of human engineering and the Human Potential Movement prospering in the United States at the time.¹⁷ From a Freudian perspective, Lilly’s mantra is tantamount to a regression to hypnosis and suggestion, which Freud’s “talking cure” was meant to overcome.¹⁸ In fact, LSD was said to provoke a state of increased suggestibility. Hence, the drug not only served to reveal the unconscious programs and beliefs by which the subject is determined, as a “reprogramming substance,” it was also meant to help substituting them with more beneficial assumptions.¹⁹

¹⁶ Ibid., xii.

¹⁷ Cf. Rebecca Lemov, *World as Laboratory. Experiments with Mice, Mazes, and Men* (New York: Hill & Wang, 2005).

¹⁸ Cf. Langlitz, *Die Zeit der Psychoanalyse*, 22-28.

¹⁹ “Certain chemical substances have programmatic and/or metaprogrammatic effects, i.e., they change the operations of the computer, some at the programmatic level and some at the metaprogrammatic level. Some substances which are of interest at the metaprogrammatic level are those that allow reprogramming, and those that allow and facilitate modifications of the metaprograms. [...] For example, the term ‘reprogramming substances’ may be appropriate for compounds like lysergic acid diethylamide. For substances like ethyl alcohol the term ‘metaprogram-attenuating substance’ may be useful.” Lilly, *Programming and Metaprogramming*, 9. And even more pointed: “It is to be emphasized for those who have not seen the phenomena within themselves that this kind of manipulation and control of one’s own programs and its rather dramatic presentation to one’s self is apparently not achievable outside of the use of LSD-25.” Lilly, *Programming and Metaprogramming*, 19-20. Lilly explained the power of LSD to modify one’s programs in terms of information theory: “In the analysis of the effects of LSD-25 on the human mind, a reasonable hypothesis states that the effects of these substances on the human computer is to introduce *white noise* (in the sense of randomly varying energy containing no signal of itself) in specific systems in the computer. [...] In such noise one can project almost anything at almost any cognitive level in almost any allowable mode: one dramatic example is the conviction of some subjects of hearing-seeing-feeling God, when “way out.” One projects one’s expectations of God onto the white noise as if the noise were signals; one *hears the voice of God in the Noise*. With a bit of proper programming under the right conditions, with the right dose, at the right time, one can program almost anything into the noise within one’s cognitive limits. Lilly, *Programming and Metaprogramming*, 76-77.

The most original aspect of Lilly's self-experiments is his use of LSD and the isolation tank for the purpose of a rather peculiar kind of thought experiment. Thought experiments are usually carried out to examine certain assumptions about reality. Based on the premises in question one thinks through the consequences of these assumptions and compares them to what one has learned about the world empirically. If the results of the thought experiment do not comply with experience the premises need to be questioned.²⁰ Lilly used the heightened suggestibility under LSD and the physical interruption of social relations in order to implement new beliefs in his own "biocomputer" by way of autosuggestion. When the drug effects died down Lilly was able to reflect on where the assumptions had taken him.

During this first trip I also defined other kinds of belief with which I would experiment. I would try to go to universes other than our consensus universe, universes I didn't necessarily believe existed, but which I could imagine. At first this was a test of the hypothesis that what one believes to be true becomes true. Before the trip, I didn't believe in these universes or spaces, but *I defined them as existing*. During the LSD trip in the tank *I then took on these beliefs as true*. *After the trip, I then disengaged and looked at what happened as a set of experiences, a set of consequences of the belief.*²¹

Lilly regarded the mind as perfectly plastic. The question was not whether the beliefs experimented with were true, but whether their consequences for the self were desirable. Hence, he did not strive only for self-knowledge. The goal was to

²⁰ Henning Genz, *Gedankenexperimente* (Hamburg: Rowohlt, 2005). See also Sören Häggqvist, *Thought Experiments in Philosophy* (Stockholm: Almqvist & Wiksell International, 1996). Ulrich Kühne, *Die Methode des Gedankenexperiments* (Frankfurt/M.: Suhrkamp, 2005). Thomas Macho and Annette Wunschel, eds., *Science & Fiction. Über Gedankenexperimente in Wissenschaft, Philosophie und Literatur* (Frankfurt/M.: Fischer, 2004).

²¹ Lilly, *The Center of the Cyclone*, 48.

change himself by meditating over new beliefs, some of which Lilly found beneficial enough to keep: “Experiments were done on myself to test the theory, to change it, to absorb it, to make it part of me, of my own biocomputer. As the theory entered and reprogrammed my thinking-feeling machinery, my life changed rapidly and radically. New inner spaces opened up; new understanding and humor appeared. And a new skepticism of the above facts became prominent: “My own beliefs are unbelievable,” says a new metabelief.”²²

In the absence of an external referent, Lilly’s thought experiments were not about testing certain assumptions about the world. Their main objective was not even to discover an inner truth, although the discovery of “previous metaprograms” was a necessary first step. The goal of Lilly’s experiments in the tank was to internalize newly constructed “truths” while maintaining an ironic distance from them. The aim of Lilly’s self-experimentation was not so much methodical self-exploration as in psychoanalysis, as much as it was a meditative work on the self producing the self-deprecating maverick Lilly came to be.²³

Samotar’s Quest for “Experiential Invariants”

Both, Lilly and Samotar are interested in the alterability of consciousness. But for Lilly self-knowledge served as the basis of an active self-fashioning or “reprogramming of the human biocomputer.” His primary aim was the construction, not the discovery or foundation of truths. To Samotar’s project,

²² Ibid., 5.

²³ For the distinction between method and meditation, see Rabinow, *Anthropos Today*, 6-12.

however, there has been a Cartesian edge from the very beginning: "When I started experimenting with altered states of consciousness my primary motivation was the search for reality. [...] [B]etween 12 and 14 years, I doubted whether I could be sure about the existence of anything since everything was just mediated by my awareness." Hence, Samotar decided to work on himself to make his mind a perfectly transparent medium, which would allow to gain certain first-hand knowledge about the self instead of taking traditional knowledge and testimony of others on trust: "I felt somehow contaminated by assumptions or even just associations, unwarily absorbed from others. This called for mental purification. The search for reality implied the search for the real self." Like Descartes' *Meditations*, Samotar's quest for certain knowledge about the world takes a detour via deviations from so-called everyday consciousness. "It may seem strange to use psychoactive drugs for close inspection of reality. They are often considered to serve the opposite aim, namely to escape from reality. But turning anything off never was an end in itself for me. I rather saw it as a possible way to find firm ground," i.e. a "state of pure awareness [that] can serve as an Archimedean point of introspection."²⁴ Following Lilly, Samotar started using an isolation tank to explore the mind. But despite his insatiable curiosity for the altered states themselves his interest in the malleability of the human mind was mostly guided by the desire to find some sort of constancy in this mental multiverse. He was determined to find an answer to the question whether there were "experiential invariants" [*Erlebnisinvarianten*]. By this he means: Is there

²⁴ Honza Samotar, "Tripping in Solitude," in *Introspective Self-Rapports. Shaping Ethical and Aesthetic Concepts, 1850-2006 (Preprint 322)*, ed. Katrin Solhdju (Berlin: Max-Planck-Institut für Wissenschaftsgeschichte, 2006), 93-94, 96.

anything in one's experience that resists a broad range of pharmacological challenges? Does anything remain experientially consistent despite sometimes massive alterations of brain chemistry? Is there a core self enduring under all conditions, something steady amidst the flux of neurotransmitters, the firing of nerve cells, the feelings of unlimited freedom and abysmal anxiety going along with the "dissolution of ego-boundaries"? These were the questions materializing in Samotar's self-experimentation with drugs in the isolation tank.

HS: When I eventually got the chance to do experiments in a Samadhi tank myself I used that opportunity, of course. That was in 1992 at the house of a friend of mine. Before and after I experimented with different drugs—at home, outdoors, with friends, in public, locked up in a shelter, armed with a stroboscope, and in autohypnosis. In the isolation tank, I tried to repeat and consolidate the insights I had gained before in this situation of almost total isolation. Basically, I asked myself a question, which, before me, John Lilly had already posed: To what extent can you change the experience of being and the world and what remains invariant under all circumstances? That is to say: What are the experiential invariants of existence? Lilly reached the conclusion that there aren't any. I verified this empirically in my self-experiments and I came to the same conclusion: There are none, everything is variable. The only thing that remains the same is the point of departure to which I always return when the drug effects wear off.

NL: What experiences did you have in the isolation tank?

HS: First of all, I did two baseline experiments in there, i.e., I climbed into the isolation tank soberly to see how this environment affected me. Then I did a series of self-experiments, in which I tested twelve substances. At the end, I did another baseline experiment to see whether the tank now had a different effect on me than the first two times after having experienced a dozen pharmacologically altered states in there. One of the most interesting findings from the series of trials was the difference of the final baseline experiment. At that point, the state of consciousness was *potentially* altered. That is to say: When I was lying in the

isolation tank in my everyday state the environment seemed like the first two times. But I could enter much more easily into different states of consciousness because I had already experienced them—beforehand, I had not been capable of this as I hadn't been able to imagine these states yet. Thus one could speak of an expansion of the *potentially experientiable*. Drug experiences do not change your existence as such, but potentially by opening up a greater freedom of one's imagination. Then you are able to enter certain experiential dimensions by way of pure concentration and without chemical support. That's a lot easier if you got to know these dimensions through chemicals beforehand.

NL: Did you take notes on your isolation tank experiments?

HS: During the experiments I always had a microphone hanging about 10 cm above my face connected to a digital audio tape (DAT) recorder standing on the tank. This allowed me to record for six hours without leaving the tank. The following day I wrote a protocol from my memory without listening to the tape. Later on, I wanted to have the possibility of comparing the real time protocol with the memory protocol because I can't foresee what a substance does to my memory and linguistic abilities. It could be that I have phantom memories, that there are things I cannot remember, or that I talk some nonsense, which has nothing to do with what I experience. That way I can be sure that the intersections of real time and memory protocol at least come close to the real experience.

NL: Is there something distinctive about your self-experiments that distinguishes them from the self-experimental practices of others?

HS: What's quite typical of my approach, something few other people are doing, is that I have explored combinations of drugs very systematically. I compiled a table and went through almost all two-drug combinations. Then I tested a lot of three-drug combinations, after that four-drug combinations, and so forth. If a combination seemed interesting to me I added further substances, which also seemed to be of some interest in this context. The maximum I have ever taken was eight drugs at a time.

NL: What exactly do you mean by "interesting"? What is an "interesting combination of drugs"?

HS: In my eyes, an interesting altered state of consciousness is a state which is as different as possible from everyday consciousness and which optimally still

allows me to minute a real time protocol and to keep a clear memory on the basis of which I can write a memory protocol. But at least one of them must be feasible: real time or memory protocol. If none of this works then the state is of no interest to me. Or if I can produce a protocol, but the state differs only minimally from everyday consciousness. For me, it's the more interesting the more adventurous the state is as long as I have the possibility to return some of it to ordinary waking consciousness.

The Paradox of Methodico-meditative Self-experimentation

Samotar's drug experiments in the isolation tank were extreme, but not excessive. They were marked by a high degree of self-discipline, control, and systematicity. Despite the philosophical pathos of his research questions he presents himself as a technically minded scientist paying close attention to practicalities. His pursuit of the truth is strictly methodical. Each of the self-experiments followed the same procedure to establish the greatest possible comparability. The only variables Samotar was willing to admit were the drugs and the mind-brain states they elicited under maximal exclusion of other external stimuli in the isolation tank. But he also wanted to minimize internal "confounding factors" tainting the pure experience of a particular substance by neutralizing the impact of his presuppositions on the perception of the drug effect. "One particularly pronounced problem in work with hallucinogenic drugs is (auto-) suggestibility. You never know in which ways your experiences are going to be biased by your own expectations or prejudices. I tried to control for this as much as possible." For this purpose, Samotar devised a mental technique based on the principle guiding his whole quest for "experiential invariants": he explores the

range of a phenomenon's variability to determine its immutable core. In this case, however, the experiential invariant extracted is not what Samotar calls the "minimal self" (i.e., the "intersection of all states [of consciousness]," representing "the unchangeable elements of experience"), but the essence of a drug-induced misperception.

I will describe the technique I used by means of sensory perceptions, since it is easiest to show in this context, but you can play the same game with emotions, thoughts, and beliefs. | When you observe illusions or pseudo-hallucinations you have basically two possibilities for reporting: a passive and an active approach. In the passive approach you try to take your own will away as much as possible and just describe your observations either in real time or at a later time. With the active approach you can somehow control for your prejudices by trying to change the perception by will power and observing how far that goes in different directions and how much effort it needs in each case. So if you see a green object you can try to see it in different colors and notice, for example, that it is easier to change to blue than to red. If you see a shape you can try to change the direction of the shape, its form, its size. Then you can measure the boundaries of changeability. Usually you can perform some changes more easily than others, and you can change the perception to some extent and not more. | Then you have what you observe when you don't do anything, and this clearly is biased. But in addition you also have the space of possibilities. Sometimes you find the core almost centrally in the whole space, which indicates that your prejudices were small, but sometimes it is located marginally, which tells you something about your prejudices and/or about the structure of the processes generating the perception.²⁵

Here, the difference between Samotar and Lilly's project comes to the fore. From Lilly's point of view, the increased suggestibility caused by hallucinogens was a particularly favorable pharmacological effect, which he

²⁵ Ibid., 99.

exploited to replace old beliefs by new ones that he wanted to experiment with. Samotar, on the other hand, regards this effect as a problem and tries to eliminate it in an unusual manner: by taking it to the extreme to get to the heart of the matter, which resists all transmutations. His primary goal is not Lilly's peculiar kind of self-fashioning aiming at an infinite transgression of the limits of experience (for Samotar this is rather a means than an end), but a variant of self-knowledge. And yet he also uses psychedelic drugs to work on himself.

NL: What motivates your self-experimentation?

HS: First and foremost, my motivation is to gain knowledge. Over the years, of course, a hedonistic motivation appeared as well. I don't want to deny that. There are certain substances, which I occasionally consume only for hedonistic reasons—or for practical purposes, i.e., not for the sake of research. For example, since about ten years, I only take LSD to clear out my flat. I haven't used this substance in any other context since.

NL: What do you gain from taking LSD when clearing out your flat?

HS: Two things: First of all, I'm a little bit obsessive-compulsive. That involves a tendency toward hoarding. I have difficulties throwing away stuff and after a while things start piling up. It is a known fact that 5-HT_{2A} agonists such as LSD work against obsessive-compulsiveness.²⁶ I've realized that when I sort through piles of old paper under the influence of LSD I conceive of 90% as garbage and I can throw it into the trash without any emotional stirring. I have to add that for such a purpose I don't take doses which knock me out. It has to be a dosage at which I remain capable of acting. After all, I want to accomplish something, which requires the ability to think logically. It's not helpful if I take such a high dose that I need to stare at every piece of paper for twenty minutes before I realize what it's about and whether I can throw it away or not.

NL: Have you tried other 5-HT_{2A} agonists like psilocybin for this purpose?

²⁶ Samotar refers to the work of Francisco Moreno et al., "Safety, Tolerability, and Efficacy of Psilocybin in 9 Patients With Obsessive-Compulsive Disorder," *Journal of Clinical Psychiatry* 67, no. 11 (2006).

- HS:** I did, yes, but LSD turned out to be the best substance. To this end psilocybin is too short-acting since a lot of stuff piles up and it takes a whole day to get rid of it. So these are very practical hands-on reasons. For hedonistic purposes, I definitely prefer psilocybin—for the same reason: It acts shorter. From a hedonistic perspective, LSD is not a good drug because the effects last for too long. After four to five hours I'm fed up and that's exactly when the effects of psilocybin die down.
- NL:** What's your other application of LSD?
- HS:** The enhancement of emotionality under LSD helps me to come to terms with the past in a way, which I personally experience as very satisfying. By working through my old stuff I relive everything and then I can consider these issues closed letting bygones be bygones. In this context, I should add that there is a second type of occasion for which I have already taken LSD: after moving into a new flat. Then it's not primarily about closure, but about growing into a new stage of life. In both cases, LSD does a good job.
- NL:** Obsessive-compulsiveness is said to be a predictor for bad trips. Has this caused problems in your self-experimentation?
- HS:** No, that's not a problem for me. I have to say that bad trips are not a problem for me. I had a number of bad trips in my life, some of them were really bad, worst trips, so to say. The fact that this hasn't put me off has to do with my motivation. If someone mostly takes drugs for hedonistic reasons then he will keep his hands from a substance after it triggered a bad trip. For me, however, a dreadful experience is no reason to distance myself from a drug. In my eyes, a bad trip is as interesting as a good one, sometimes even a lot more interesting. My goal is to carry as much as possible from such altered states into everyday life. It doesn't matter whether I experience bliss or anxiety in these states. What's important is that the state differs from everyday consciousness and that it's describable. That's it.
- NL:** Would you describe your attitude as a heroic ethos of self-experimentation? Aren't you afraid when you take a substance with which you've already had a bad experience?
- HS:** Of course, I'm afraid. I'm a human being or an animal like any other. Pavlovian conditioning works in my case, too, and if a stimulus was aversive I don't like to

take the substance in question for a second time. So you can say that it's a heroic ethos of self-experimentation. Comparable with this parasitologist who swallowed two thousand roundworm eggs to demonstrate that you can survive that. It was clear from the very beginning that this wouldn't be fun.

Following Michel Foucault, Samotar's use of LSD to clear out his flat and to come to terms with the past can be looked at as a rather unusual form of "care of the self" in the age of psychopharmacology. Care of the self differs from the Delphic precept to know oneself as the other dimension of the antique culture of the self described in Foucault's last books.²⁷ Techniques of self-care aim less at scrutinizing one's life to learn the truth about oneself than to look after oneself and to give a desirable form to one's existence. Although these two sets of practices have been combined in countless ways (think of psychoanalysis or Lilly's project, for example), there is a certain tension between methodical self-exploration and a more meditative work on the self, which aims at transformation rather than identification of a given self.²⁸ This tension between method and care also affects Samotar's use of drugs.

Hans Blumenberg pointed out that modern science is based on the principle of method. Its purpose is the integration of a potentially infinite number of subjects pursuing scientific investigations in different contexts over time. The implication of their individual lives and their personal desire for truth in their research activities are merely accidental.²⁹ Within the wider framework of the

²⁷ Michel Foucault, *The Care of the Self. The History of Sexuality*, vol. 3 (New York: Vintage Books, 1986). Michel Foucault, *The Use of Pleasure. The History of Sexuality*, vol. 2 (New York: Vintage Books, 1985).

²⁸ The distinction between method and meditation is borrowed from Foucault, *The Hermeneutics of the Subject*.

²⁹ Blumenberg, *Die Legitimität der Neuzeit*, 370.

pursuit of knowledge realized in a series of experiments (and not in one experiment alone), it is to be expected that single experiments do not lead to the desired outcome. This is regrettable for the experimenter, but the scientific community can still learn from such failures. Hence, even experiments with negative results are valuable. And if experiments succeed in generating new knowledge it usually does not provide answers to the big questions, which could be directly relevant to our lives, but small building blocks, largely insignificant in themselves, which may or may not make an important contribution to some future development. Instead of satisfying the individual researcher they contribute to the progress of science at large. On the side of the experimenter, this implies a suspension of his personal desire for gratification.

In the case of methodical self-experimentation, this scientific asceticism can take the form of a pronounced recklessness toward oneself hardly compatible with more caring self-relations. Friedrich Nietzsche offered one of the most vivid articulations of this unsparing ethos:

[O]ur attitude towards *ourselves* is *hubris*, for we experiment with ourselves in a way we would never permit ourselves to experiment with animals and, carried away by curiosity, we cheerfully vivisect our souls: what is the "salvation" of the soul to us today? Afterwards we cure ourselves: sickness is instructive, we have no doubt of that, even more instructive than health—*those who make sick* seem even more necessary to us today than any medicine men or "saviors." We violate ourselves nowadays, no doubt of it, we nutcrackers of the soul, ever questioning and questionable, as if life were nothing but cracking nuts; and thus we are

bound to grow day-by-day more questionable, *worthier* of asking questions; perhaps also *worthier*—of living?³⁰

Following this severe logic of self-negation for the purpose of knowing oneself and overcoming one's current limitations, John Lilly even welcomed what he described as a "near-lethal 'accident'," a suicide attempt he committed after his second LSD experience: "No experiment is a failure," he concluded. "I had learned that death is not as terrifying as I had imagined it to be."³¹ Samotar's embrace of good and bad trips alike and the risks he takes by ingesting new combinations of highly potent drugs is in line with this acceptance of severe hardship up to the point of self-annihilation. This indifference to oneself reflects the detached relationship with the world underlying the ideology (if not the practice) of modern science. As if he were a distant observer of his own life, almost unaffected by what is happening to him in such moments. What is the relationship between such an "experimental life" and the empirical knowledge it produces? How does this production of self-knowledge and the quest for a better existence for oneself go together? After all, the subject experiments for its own sake, not for the sake of scientific progress.

The French historian of science Georges Canguilhem has raised the question of norms underlying the epistemology of medicine and the life sciences. Can living beings, who—by nature—invest life with normativity, study this very life in a value-neutral manner? Canguilhem did not think so. From his point of view,

³⁰ Friedrich Nietzsche, *On the Genealogy of Morals*, trans. Walter Kaufman and R. J. Hollingdale (New York: Vintage Books, 1967), 113 (§9).

³¹ Lilly, *The Center of the Cyclone*, 35.

[m]edicine exists as the art of life because the living human being himself calls certain dreaded states or behaviors pathological (hence requiring avoidance or correction) relative to the dynamic polarity of life, in the form of a negative value. We think that in doing this the living human being, in a more or less lucid way, extends a spontaneous effort, peculiar to life, to struggle against that which obstructs its preservation and development taken as norms.³²

According to Canguilhem, regarding ominous states and behaviors as pathological is a function of the normativity inherent in life itself. Consequently, medical and biological research—including self-experimental approaches like Lilly or Samotar’s drug research—must be seen as part of the struggle of living beings for preservation and development in insecure and changing environments. The production of knowledge in the life sciences constitutes a life process itself. However, if physicians and biologists are not detached observers, but living organisms pursuing vital interests, one would expect that the degree of engagement Canguilhem postulated would be even higher in the case of a self-experimenting brain researcher. In his isolation tank experiments, Samotar was involved in the most existential manner. After all, it was his own life with which he experimented. From Canguilhem’s viewpoint, it seems paradoxical that Samotar presents himself as a detached observer of his own impingement while putting his well-being and even his life at risk without pressing cause. He is not a terminally ill patient grasping at straws, but a healthy young man—seeking what?

³² Canguilhem, *The Normal and the Pathological*, 126.

Disenchanted Mysticism

In *Selbstversuche*, the German philosopher Peter Sloterdijk pointed out that the rationale underlying modern self-experimentation must not be reduced to the logic of self-preservation. Often a second motivation comes into play, which Sloterdijk called self-intensification:

In the concept of self-intensification, there is an element that cannot be accounted for by the rationale of self-preservation alone. In classical tradition, he who preserves himself by abiding by the cosmos is wise—and even in modernity, one still presumes a profound equation of reason and self-preservation. But modernity has long since left the space of self-preserving rationality. The will to self-intensification cuts the auto-conservative cord. One reclaims the right to self-annihilation. The one who always acted in a self-preserving manner couldn't do many things that have been part of our experimental habits since long ago—this unbridled furor, this tendency toward escalation in everything made into an absolute.³³

Looking at all things human through the glasses of psychology, Samotar's colleague Boris Quednow interprets self-experimentation with hallucinogenic drugs against the background of Marvin Zuckerman's concept of sensation seeking behavior. Like Lilly's isolation tank, this concept emerged in the field of sensory deprivation research in the 1960s.³⁴ According to Zuckerman, sensation seeking is a personality trait "defined by the seeking of varied, novel, complex, and intense sensations and experiences, and the willingness to take physical,

³³ Peter Sloterdijk, *Selbstversuch. Ein Gespräch mit Carlos Oliveira* (München: Carl Hanser Verlag, 1996), 15 (my translation – NL).

³⁴ Marvin Zuckerman, D. Schultz, and T. Hopkins, "Sensation seeking and volunteering for sensory deprivation and hypnosis experiments," *Journal of Consult and Clinical Psychology* 31, no. 4 (1967).

social, legal, and financial risks for the sake of such experience.”³⁵ This constant search for thrill and adventure, this pursuit of an exuberance of new experiences through travel, art, music, parties, changing sex partners, and drugs is said to be associated with an increased susceptibility to boredom produced by unchanging circumstances. Or, as Quednow believes, the desire for strong external stimuli might also be due to a lack of autonomous mental activity. From this point of view, self-experimentation with psychedelics appears to be symptomatic of a nagging emptiness. Is the trial-and-error approach to life, the quest for its intensification symptomatic of a psycho-spiritual deficiency characteristic of the modern subject or is it an expression of profuse courage and curiosity, of the neo-Nietzschean mania made out by Sloterdijk?

In his genealogy of self-experimentation, Sloterdijk traces its self-destructive tendencies and the hunt for powerful sensations back to Christian mysticism. He claims that

in its self-experiments, the modern individual takes the freedom to put itself to the test up to the limits of self-destruction. That's a pretty surprising trait. To find something comparable you need to go back to the idea of mystical self-annihilation spreading during the European Middle Ages, maybe also in Eastern schools of meditation. It seems to me that, today, elements that have already been tried out in Christian mysticism are being reiterated in a non-theological code—mostly in the language of intensified self-experience, of inebriation, of the experience civilization [*Erlebnisivilisation*].³⁶

³⁵ Marvin Zuckerman, *Behavioral expressions and biosocial bases of sensation seeking* (Cambridge (UK): Cambridge University Press, 1994).

³⁶ Sloterdijk, *Selbstversuch*, 14 (my translation—NL).

In neuropsychodelia, these elements of mystical traditions have also been reassembled with the tools of psychopharmacology and a neurochemical conception of the human. But Samotar's headstrong perspective on his self-experimental practice not only resists the evolutionist account of man as a self-preserving organism, but it is inconsistent with Sloterdijk's epochal account as well. Although this hardheaded scientist explicitly associates his drug experiments with mysticism, it is a mysticism, which, surprisingly, is not based on the kind of mystical experiences, which psychedelics can induce.

NL: Apart from these frightening states of self-disintegration causing bad trips hallucinogens can also give rise to ecstatic and mystical forms of ego-dissolution. Has there also been a mystical dimension to your drug experiences?

HS: In my eyes, the mystical cannot be found in such ego-dissolution experiences, which make you feel at one with everything. The truly mystical is that, when the drug effects wear off, you always return to your point of departure in everyday consciousness, to the baseline, so to say. It's about the fact that I can lose myself in a state in which I'm not human anymore, in which I lack both individuality and sociality, in which I have no lifetime because I'm eternal, being everything and nothing, neither dead nor alive, not divided into subject and object, not in a universe with a beginning and an end—and that this state eventually comes to an end. That I can even remember it. In retrospect, I then tell myself: Yes, there are states, in which I'm eternal, but then I'm not myself—then *it* simply is, *that state* is. And strangely enough I always come back here, to the same body at the same place (at least most of the time). That's what I conceive of as the mystical. Others think of this as pure materialism. I can live with that allegation very well. Partly through my drug experiments, I have become an avowed materialist. I simply think: I am my brain state. Full stop. And at the same time, I conceive of *exactly* this as deeply mystical.

But when I state that I perceive this fact as the truly mystical this doesn't imply that I attach particularly great importance to it. For me, the mystical is the amazing, that which amazes me. Of course, what is generally meant by the term

“mystical” fits those altered states better than everyday consciousness. I don’t want to dispute that. But I’m speaking about the mystical in the Wittgensteinian sense. Wittgenstein wrote this brilliant sentence in *Tractatus Logico-Philosophicus*, which I fully subscribe to: „It is not *how* things are in the world that is mystical, but *that* it exists.”³⁷ In my eyes, the truly mystical is not what seems amazing at first glance, but what is the most amazing. The more it amazes me the more mystical it is. And it amazes me a lot more that this life, as it is, so odd, so absurd, so simple, and yet so complicated, that this is what life is. On the basis of this life, the altered states of consciousness can be explained logically. If I apply, for example, [the philosopher] Thomas Metzinger’s model of the mind then it’s just a question of a few switches to have different kinds of mystical experiences. For me, however, the truly mystical is that this whole mechanism exists in the first place, that there are these switches, which you can hit.

NL: So you don’t assign any particular value to your mystical experiences?

HS: No, particularly because of my experiences of altered states of consciousness it seems extremely reprehensible to me how certain religions and sects make political, economical, and religious capital out of real or ostensible altered states. People are led by the nose by making them believe that certain states are more valuable than others. After all my experiences, I regard this as total nonsense. Why should one state of mind be more valuable than another? But maybe that wasn’t an empirical finding, but one of my premises. I entered into my self-experiments presupposing an equal interest in all states. So it’s not surprising that I came back with this result.

NL: Does this have any consequences for your everyday life?

HS: No, in my everyday life the assumption of an equivalence of all states of consciousness doesn’t make a difference. There, I behave like any other organism. I don’t touch the hotplate every day just because I think of pain as an interesting state.

Although Samotar’s self-experiments are all about experience, his mysticism is not. The mystical states of mind, which Samotar has experienced on

³⁷ Ludwig Wittgenstein, *Tractatus Logico-Philosophicus*, trans. David Pears and Brian McGuinness (London: Routledge, 2001), 6.44.

drugs and in the isolation tank are not what he is talking about when referring to “the truly mystical.” He looks at them in a detached and reductionist way. It’s all a matter of a few “switches,” of neural circuits and brain chemistry. What others interpret as divine revelations Samotar regards as a matter of neurochemical intervention. “Why should one state of mind be more valuable than any other?”, he asks. In his eyes, pleasure and pain, good trips and bad trips, experiences of the mystical and the profane, of psychosis and normality are equally “interesting.” This radically objectivist self-conception is even devoid of the vitalist normativity Canguilhem believed to be inherent in life itself.

At first glance, Honza Samotar’s self-image and worldview seem entirely disenchanted. In principle, everything can be explained mechanistically—even mystical experiences. However, for Samotar, Weber’s definition of disenchantment as the belief “that principally there are no mysterious incalculable forces that come into play, but rather that one can, in principle, master all things by calculation” raises the question of what Weber meant by “in principle.” He explains:

The fact that we can juggle with increasingly complex models doesn’t mean that we can only begin to understand the real world. Even if our models were perfect representations of the “real world” (whatever that might be) they would still hopelessly lag behind, if only because they are part of the world. That is to say: Being part of the world myself I will never have all the information necessary to simulate myself faster than I live—even if the whole universe was determined from the start.

Hence, despite the absence of mysterious forces the world continues to be too complex to master more than a narrow selection by calculation. At this point,

where the scientific disenchantment of the world reaches its limits both in practice and in principle, a disenchanted mysticism materializes.

In his diary, Ludwig Wittgenstein noted: “The desire for the mystical arises from the dissatisfaction of our wishes by science.”³⁸ Samotar, however, does not seem frustrated by the limitations of science. His “rational mysticism” is not based on resentment at the disillusionment brought about by the natural sciences.³⁹ Although it is a response to their mechanistic perspective and its restraints, it does not turn its back on science or the world. It is the very fact that science *can* explain *how* everything works while it *cannot* account for *why* things are the way they are, which inspires Samotar’s awe. In his eyes, the meaning which science cannot provide is the very mystery filling him with wonder.

Samotar has no nostalgia for a god-given soul or a transcendental subject. His this-worldly mysticism affirms the identity of person and brain. While the representatives of an anti-biologistic current in the humanities and the German and Swiss feuilleton have responded to neuroscientific incursions of their traditional territory by writing more and more defensive texts denouncing reductionism, Samotar is too happy a materialist to be overly disconcerted by the latest edition of “the end of the soul.”⁴⁰ And yet his quest for experiential invariants seems to indicate a gnawing disquiet, a lack of confidence vis-à-vis the

³⁸ Quoted in: Chris Bezzel, *Wittgenstein zur Einführung* (Hamburg: Junius, 1988), 88 (my translation—NL).

³⁹ The term “rational mysticism” was coined by the science journalist Horgan, *Rational Mysticism*.

⁴⁰ Of course, the dispute about the reduction of mind to matter is everything but new. For an earlier version in nineteenth-century France, for example, see Jennifer Michael Hecht, *The End of the Soul. Scientific Modernity, Atheism, and Anthropology in France* (New York: Columbia University Press, 2003).

self in tune with the uneasiness articulated by those who never tire of defending the self and its lifeworldly experience against their objectification. Like them, Samotar is looking for firm ground in ordinary life. Soberness—although not an invariant in Samotar's life—serves as a haven to come back to after each pharmacological odyssey. It is in everyday brain chemistry where he encounters the mystery of the self. However, the *terra firma* to which he returns is not the lifeworld anymore, Husserl's "universe of pregiven self-evidence."⁴¹ It has lost its perfectly natural semblance and turned into an object of wonder.

Self-experimentation Today

In May 2006, Honza Samotar and I gave a joint presentation at a workshop on the past and present of self-experiments at the Max Planck Institute for the History of Science in Berlin. I introduced his project and provided a conceptual framework by talking about John Lilly's isolation tank experiments and Samotar described what he had learned from his own drug experiences in the tank.⁴² For this occasion, he had chosen the Czech pseudonym, which I am also using here, to protect his identity. One of the questions raised in the subsequent discussion was why he had to use a fictitious name in the first place and why he could talk about his self-experiments at the Max Planck Institute for the History of Science, but not at the Max Planck Institute for Psychiatry in Munich, for instance.⁴³

⁴¹ Husserl, *Krisis*, 183.

⁴² Nicolas Langlitz, "Tripping in Solitude. Introducing Honza Samotar by Way of John Lilly," in *Introspective Self-Rapports. Shaping Ethical and Aesthetic Concepts, 1850-2006* (Preprint 322), ed. Katrin Solhdju (Berlin: Max-Planck-Institut für Wissenschaftsgeschichte, 2006). Samotar, "Tripping in Solitude."

⁴³ The Max Planck Institutes are an ensemble of first-class non-profit research facilities

Self-experimentation has not always had such a dodgy reputation as today. In the era of Romanticism, many distinguished scientists such as Alexander von Humboldt experimented on themselves. This was not only respectable, but contributed significantly to their reputation as trustworthy researchers. In his case study of the self-experiments of Johann Wilhelm Ritter in the late eighteenth and early nineteenth century, Stuart Walker Strickland remarks that one of the reasons for which Ritter was willing to bear excruciating pain and long-term damage to his health was the fact that his heroism served as a source of social distinction among his colleagues. "In a competitive intellectual environment, the extent of Ritter's self-experimentation distinguished him from his rivals. It gave him access to experiences they had not been able to observe. It became the basis of his personal and intellectual authority and a testament to his character and personal dedication. [...] [H]e used the self-experiments to distinguish himself from his peers, to mark himself as a superior source of knowledge."⁴⁴

But even in the heyday of self-experimental science in the late eighteenth and early nineteenth century, the endorsement of self-experimentation was far from univocal. Morally, the self-experimenter was accused of "failing to show proper reverence for his body as 'God's image'"⁴⁵ while there were serious epistemological concerns about the truth-value of the knowledge that he acquired

in Germany located outside of the university system.

⁴⁴ Stuart Walker Strickland, "The Ideology of Self-Knowledge and the Practice of Self-Experimentation," *Eighteenth-Century Studies* 31, no. 4 (1998): 459-460.

⁴⁵ *Ibid.*: 455.

by way of introspection.⁴⁶ Was it not too personal to be accepted as universally true? Self-experimentation has been gradually discredited in medicine and biology ever since. Strickland points out that the “efforts to deny any space for personal knowledge within the domain of scientific medicine” were closely associated with the “disputes that raged during the first decade of the nineteenth century over efforts to raise medicine to the status of a science.”⁴⁷ Psychiatry looks back at an even more difficult and protracted history of fighting for scientific recognition than other medical disciplines. Hence, the legitimacy of a practice of such questionable scientificity as psychiatric and psychopharmacological self-experimentation has been heavily contested. The problematic marking this approach becomes apparent in an aside of the conversation with the Swiss administrator Paul J. Dietschy and the professor of pharmaceutical sciences Rudolf Brenneisen in chapter 3.

RB: When my doctoral student Felix Hasler elucidated the metabolism of psilocybin in humans in the mid 90s we served as test subjects ourselves. I was one of them. At the time, I was an official consultant of the Swiss Federal Office of Public Health. That provoked a nice little conflict: A consultant of the SFOPH volunteers for a psychotropic experiment! The ethics committee required that neither medical students nor people from the street took part in this trial. It had to be people who knew what to expect and who had been screened extremely well by Vollenweider and his colleagues. If someone's grandmother had a psychiatric problem they were out.

PJD: I can add that when I heard about this I thought that it wasn't a good idea at all.

RB: That was the conflict we had.

⁴⁶ Of course, self-experimentation cannot be reduced to introspective approaches.

⁴⁷ Strickland, "The Ideology of Self-Knowledge," 462.

PJD: We sat down together and I realized that this was a requirement of the ethics committee. Then we agreed that it made sense to conduct this study at a relatively high security level instead of taking anyone, maybe even paid test subjects or medical students who might end up enjoying it. We wanted test subjects who were knowledgeable and who also knew the risk they were taking. So I waved this through. But you are right, we fought with each other quite passionately.

NL: Where did your original reservations come from?

PJD: Brenneisen was in charge of the study. I said: In my eyes, the study director has to be independent. But that's hardly possible if he takes the substance himself.

RB: That the study director takes part as a test subject would not be authorized anymore today. The Berne ethics committee didn't even allow me to recruit my own collaborators for therapeutic cannabis trials if they were in a relationship of dependence with me. As the director of the study you don't even have to think about participating anymore. By now that would be completely off-limits! And, in principle, that's a good thing. But back then we groped our way forward. We were breaking new ground and didn't have much experience. And, of course, we wanted to generate data as quickly as possible: publish or perish! Apart from that, the doctoral students also wanted to finish at some point. So we pushed ahead—within the framework of existing legislation.

Dietschy's main concern in this argument was that Brenneisen's participation in the study would spoil his impartiality as a scientist. The ardor with which a few vocal individuals from the previous generation of hallucinogen researchers had come to advocate drug use had raised grave concerns whether drug experiences of scientists working in this field did not corrupt the dispassionate perspective expected from their profession. But the question is not only whether drugs warp the researchers' scientificity, but also whether the their scientificity warps the researchers' drug experiences.⁴⁸ In the case of

⁴⁸ In the case of Hasler's doctoral research, what was investigated was the

hallucinogen research, the bias inherent to studies examining a select population of pharmacologists or psychiatrists might be particularly pronounced considering that the drugs' effects are said to be highly dependent on a subjects' expectations. The presuppositions are likely to be more uniform, but in any case more developed among a group of people professionally dealing with these substances. Furthermore, the self-experimenting scientist's expectations concerning the outcome of her self-experiment seem likely to affect its results, especially if the test subject's experience is the focus of attention. If the researcher's initial hypothesis inflects her findings they cannot count as impartial. John Lilly's constructivist maxim—"in the province of the mind, what one believes to be true is or becomes true"—can inspire a work on the self based on autosuggestion, but it undermines the scientific pursuit of objectivity.

Both Dietschy and Brenneisen also address ethical concerns. Human subjects are to be protected from a class of dangerous substances. On the one hand, this is presented as a reason in favor of self-experimentation. But Brenneisen also points out that by now it has become as difficult for scientists to get permission to experiment on themselves as to recruit laypersons externally. At first glance, this seems surprising: Who would be better equipped to evaluate the risk he or she is taking than researchers working on the drug in question? And who would profit more from the results? In Germany, it is for similar reasons that only physicians and medical staff are allowed to participate in hallucinogen

pharmacokinetics of psilocybin, i.e. its metabolization by liver and kidneys. A distortion of the results by a subjective bias was not to be expected. Hence, Dietschy's reservations were more a matter of principle and with an eye to possible future studies focusing on the psychological effects of the drug.

experiments. Even though the experiments are based on classical “allo-experimental” study designs (usually placebo-controlled double-blind trials), they count as medical self-experimentation.⁴⁹ Such “self-experiments” need to be approved of by ethics committees as well. After all, they are taking place in a web of professional power relations. The participants might be more knowledgeable and mature than nonprofessionals, but the fact that they are well-informed does not necessarily make their consent any more free.

However, beyond this regulatory framework protecting human subjects from scientists and scientists from each other there is also a very different ethical rationale involved, an ethos of self-experimentation widespread among hallucinogen researchers. Personal familiarity with the administered substances is not only feared to debase a scientist’s objectivity, but it is also regarded as a professional obligation towards one’s test subjects. Having persuaded his former dissertation advisor Brenneisen to take part in his doctoral research, Felix Hasler states:

In the debate [over self-experimentation], there are two classical positions. Some people say that one shouldn’t do self-experiments because this jeopardizes scientific objectivity. I don’t agree with that. If I do hallucinogen research, I should know the effects of these substances first-hand. Besides, there is an ethical responsibility. If I expect my test subjects to put up with certain states I should at least know from personal experience what they’re going through.⁵⁰

To be able to treat the participants of a hallucinogen trial more empathetically one needs to know how they feel and how they experience the world in these

⁴⁹ Gouzoulis-Mayfrank, Euphrosyne (personal communication).

⁵⁰ Felix Hasler, “LSD macht keinen zum Genie [interview by Thomas Gull and Roger Nickl],” *Unimagazin*, no. 2 (2007): 40 (my translation—NL).

moments. In the context of model psychosis research, Hasler's German colleague Euphrosyne Gouzoulis-Mayfrank also emphasizes the value of her own hallucinogen experiences for her clinical work as a psychiatrist:

If you have experienced yourself how important it is in such a state that the other makes his presence felt reliably without failing to respect a certain distance you're better equipped to deal with psychotic patients. You will treat them more gently. Such states are difficult to impart if you haven't experienced them first-hand. Otherwise you can hardly imagine how important it is that people don't make noise or that you don't approach the other abruptly. You can conduct yourself more adequately if you've experienced how sensitively one responds to even minute behavioral changes. That's the feedback we always get from test subjects working in psychiatry. By having learned from the drug experience to empathize better with their patients in their professional everyday life they've become more confident in dealing with them.

Like Gouzoulis-Mayfrank, Samotar reports that his own drug experiences help him to understand his psychiatric patients. But Samotar foregrounds a neurophenomenological understanding rather than the development of empathy. His self-experiments allow him to relate mental phenomena to their neurochemical substrates and to reach an understanding of his patients' brains mediated by an understanding of his own brain and the experiences it has produced. In this case, psychopharmacological self-experimentation has served as an element in the subject-formation of a biological psychiatrist.

On the one hand, you have a drug and you know to which receptors it binds and what it does. You can understand how it affects the brain up to the molecular level. On the other hand, you have the phenomenological level. There, you can observe in yourself how the drug changes your experience, your being. To recognize such correlations is one thing that you can learn from self-experiments (although, from a monist perspective, they aren't actually correlations but in

everyday life we're all dualists insofar as I am myself and you're yourself and I can only look at your brain from the outside while I can't see mine). If you work in this area as a psychiatrist or as a neuroscientist it can be useful to have experienced yourself how the modulation of certain neurotransmitter systems changes the way we experience the world. That seems to be enriching to me—also for my clinical work as a psychiatrist. When I see a patient behaving in this or that way I don't have to rely solely on what I know from textbooks. I think: Which states have I experienced myself which come close to this guy's behavior and what did I take then? Then I can try to imagine which transmitter system could be affected in this particular human being.

On the level of basic research, personal acquaintance with the drugs also continues to play a significant role in hallucinogen research. Despite its precarious status in the public realm it still has a legitimate place in laboratory life. In so-called pilot studies, researchers often test methods, instruments, and drugs on themselves before a study with externally recruited test subjects is launched. Thereby, they take soundings whether an envisaged experiment has sufficient potential. In such test runs, they familiarize themselves with equipment and procedures and gain a better understanding of how their future test subjects will experience the situation. The results of such self-experimental pilot studies are usually not published. Today, no respectable scientific journal would accept a study based on systematic self-experimentation. Instead one tries to reproduce and consolidate the findings from the pilot study with test subjects recruited outside of the laboratory. After completion of the study, personal experiences also help to interpret the data. What might appear to be a hallucinogen-induced attention deficit could also be a lack of interest, which a tripping test subject experiences when having to perform test after test on the computer screen while

confronted with the most elementary questions of life or a magical world of sublime beauty. Most hallucinogen researchers have experienced this firsthand and are careful not to rush to drug-naïve conclusions.

Even though self-experiments have lost the status they had in the times of Alexander von Humboldt and Johann Wilhelm Ritter they have not disappeared altogether. Many drug researchers, including Samotar, have entered the field of neuropsychopharmacology because of an interest fueled by personal drug experiences. Hence, it is not surprising that such experiences continue to be an important element of corridor talk among the scientists and often they are part of the preparation of a study. Despite their systematic exclusion from public scientific discourse self-experimentation still forms a critical element of the practice of drug research, private and academic. Against the background of Husserl's epochal crisis of science and the current problematization of subjective experience in the context of cognitive neuroscience, this "marginal practice" serves as a reminder of the persisting role of the subjective in brain research, biological psychiatry, and psychopharmacology. But it is also evidence of a culture of the self integrating more and more conceptions and practices from the neurosciences.

8. Psychedelic Photography

In drug research, experience reports, self-rating scales, and brain images serve to represent the effects of hallucinogens. Marco Benz, an M.D./Ph.D. involved in model psychosis research in Vollenweider's laboratory has chosen a different medium to articulate and reflect on his own drug experiences: Next to his neuroscientific research he works as a fine arts photographer. Benz's pictures are on display and for sale on his website www.mindscales.ch. "Mindscales" is the overarching concept tying three series of photographs together: Urban Contemplations, Nature Introspections, and Highway Memories. Apart from the latter series comprising abstract "light paintings" drawn with the headlights and rear lights of cars passing by on US interstate highways Benz's work mostly consists of landscape photography. The titles point to the aesthetic integration of a concrete "outer reality" captured on film and an abstract mental sphere of concepts, cognitive processes, and states of mind. He writes: "Today, I explore the potential of photographs to act as interfaces between outer physical and inner mental realities of contemplativeness. | My photographic vision and intention has increasingly become influenced by my interest in the philosophy and science of consciousness—specifically the relationship between mind and matter—and my activity as an MD in brain research on altered states of consciousness."⁵¹

⁵¹ Marco Benz, *Mindscales. Introduction* ([cited 28 March 2007]); available from <http://www.mindscales.ch/intro.htm>.

Neuro-Aesthetics

At first glance, Marco's translation of impulses from hallucinogen research into the visual arts seems consistent with the fact that perceptual distortions are seen as such a prominent aspect of hallucinogen action that these drugs are referred to as "hallucinogens" in the first place. In 1924, the German psychologist Heinrich Klüver explored the aesthetics of mescaline-induced visions in a series of systematic psychophysiological self-experiments in his laboratory at the University of Minnesota. Klüver decided to ignore the meaning of his hallucinations in favor of a purely formal analysis of their geometric-ornamental structure. He organized the images he saw into four groups called "form constants": (I) tunnels and funnels, (II) spirals, (III) lattices, including honeycombs and triangles, and (IV) cobwebs. He noted that this limited number of recurrent basic forms could also be observed in other visual disorders such as hypnagogic hallucinations, the visual phenomena of insulin hypoglycemia, fever deliriums, or migraine attacks. Klüver attributed these to neural structures in the eyes and the brain, which were affected by hallucinogen intoxications as well as other neurological conditions.⁵² More recently, this hypothesis has been taken up by a group of researchers around the American mathematician and computational neurobiologist Paul Bressloff. These researchers developed a theory of the form constants' origin in the visual cortex based on the assumption that their geometry

⁵² Heinrich Klüver, *Mescal: The 'Divine' Plant and Its Psychological Effects* (London: Kegan Paul, Trench, Trubner, and Company, 1928). See also Heinrich Klüver, *Mescal and the Mechanisms of Hallucination* (Chicago: University of Chicago Press, 1966).

is determined by the form of the retino-cortical map and the neuroanatomical architecture of the visual cortex.⁵³

When hallucinogens came to inspire a growing number of artists from the 1950s onwards some of them decided to nominally associate their aesthetics with these drugs. Psychedelic art was born. In their 1968 book *Psychedelic Art*, the hallucinogen researchers Robert Masters and Jean Houston pointed out that Klüver's form constants could be found regularly in this genre.⁵⁴ Their observation raises a number of interesting questions concerning the emergence of psychedelic art as an event at the intersection of neuropsychopharmacology and aesthetic production. In recent years, the neuronal conditioning of historically situated works of art has been explored extensively by the German art historian Karl Clausberg and his American colleague Barbara Stafford. Rejuvenated through the latest neuroscience hype the old nature vs. culture debate is brought to bear on the history of art. Clausberg asks: "Does a history of art pursued in broad outline provide evidence that the cerebral habitus of acculturated mankind can be essentially treated within the limitations of anthropological constants or are its cultural transformations so strong that this model needs to be given a complete overhaul?"⁵⁵ Looking at pieces of art as "interesting records of human

⁵³ Bressloff et al., "Geometric visual hallucinations."

⁵⁴ "Man braucht nicht erst mühsam zu suchen, um festzustellen, daß gerade diese Formkonstanten in der psychedelischen Kunst immer wieder auftauchen." Robert Masters and Jean Houston, *Psychedelische Kunst* (München: Droemer Knaur, 1969), 96.

⁵⁵ Karl Clausberg, *Neuronale Kunstgeschichte. Selbstdarstellung als Gestaltungsprinzip* (Wien: Springer, 1999), 9-10 (my translation—NL). For another contemporary discussion of the neurobiological basis of "aesthetic universals," see Wolf Singer, "Neurobiologische Anmerkungen zum Wesen und zur Notwendigkeit der Kunst," in *Der Beobachter im Gehirn. Essays zur Hirnforschung* (Frankfurt/M.: Suhrkamp, 2002).

cerebrality in the course of time”⁵⁶ Clausberg tries to show how certain features of the human nervous system have entered into artistic production: “Very many pictures which seemingly show nothing but the outer world or entranced imaginary worlds unconsciously represent essential structures of cerebral organization of their creator; they are [...] *self-portraits without mirror*.”⁵⁷

Of course, reflections of neuroanatomical organization are not all these images consist of. Michael Betancourt points out that Klüver’s form constants and other visual forms of hallucination and synesthesia were already taken up by nineteenth-century Romanticism, which charged these aesthetic elements with its rejection of scientific rationalism in favor of a primacy of the imagination.⁵⁸ And psychedelic art not only draws its forms from Romanticism’s embrace of an aesthetics derived from man’s cerebral nature, but also from a broad range of other art historical styles such as art nouveau, surrealism, pop art, Islamic ornaments, or Buddhist mandalas.⁵⁹

A Contemporary Form of Visionary Art

The references to different kinds of religious art are not merely formal. Masters and Houston characterize the genre as follows: “This art is religious, mystical: pantheistic religion, God revealed in the universe, but especially in the primeval energy moving the world and enabling the eternal flow of all being. Mysticism of

⁵⁶ Clausberg, *Neuronale Kunstgeschichte*, 20 (my translation—NL).

⁵⁷ *Ibid.*, 9 (my translation—NL).

⁵⁸ Michael Betancourt, “A Taxonomy of Abstract Form Using Studies of Synesthesia and Hallucination,” *Leonardo* 40, no. 1 (2007).

⁵⁹ Cf. Christoph Grunenberg, ed., *Summer of Love. Psychedelische Kunst der 60er Jahre* (Ostfildern-Ruit: Hatje Cantz Verlag, 2005).

nature and of the body: the one as an all-embracing now. And occasionally deeper insights.”⁶⁰ Although it seems very questionable whether all self-reported psychedelic artists would subscribe to this description the discourse of spirituality has played a crucial role in psychedelic art since its inception. The painter Alex Grey, one of the central figures in the field today, found his vocation during a LSD experience in 1976, which he describes as mystical.⁶¹ Against the grain of modern differentiation into separate value-spheres, social systems, and the corresponding modes of experience the origin of Grey’s artistic project is not purely aesthetic, but first and foremost spiritual. However, in the vein of the unchurched forms of American religious life burgeoning since the 1960s, Grey qualifies the description of psychedelic art as religious in a formal sense. While rejecting the subordination or (re-)alignment of art with particular denominations and religious institutions he associates the “mission” of contemporary art with mysticism, including the “experimental mysticism” induced by hallucinogenic drugs: “In contrast to the religious artist who repeats a previously established and prescribed iconic tradition, the contemporary artist must find a way to plunge into the transpersonal state in order to experience and then convincingly convey transcendental reality.”⁶² Here, the question is not primarily how visual experiences conditioned by the central nervous system—the hallucination of Klüver’s form constants, for example—find expression in works of art. If the

⁶⁰ Masters and Houston, *Psychedelische Kunst*, 81 (my retranslation—NL). “Diese Kunst ist religiös, mystisch: pantheistische Religion, Gott offenbar im All, besonders aber in der Ur-Energie, durch die sich die Welt bewegt, die den ewigen Fluß allen Seins ermöglicht. Mystik der Natur und des Körpers: das Eine als ein allsinnliches Jetzt. Und gelegentlich tiefere Erkenntnis.“

⁶¹ Alex Grey, *The Mission of Art* (Boston: Shambhala, 2001), 21.

⁶² *Ibid.*, 116.

referent is transcendental reality the challenge is how to visualize what can neither be put into words nor images, how to develop a timely aesthetics reaching beyond the limits of aisthesis.

Marco Benz's work can be read as a response to this problem.⁶³ Even though he developed his visual vocabulary through drawing and painting he began to focus on photography from the mid 1990s onwards. Against the background of his interest in altered states of consciousness it is remarkable that he chose a medium, which seems more suitable for the representation of outer than inner realities. In one of our conversations on the patio of the Burghölzli cafeteria Marco explained to me on which level his work reflected his own drug experiences. Under the influence of hallucinogens he also saw colorful geometric patterns and moving fractals and experienced visual defragmentation. It makes sense to him that these phenomena mirror particular aspects of the organization of the visual cortex. But he emphasizes that there is more to the hallucinogen experience than visions and perceptual distortions. Beyond this sensory hyperarousal there is a deeper experiential level, Marco says, which is associated with deep calm, relaxation, and clarity of consciousness. The deepest experience of this sort he had as a test subject in one of his colleagues' experiments when he was lying stock-still in a PET scanner for two and a half hours while voyaging to the "antipodes of the mind." It is this level, which he addresses in his pictures. He shows me a series of prints entitled "slot canyon."

⁶³ For a broader range of responses to this problem in contemporary art, see Lisa Mark, ed., *Ecstasy. In and About Altered States* (Los Angeles: The Museum of Contemporary Art, 2005).

They display curved and grooved surfaces in different tones of red: dynamic, but soothing. The photos were taken in Antelope Canyon, a popular sightseeing spot in Arizona photographed over and over again by millions of tourists and amateur photographers. But Benz's pictures are so abstract that the viewer cannot tell what they depict. He emphasizes that he refrains from digital manipulation. He does not want to alter reality or deny the specific concrete nature of his motifs. Instead he makes use of the documentary quality of the medium of photography to reveal material reality as amorphous matter devoid of meaning. It is our conceptual categorizations and observations, which tell apart and assign significance to things in the world—making the canyon a canyon, for instance. Hallucinogen experiences, Marco explains, are consciousness-expanding in that they allow us to gain a new perspective on the world. This is what he is also trying to accomplish in his photographic work: By enabling us *not* to recognize the canyon as a canyon he allows us to take a fresh look. Benz is trying to turn the viewer's gaze from the way things appear in everyday life to their unchanging mystical and metaphysical nature: "For the purpose of transcending the particularity of the moment of light capture my photographs attempt to provide the observer with an intuition of timelessness. Contemplative experience may lead to higher order abstract mental concepts which are less bound to specific transient, finite, and concrete embodiment. Such mental concepts may rather be about the essence of reality than reality itself."⁶⁴

⁶⁴ Benz, *Mindscales. Introduction* ([cited]).

Benz's use of photography to reveal the "essence of reality" seems peculiar. As Lorraine Daston and Peter Galison point out: "The photograph that was the essence and emblem of mechanical objectivity carried no metaphysical cachet: at best it was an accurate rendering of sensory appearances, which are notoriously bad guides to the 'really real.'"⁶⁵ The ideal of mechanical objectivity—the replacement of the meddling observer by a self-recording instrument—is what Benz alludes to when stressing that he abstains from digital manipulations. But even photography does not provide immediate access to reality. The photographic gaze is radically perspectival. To produce images depicting the metaphysical truths Benz experienced under the influence of hallucinogens he carefully chooses a suitable angle of vision. For example, it is remarkable that his pictures are almost devoid of human beings. The hordes of tourists frequenting Antelope Canyon or the social phenomenon of amateur photography are willfully excluded from Benz's contemplation of the place's "essence of reality."⁶⁶

But ultimately what these photos represent is not the canyon, but a mental state. In the tradition of Romantic painting, landscape depiction serves to depict and evoke a certain state of mind. Formal elements of landscape composition are meant to mirror the "inner movements of the human heart" (Friedrich Schiller).⁶⁷ Even though the genre of *Seelenlandschaften*—landscapes of the soul—has become well established in the history of art, this practice of

⁶⁵ Lorraine Daston and Peter Galison, "The Image of Objectivity," *Representations* 40 (1992): 123.

⁶⁶ Had Martin Parr photographed the place the results would certainly look very different.

⁶⁷ Quoted in: Jason Gaiger, "Schiller's Theory of Landscape Depiction," *Journal of the History of Ideas* 61, no. 1 (2000): 124.

representation does not appear to be self-evident. What is the *tertium comparationis* of a landscape and a particular mental state? Does looking at one of Benz's pictures give the viewer an idea of "what it is like" to be on hallucinogens? Or is his photographic work "state specific" as Alex Grey's psychedelic paintings—that is to say: "if you haven't been there you won't recognize the territory"?⁶⁸

Despite the underlying metaphysical realism, Benz's landscape photography—at least in its pictorial vocabulary—is rooted in a modernist tradition simultaneously emphasizing and problematizing the subjectivity inherent in representation. In an essay on "Landscapes, Pictures, and the Epistemology of Image-Making," Stewart Ziff states:

The modernist trend was towards an increasing acknowledgment of the subjective basis of knowledge. Early Modernism was consciously marked by the disappearance of the ideal reference against which the artwork was measured. Nature was no longer an opaque model to be faithfully realized in any absolute sense. Previously, perception was understood as simply an a priori principle. But as Cézanne studied nature in his landscape painting, he found he was not interested in the appearance of things but rather in his *experience* of them. What he painted was "perception, rather than the perceived." This phenomenological experience of nature, which characterized the work of the Impressionists, formed the basis of the introspective framework on which Modernism was built.⁶⁹

Benz rearticulates this introspective tradition in modernist art with the naturalization of introspection in neurobiological consciousness research. He

⁶⁸ Alex Grey, *Alex Grey on Cyberart as a Visionary Tool. Interview with Karen St. Pierre* (1995 [cited 11 April 2007]); available from <http://alexgrey.net/interviews/cyberart.html>.

⁶⁹ Stewart Ziff, "Beyond the Context. Landscapes, Pictures, and the Epistemology of Image-Making," *Leonardo* 28, no. 5 (1995): 437-438.

emphasizes the importance of “the subjective in the loop of the physical which is perceived and the physical which perceives.” He explains:

I’m a monist. When we look at nature we look at ourselves. This is a kind of introspection on different levels. Through the emergence of consciousness nature has come to observe itself. Nature observes itself on a level beyond the individual. But on the level of the individual the observation of nature is also a kind of introspection. For example, looking at a horizon evokes certain feelings, which cannot be expressed by words. These are memories taking us back to a point in natural history preceding language. There is something archetypal about a horizon, which moves us. When I talk about introspection, about nature observing itself, this is based on the assumption that we are part of nature, that we are made from the same stuff, that—romantically speaking—we are star dust. On the level of the individual the observation of nature allows us to experience deeply emotional, deeply touching inner spaces. I would like to foster this by producing images where the eye is not constrained by conceptual thought. I’m trying to show that outer spaces can also be inner spaces.

Benz’s overarching interest is “the connection between consciousness and biology, between the subjective and the objective.” “Within the possibilities of subjectivity,” he adds, “I’m particularly interested in the spiritual dimension.” Here, the neurobiologization of consciousness meets the Romantic association of spirituality and nature. The Romantic impulse Benz is trying to convey through his photographs is meant to counteract what he conceives of as the destructive potential of reductionist neuroscience. Man must feel embedded in a cosmic whole. In Benz’s eyes, commitments to bigger causes such as the preservation of the environment in the face of ecological catastrophe are undermined by the individualizing image of man advocated by some of his colleagues in brain research. Against their naturalization of the mind Benz brings up a variety of

Naturmystik (nature mysticism). His work can be described as a modernist version of visionary art. It has given up the medieval quest for transcending matter and departing from the body altogether. It neither aspires to glimpse a universe beyond reality nor to withdraw from the world into a subjectivist realm of fantasy. Instead it aims at an epiphanic vision found immanently in the things of the world, in the here and now captured by photography. He makes use of this medium to express and cultivate a this-worldly mysticism. This-worldly, not disenchanted.

Two Types of Images, Two Types of Self-fashioning

Benz faces the problem of representation of drug-induced mind-brain states in both his photographic and his neurophysiological work. This raises the question of the epistemological status and relationship of the two types of images he produces. At first glance, the answer seems plain and simple: His PET scans generate scientific images of the drugged brain while the photos reflect the corresponding drug experiences in an artistic manner. The former provide an objective third person account, the latter a first person perspective immersed in subjectivity. In their article, Daston and Galison indicate and analyze the aura of objectivity surrounding scientific images often seen as uncontaminated by judgment and interpretation: "Images had always been considered more direct than words, and mechanical images that could be touted as nature's self-portrait were more immediate still. Thus images were not just the products of mechanical

objectivity; they were also its prime exemplars.”⁷⁰ But on closer inspection, the situation turns out to be more complicated. My discussion of the neuroimaging work in Vollenweider’s lab has already shown how their PET scans implicate introspective accounts of test subjects. Additionally, positron emission tomographs are the product of much laborious and skillful data crunching—mechanical, but certainly not noninterventionist in Daston and Galison’s jargon. Photography, on the other hand, the medium Benz has chosen for his artistic endeavor, even served as “the emblem for all aspects of noninterventionist objectivity.”⁷¹ My point is that in Benz’s case both practices of representation refer to the same hybrid subject/object: chemically induced altered states of consciousness. Both serve to objectify these experiences by making things, namely two types of images, that stand for these curious mental phenomena. As objects in the world they are “accessible” to subjects other than the one originally experiencing the altered state. In both cases, pictures—of the brain in the first case and of landscapes in the second case—are made to serve as material correlates of consciousness.

And yet Benz’s functional neuroimages and artistic photographs each work differently. In *Picturing Personhood*, Joseph Dumit argues that PET scans play an important role in what he calls objective self-fashioning. “Objective self-fashioning is how we take facts about ourselves—(about our bodies, minds, capacities, traits, states, limitations, propensities, and so on)—that we have read,

⁷⁰ Daston and Galison, “The Image of Objectivity,” 120.

⁷¹ Ibid.

heard, or otherwise encountered in the world and incorporate them in our lives.”⁷² Dumit shows how supposedly value-neutral scientific facts—for example, PET scans of mentally ill patients—have profound consequences for the ethical state of these subjects. Seeing one’s diseased brain breaks the patient’s identification with his or her experienced illness. Instead of bearing the stigma of a psychiatric disorder “the patient who looks at his or her brain scan is an innocent sufferer rationally seeking help.”⁷³ A psychiatrist serving as Dumit’s informant reports that he deliberately shows PET images to his patients to relieve them from feelings of shame. However, normally these pictures are not produced for the sake of their transformative impact on the viewer, but for scientific or diagnostic purposes. What Dumit has described so astutely is the fact that—intended or not—we do identify with such medico-scientific images of our “objective body” incorporating them into our lived experience. Nevertheless, compared to works of art the reception of these “expert images” is usually rather passive. Laypeople encounter brain scans while thumbing through magazines and patients might be presented with them by their doctors, but there is no widely established culture of looking at brain images as part of an *éducation sentimentale* aiming at active self-formation. Primarily, scientific images of the brain are about knowing ourselves or others, not about a care of the self. By contrast, Benz’s fine art photographs are meant to serve as objects of visual contemplation—equipment for a “subjective self-fashioning.” With the help of these pictures he wants to convey his own mystical drug experiences to transform their viewers.

⁷² Dumit, *Picturing Personhood: Brain Scans and Biomedical Identity*, 164.

⁷³ *Ibid.*, 166.

This already indicates the second major difference between the two types of images: Objective self-fashioning by way of looking at PET scans presupposes that the subject is already familiar with the experience correlated with the depicted brain state. A subject, which has already experienced a mystical revelation might come to conceive of it differently after having been shown the corresponding alterations of brain activity. Such a presentation is likely to change the way he or she thinks about this incident and it could even affect future experiences of this sort. Furthermore, the subsequent reinterpretation of one's past can itself be experienced as a life-changing moment. But the PET scan does not aim at provoking a powerful experience in the first place. The principal purpose of Benz's art photographs, on the other hand, is to evoke transformative aesthetic and spiritual experiences.

The fact that Benz feels a need to supplement the forms of image-making practiced in Vollenweider's lab by an artistic reflection of his drug experiences points to the problematic relationship of contemporary brain research to what Husserl called the lifeworld. The cognitive neurosciences do not negate or denounce subjective experience, but they can only process introspection in numerical terms compatible with neurophysiological recordings. Benz says that he has never been disappointed by this fact as he does not expect science to convey experience. "Of course, these states look very different on paper than what they feel like. I have always known that I would only get numbers and not the experiences themselves." This division of scientific and artistic work does not provide a principled solution to the discrepancy between experience and

scientific measurement of hallucinogen-induced states of consciousness. But it is a workable, if not perfectly satisfying compromise in response to science and its discontents.⁷⁴

⁷⁴ Cf. Rabinow, *Anthropos Today*, 91-106.

9. Neurophilosophy in Practice

The small conference “The Challenge to Freedom in the Twentieth Century. Psychoanalysis—Structuralism—Neuroscience” takes place in the parsonage of Zurich’s Grossmünster. The church was one of the strongholds of the Swiss Reformation movement in the sixteenth century, which challenged the freedom of the will 400 years before a neural predestination of our actions was inferred from Benjamin Libet’s experiments. Two philosophers, a psychoanalyst, and Franz Vollenweider as representative of the neurosciences have been invited to discuss what is currently conceived of as a pressing problem: Is our conscious experience of deciding about our actions voluntarily genuine or are our choices actually determined by social and symbolic structures, the unconscious, or the brain? Vollenweider’s closing speech is disillusioning—not so much with respect to “our” image of man, but regarding the alleged “challenge to freedom” posed by the neurosciences. “When preparing this talk I was almost disappointed,” he begins, “how little I found—even though I went over 48 books on brain research to see what is known about free will. The chapters in there were hardly longer than a page. What you find is still mostly in the realm of philosophy.” Eventually, Vollenweider contents himself with giving a detailed explanation of the now historical Libet experiments from the early 1980s in the context of consciousness research more broadly. No mention of hallucinogens. Here, Vollenweider does not speak as a drug researcher, but as a neuroscientist interested in the problem of consciousness.

“Operationalizing” Philosophical Questions

Hallucinogens, however, serve as Vollenweider’s primary, if modest tool to approach issues in the remit of philosophy. As pharmacological agents altering consciousness they raise profound questions with respect to the neural conditions of the subject’s access to truth. In one of our conversations, Vollenweider remarks:

Another reason why I’m interested in hallucinogens I haven’t mentioned yet. I have always been interested in epistemology. What is reality? What is truth? What can I know? If you do research in the natural sciences you learn very little about the axioms from which you depart. In this respect, hallucinogens are very interesting because they change your perspective. Roland Fischer postulates that we construct truths in a state-dependent manner [i.e., contingent on the observer’s state of consciousness]. This touches on Kant’s question whether the categories organizing our perceptions are preformed. To what extent do our observations of nature depend on our cognitive faculties [*Erkenntnisapparat*], i.e., the brain? Hallucinogens shake this enormously by altering our sensory perceptions.

Vollenweider’s interest in such issues is not only intellectual, but also practical. As a brain researcher he is looking for ways of “operationalizing” philosophical questions by rearticulating them as experiments qua “questions to nature.” Such neuroscientific incursions into philosophical terrain date back to the nineteenth century, but the most recent technological advances in studying the mind at work have given them new momentum since the Decade of the Brain. They take place against the background of a generally tense and competitive relationship between the disciplines of neuroscience and philosophy. The new self-confidence and the corresponding claims to power have led some of

Vollenweider's colleagues in the field of brain research to proclaim that after 2000 years of futile philosophical speculation the neurosciences will finally take up the problem of consciousness more successfully.⁷⁵ Here, it becomes obvious that Husserl's crisis of science is first and foremost a crisis of philosophy. The eminent British neurologist Semir Zeki looks at its latest chapter uncharitably:

The study of [the brain's capacity to acquire knowledge, to abstract and to construct ideals] is a philosophical burden which neurobiology has to shoulder if it is to understand better the workings of the brain [...]. [T]he problems that neurobiology will face in the future are those lasting truths and ultimate values which philosophy, the discipline that Bertrand Russell (1914) tells us "has made greater claims and achieved fewer results than any other branch of learning," has so unsuccessfully tackled in the past. In this endeavour, neurobiology, like philosophy before it but probably with greater success, will also be naturally led to probe more deeply into areas that may seem remote from its terrain, fields such as art, aesthetics and morality.⁷⁶

The spreading eagerness of senior neuroscientists to "shoulder this philosophical burden" seems to be based on the hope that some of its splendor is going to rub off—since splendor still remains with the questions of philosophy, if not with the discipline anymore. Unlike the narrow research questions of science, philosophy is still reputed to address the "big questions" of human life: the Good, the True, and the Beautiful. Accordingly, the rare neuroscientific studies with philosophical implications gain the lion's share of media attention—even in high-impact scientific journals. Vollenweider, however, abstains from grandiose gestures.

⁷⁵ See, for example, Francis Crick, *The Astonishing Hypothesis. The Scientific Search for the Soul* (New York: Touchstone, 1995). Gerald Edelman, *Bright Air, Brilliant Fire. On the Matter of the Mind* (New York: Basic Books, 1992).

⁷⁶ Semir Zeki, "Splendours and miseries of the brain," *Philosophical Transactions of the Royal Society* 354 (1999): 2054.

Despite his own efforts in the field he is rather modest and self-critical with respect to his discipline's ability to answer philosophical questions.⁷⁷

NL: In the mission statement of the Heffter Research Institute you say that "research with psychedelic substances offers an unparalleled opportunity for understanding the relationship of brain to mind in ways not possible using other methods."⁷⁸ But when looking at concrete experiments it seems as if there was a gap between the big philosophical questions such as the mind-body problem and the experiments that are actually put into practice.

FXV: That's right. The reason is that it's extremely difficult to grasp inner subjective truth or subjective reality. You can map it with the help of rating scales and neuropsychological experiments, but the required interventions make these states collapse. That's disappointing. Capturing the patterns of neural activity by way of neuroimaging was interesting. However, what I'm really after is how altered states emerge. But we always need to take into consideration what tools we have at our disposal. You can't follow this with fMRI or PET. That's too slow. To study the mind-body interface we're now using EEG, which allows us to record phenomena in real time. Rael will examine a number of subjects for this purpose: They ingest psilocybin and something begins to build up. It would be really fascinating to see what's going on when someone is acutely hallucinating, when I sit there and see a bear standing in front of me. But these are pearls. You don't hallucinate continuously. Of course, this raises all these questions again: Are these projections? Is this only happening in the brain? But it's not that simple. Experience is not only in the brain. I need the brain for it, but it's only a function of the brain.

NL: Where does experience take place if not in the brain?

FXV: Outside, in the world. I don't have pain in my brain, but in my finger. Hallucinogens make the finger longer.

NL: What do you mean by "making the finger longer"?

⁷⁷ For a science studies perspective on the construction of "doable problems," see Joan Fujimura, "Constructing 'Do-Able' Problems in Cancer Research: Articulating Alignment," *Social Studies of Science* 17, no. 2 (1987).

⁷⁸ Heffter Research Institute, *Research at the Frontiers of the Mind*, 1.

- FXV:** Experience is an open projection. Do you know the brain paradox? That's like the barber of Seville. He only shaves people who don't shave themselves. But if he shaves himself, whom does he shave? The brain only produces contents of consciousness that don't produce themselves and if they develop themselves who is developing them? I don't experience you up there in my brain, but outside, where I see you. And a hallucinosis is also taking place out there.
- NL:** But doesn't the term projection imply that it is a brain state after all—even though you don't realize it at the time because your brain presents it as part of the external world?
- FXV:** Subjectively, I feel that the contents of my consciousness are organized in space and time, but the natural sciences lack such a spatio-temporal construct. Space and time don't exist in the world. I only act as if they existed. Pragmatically, that's very useful though as it allows me to fly to the moon.
- NL:** Is there a connection between this kind of reflection and your work on time perception under the influence of psilocybin?
- FXV:** [Laughs.] That would be nice. We're making a lot of effort, but we progress very slowly. In that study with Mark Wittmann, we investigated objective measures of time perception under psilocybin.⁷⁹ In one task, test subjects had to reproduce different durations of a sound by pressing a button. Wittmann showed that hallucinogen-induced ego dissolution corresponds with a dilation of temporal experience. We know very little about the neurochemistry of time and hallucinogen studies suggest themselves to learn more. During a hallucinogen intoxication I can experience time as passing very slowly, almost standing still, or as accelerated. Either there is a rush of associations or this great calm allowing you to let go. Then you feel that you've reached eternity. Is it eternity or does your inner meter work differently? That's the kind of questions I'm interested in. It's tempting to say that it's not the meter. Some people claim that in such moments you've been spread out in the universe, in the *atman*. Where does madness begin?
- NL:** An experience of eternity paradoxically implies that it is possible to observe timelessness in time. The problem with any kind of mystical experience of

⁷⁹ Marc Wittmann et al., "Effects of psilocybin on time perception and temporal control of behaviour in humans," *Journal of Psychopharmacology* 21, no. 1 (2007).

oneness is that if all is one it can't be observed. At least not on the basis of bivalent logics distinguishing the object of observation from something else.⁸⁰

FXV: Yes, there are many questions like this, but you need to ask yourself: Does this have to be studied? Should the state pay for it?

NL: Could your work on the temporal organization of experience be described as an attempt to examine Kantian categories neurophysiologically?

FXV: Yes, absolutely.

NL: Then it's an operationalization of philosophical thoughts?

FXV: I would like to say so, but maybe we haven't got the necessary tools yet. With colleagues I've often racked my brains over this. Where it might work best is in the area of self-experience. But how can I operationalize the ego as self-experience? That's extremely difficult.

NL: What approaches do you have in mind?

FXV: We've been thinking a lot about how to tackle the problem of consciousness. It's easy to do biophysics, it's easy to do neuropharmacology, but to integrate consciousness is the most difficult thing to do. We tried to do it in the binocular rivalry study, for which Olivia Carter came here from Australia.⁸¹ Her group claimed that binocular rivalry allows studying the interface between the brain and consciousness. We wanted to see whether we could measure this phenomenon. It turned out that we could. But can we also identify the neural correlates? It would be very interesting to see which centers are affected and how the transitions between seeing the horizontal and the vertical stripes work. Our question was: Can we learn more about this process with the help of hallucinogens? Clinically, this is completely irrelevant, of course. But there is also

⁸⁰ Cf. Niklas Luhmann and Peter Fuchs, *Reden und Schweigen* (Frankfurt/M.: Suhrkamp, 1989), 70-100.

⁸¹ Olivia Carter et al., "Modulating the Rate and Rhythmicity of Perceptual Rivalry Alternations with the Mixed 5-HT_{2A} and 5-HT_{1A} Agonist Psilocybin," *Neuropsychopharmacology* 30 (2005). Binocular rivalry occurs when different images are presented simultaneously to the left and the right eye. Under these conditions, the observer's conscious perception will oscillate between the two "rivaling" images even though the visual stimulus does not change. Carter's study was originally motivated by the incidental observation that the rhythmicity of these perceptual alternations was greatly increased in a test subject that had ingested LSD ten hours before the experiment.

the question of the philosophical significance of this work. For these experiments, we would need critical philosophers who think about what we're doing.

NL: On some level, this is what neurophilosophers and certain empirically minded people in the philosophy of mind are already doing.

FXV: Yes, I've had a number of conversations with Thomas Metzinger. He came to visit and he has just sent me his new book.⁸² He said that it contains some suggestions for new experiments and asked us whether we could operationalize them. He is very interested in these issues, e.g., in the question to what extent we construct and simulate the world. Is the trip only a hallucination?

But you hit a tender spot with your questions. I often wonder whether we aren't doing classical psychophysiology of a peculiar state of mind and to what extent this allows us to address philosophical questions. I realized pretty quickly: For each question you raise you need the right tools, the right methods, and the right people. But everything takes so long. You always think much faster, but then you still need to do all these experiments.

Neurophilosophy and the Renaissance of Consciousness Research

In recent years, Thomas Metzinger, the philosopher with whom Vollenweider occasionally discusses experimental designs, imported an empirically minded philosophy of mind from the United States to Germany. In the early 1980s, the American philosophers Patricia and Paul Churchland founded the field of neurophilosophy. Even though this new philosophical subdiscipline grew out of the Anglo-American tradition of an analytically oriented philosophy of mind the Churchlands broke with the latter's fixation on language. "In the mid-seventies," Patricia Churchland's 1986 manifesto begins, "I discovered that my patience with most mainstream philosophy had run out. What had instead begun to seem promising was the new wave of philosophical method, which ceased to pander to

⁸² Thomas Metzinger, *Being No One. The Self-Model Theory of Subjectivity* (Cambridge (Mass.): MIT Press, 2003).

'ordinary language' and which began in earnest to reverse the antiscientific bias typical of 'linguistic analysis.'"⁸³ Convinced that conceptual clarifications would not suffice to understand the human mind Churchland decided to ignore disciplinary boundaries and began to look for answers to her philosophical questions in the budding neurosciences. For the sake of a radical renewal of philosophy in the spirit of an uncompromisingly materialist perspective on the mind, she proposed to break with the ill-founded vocabulary of "ordinary language," which some of her colleagues regarded as the basis of philosophical reflection, replacing the underlying "folk psychology" with a scientifically enlightened worldview and self-conception. In the course of this cultural revolution, all talk about consciousness and subjective experience would be done away with as the neurosciences would eventually describe how the brain comes to have knowledge about the body and its relationship to the world without such "prescientific" concepts. But the Churchlands' rhetoric of a scientific progress making a beeline for their "eliminative materialism" is misleading. As I have already shown, consciousness and other mental phenomena have come to attract a significant amount of scientific attention again. In the heterogeneous field of contemporary neuroscience, they currently serve as objects of problematization, not elimination. From the Churchlands Thomas Metzinger learned to closely engage with brain research and the people who practice it, but within the field of neuroscience he aligned himself with positions taking the "first person perspective" seriously. His own philosophical project began to take shape

⁸³ Patricia Churchland, *Neurophilosophy. Toward a Unified Science of the Mind-Brain* (Cambridge (Mass.): The MIT Press, 1986), ix. Of course, the philosophical reflection of brain research goes back to the nineteenth century.

right at the time when the present renaissance of a “disciplined science of consciousness” got under way.

Michel Ferrari, Adrien Pinard, Andreas Roepstorff, Bernard Baars, and others have described the formation of a “New Science of Consciousness” since the 1990s.⁸⁴ The fact that all of these authors diagnose a resurrection of scientific and philosophical interest in consciousness already indicates that the claim of many brain researchers that consciousness—as “the guarantor of all we hold to be human and precious”—“has attracted speculation and study across the ages” is false.⁸⁵ The ancient Greeks and Romans had no terms exactly equivalent to the modern notion of consciousness and only in the mid nineteenth century more systematic attempts to study consciousness were made. At a time when the term had been appropriated by the tradition of German Idealism, Wilhelm Wundt began to approach the conscious mind with the scientific methods used to study the “mental physiology” of sensory perception. Thereby, consciousness was constituted as the epistemic object of the emerging academic discipline of psychology. It manifested in an experimental system combining instrumental measurements and introspection. On the other side of the Atlantic, Wundt’s contemporary William James also contributed to the formation of psychology as a science of consciousness, although he was more interested in “exceptional

⁸⁴ Baars, “How Brain Reveals Mind.” Michel Ferrari and Adrien Pinard, “Death and Resurrection of a Disciplined Science of Consciousness,” *Journal of Consciousness Studies* 13, no. 12 (2006). Anthony Jack and Andreas Roepstorff, “Why Trust the Subject?,” *Journal of Consciousness Studies* 10, no. 9–10 (2003). Andreas Roepstorff, “Outlining the Sandpit of Consciousness Studies: A Question of Foundations or of Style?,” *Bulletin fra Forum for Antropologisk Psykologi* 13 (2003).

⁸⁵ Gerald Edelman, *Wider Than the Sky. The Phenomenal Gift of Consciousness* (New Haven: Yale University Press, 2004), xi.

mental states” and the significance of such extraordinary experiences in people’s lives than in lab work.⁸⁶ Today, the trajectories initiated by these two self-proclaimed “empirical philosophers,” Wundt’s experimental approach and James’ exploration of altered states, intersect in Vollenweider’s project. But the one hundred years between the hegemony of behaviorism in psychology and the linguistic turn in philosophy imposed a “taboo against consciousness.”⁸⁷ As the method of introspection and its correlation with instrumental measures was regarded with growing suspicion, psychology was reinvented as a science of behavior while both Anglo-American analytic philosophy and French (post-) structuralism reoriented themselves towards linguistics as the paradigmatic *Leitwissenschaft* of the mid twentieth century.⁸⁸ Consciousness appeared to be a relic of the nineteenth century until advances in brain scanning techniques, single-cell recordings of neural activity, as well as new models and changes in intellectual interests within psychology, philosophy, and neurobiology led to the formation of consciousness studies as a novel research field at the interface between these disciplines.

Consciousness Studies is typically conceived as a distinct new interdisciplinary synthesis of neuroscience, psychology, philosophy, and sometimes cultural

⁸⁶ Ferrari and Pinard, "Death and Resurrection."

⁸⁷ Cf. Bernard Baars, "How Brain Reveals Mind. Neural Studies Support the Fundamental Role of Conscious Experience," *Ibid.* 10, no. 9-10 (2003). Sybille Krämer, "Einleitung," in *Bewußtsein. Philosophische Beiträge*, ed. Sybille Krämer (Frankfurt/M.: Suhrkamp, 1996), 10.

⁸⁸ However, behaviorism began to undermine itself with the “cognitive turn” from the 1950s onwards: Instead of continuing to content itself with correlating sensory input and behavioral output, cognitive psychology took a look into the blackbox in between examining the mechanisms that translate input into output. Thereby, the concept of mind was reintroduced in a cybernetic variant. Cf. Ferrari and Pinard, "Death and Resurrection," 84-86. Perler and Wild, "Der Geist der Tiere," 46-49.

anthropology. At least four new print journals with “consciousness” in their titles have appeared since the 1990s (i.e., *The Anthropology of Consciousness*; *Consciousness and Cognition*; *The Journal of Consciousness Studies*; *Consciousness and Emotion*), along with two on-line journals (*PSYCHE*; *Science and Consciousness Review*), a new Center for Consciousness Studies in Tucson Arizona (which since 1994 hosts a well-known biennial conference, “Toward a science of consciousness”), and an Association for the Scientific Study of Consciousness which holds its own series of conferences—even an undergraduate textbook has appeared.⁸⁹

In the field, there is a sense of the dawning of a new age. Finally, a generation of scientists and philosophers is coming of age that will first bridge the gap between the “two cultures,” the natural sciences and the humanities, and then, in a joint effort, close the “explanatory gap” between mind and brain.⁹⁰ However, this almost messianic air of expectancy also reflects the insufficiency of the theories and methods currently available, which Vollenweider addresses. After one of our discussions, he gave me Jeffrey Gray’s book *Consciousness. Creeping Up the Hard Problem*. The British brain researcher argues that there is

a theoretical *Hard Problem* that also needs to be solved, one whose solution is likely to take us beyond the bounds of current scientific orthodoxy. To put this Hard Problem into a preliminary nut-shell: it arises because nothing in our current theoretical models of brain and behaviour accounts for the existence of consciousness, still less for its detailed properties. Or, to put the other side of what is essentially the same coin: despite the fact that everyone knows it as an empirical fact (in each of our personal lives), conscious experience has no scientifically understood links with the concepts of neuroscience or behavioural science. And without such links, consciousness lacks any comprehensible causal

⁸⁹ Ferrari and Pinard, “Death and Resurrection,” 86. As to the contribution of cultural anthropology to consciousness studies, see also the website of the Society for the Anthropology of Consciousness at www.sacaaa.org.

⁹⁰ Levine, “Materialism and Qualia.” C. P. Snow, *The Two Cultures* (Cambridge University Press: Cambridge, 1964).

powers that would enable it to interact with the physical world. To fill this gaping hole [...] a [radically] new scientific theory is needed.⁹¹

Similarly, the Finnish philosopher-neuroscientist Antti Revonsuo points out that “there are several fundamental obstacles on the way toward a scientific research program on consciousness, since the ontology and methodology of mainstream cognitive neuroscience is not entirely compatible with that required in the science of consciousness.”⁹² This is a recurrent motive in the literature of the new consciousness studies: The available approaches do not suffice, a “paradigm shift” must be imminent, but nobody knows yet what form the coming style of reasoning will take. For the time being, the research field in the making is characterized by lively exploration and experimentation with different stylistic possibilities and the emergence of a new genre of popular science books and magazines combining scientifically solid expositions with some hand-waving and speculation. A growing body of literature—to which Vollenweider is also planning to contribute after his retirement—fits the cornucopia of more or less significant scientific facts into big meaningful pictures of homo cereбрalis.⁹³ In the “trading zone” at the borders of brain research, psychology, and philosophy of mind, the development of a philosophico-scientific pidgin language facilitates exchanges between the different academic cultures involved.⁹⁴ If such interdisciplinary efforts will eventually engender a genuinely new and sufficiently complex and

⁹¹ Jeffrey Gray, *Consciousness: Creeping up on the Hard Problem* (Oxford: Oxford University Press, 2004), 5.

⁹² Antti Revonsuo, “Prospects for a Scientific Research Program on Consciousness,” in *Neural Correlates of Consciousness*, ed. Thomas Metzinger (Cambridge (Mass.): MIT Press, 2000), 57.

⁹³ Roepstorff, “Outlining the Sandpit of Consciousness Studies.”

⁹⁴ Cf. Peter Galison, “Trading Zone. Coordinating Action and Belief,” in *The Science Studies Reader*, ed. Mario Biagioli (New York: Routledge, 1999).

stable style of reasoning appropriate to the subject of consciousness remains to be seen.

Whether the so-called new science of consciousness actually deserves its name also depends on the novelty of the nexus of problems around which it crystallizes, especially the seeming qualitative incompatibility between descriptions of conscious experience and its neural basis. As Max Weber put it: "It is not the 'actual' interconnections of 'things' but the conceptual interconnections of problems which define the scope of the various sciences. A new 'science' emerges where new problems are pursued by new methods and truths are thereby discovered which open up significant new points of view."⁹⁵ Michael Hagner argues that since its inception in the nineteenth century the problems the philosophical branch of brain research has been struggling with have remained relatively consistent and uniform.⁹⁶ Whether the current way of posing the problem of conscious experience and any of the responses to it are genuinely new—not only in a technical, but also in an intellectual sense—cannot be answered conclusively from my vantage point. However, leaving aside the history of ideas for a moment, what is increasingly becoming obvious from a social scientific perspective is a heated problematization of subjective experience in the context of brain research.

⁹⁵ Max Weber, "Objectivity in the Social Sciences," in *The Methodology of the Social Sciences* (New York: The Free Press, 1949).

⁹⁶ Hagner, *Der Geist bei der Arbeit*, 36.

***Cultura animi* in the Light of Cognitive Neuroscience**

This problematization—however original or stale it may appear from a conceptual point of view—requires philosophical reflection in its own right. Thomas Metzinger argues that it is going along with the spread of “a new image of man [...], an image that will dramatically contradict almost all traditional images man has made of himself in the course of cultural history.” Although Metzinger contributes to its dissemination he is concerned about the socio-cultural ramifications of this new *logos* of *anthropos*.

Just as in technology assessment, where one tries to calculate potential dangers, unwanted side-effects and general future consequences of new technologies introduced into society, we need a new kind of anthropology assessment. We have to start thinking about the consequences a cultural implementation of a new image of man might have. | It may be helpful to differentiate between the “emotional price” and the “sociocultural price.” The emotional price consists in a certain unease: We feel insecure because many of our unscrutinized beliefs about ourselves suddenly seem obsolete. [...] | There will be a sociocultural price for the current development as well. Unfortunately, this aspect is much harder to assess. First of all, the image we have of ourselves in a subtle, yet very effective way influences how we live our everyday life and how we interact with our fellow human beings. A popularized form of vulgar materialism following on the heels of neuroscience might therefore lead us to another, reduced kind of social reality. If our image of ourselves is a radically demystified image, then we run the risk of losing a lot of the magic and subtlety in our social relationships.⁹⁷

The rationale of technology assessment is to foresee and contain undesirable effects that might accompany the use of a new technology. This practice of “observing the future” is tightly coupled with the institutionalization and professionalization of an ethics that serves to restrict the excesses of science

⁹⁷ Metzinger, “Introduction,” 6-7.

and technology by drawing moral boundaries.⁹⁸ In the context of brain research and psychopharmacology, it is the new subfield of neuroethics that protects concrete human subjects as well as more abstract notions of humanness against unrestrained intervention. These practices of normative delimitation are accompanied by philosophical efforts to curb the neuroscientific transformation of our image of man. Metzinger, however, advocates a more constructive response to the anthropological implications of recent neuroscientific advances: the development of a modern “consciousness culture.”

Anthropology assessment and ethical considerations are not enough. The issue is not just how to avoid the adverse side effects of a very special and controversial kind of scientific progress. Rather, the crucial point is that new insights about the structure of the mind and the wealth of knowledge generated by empirical research on the phenomenon of conscious experiences *themselves* have to be culturally implemented. We have to move away from a purely defensive position (as is currently widespread in the humanities), away from any cheap, counterproductive resentment. Laying the foundations for a consciousness culture means taking a more active attitude, a—nevertheless critical—point of view that allows us to ask positive questions like, How would a future culture look that uses the results of consciousness research in a fruitful way?⁹⁹

With his call for a consciousness culture based on rationality, autonomy, and responsibility Metzinger follows the current trend toward a reintegration of the ancient conception of philosophy as a way of life into contemporary practical philosophy.¹⁰⁰

⁹⁸ Cf. Paul Rabinow, *Marking Time. On the Anthropology of the Contemporary* (forthcoming).

⁹⁹ Metzinger, "Introduction," 9.

¹⁰⁰ According to the French historian of philosophy Pierre Hadot, it was the advent of

[C]onsciousness culture, just like self-knowledge, is an old philosophical project. Cicero conceived of philosophy as *cultura animi*, as taking care of and cultivating the soul—and in this sense I have only advertised a very old concept of philosophy that went out of fashion a long time ago. Maybe defining the love of wisdom as cultivating the soul is a classical motif that could inspire us as we take our first steps in the present situation. One has to admit, though, that initial conditions for the time-honored project of a consciousness culture have changed slightly since the time of Cicero. It therefore remains an open question whether a convincing new interpretation of this classical motif, in light of our recent discoveries about the neurobiological foundations of consciousness and subjective experience, could actually be achieved.¹⁰¹

In a public intervention demanding an “Intelligent Drug Policy for the Future,” Metzinger urges the readers of the German popular science magazine *Geist & Gehirn* to engage in a process of rational deliberation over the question what a “good state of consciousness” is, which states of consciousness we would like to integrate into our culture, and which states we would prefer to exclude by all means. However, despite such calls for and gestures toward a substantive ethos, Metzinger’s own contribution to its development largely remains true to the procedural character of most modern moral philosophy. In the article, for example, he picks up one of Timothy Leary’s ideas and advocates a strictly

Christian scholasticism in the Middle Ages, which separated philosophy—as a highly sophisticated, but originally pagan form of reasoning that could provide a conceptual basis to theology—from the *bíos* or way of life, which was supposed to be based on Christian faith. Pierre Hadot, *Philosophy as a Way of Life. Spiritual Exercises from Socrates to Foucault* (Oxford: Blackwell, 1995), 107-107, 270. For a broad overview and a critical discussion of the return of this “premodern” conception of philosophy, see Wolfgang Kersting and Claus Langbehn, eds., *Kritik der Lebenskunst* (Frankfurt/M.: Suhrkamp, 2007).

¹⁰¹ Metzinger, “Introduction,” 9-10. See also Thomas Metzinger, “Hirnforschung, Neurotechnologie, Bewußtseinskultur. Medizin-ethische, anthropologische und sozialphilosophische Fragen der Zukunft,” in *Die Zukunft der Medizin. Neue Wege zur Gesundheit?*, ed. Gert Kaiser, et al. (Frankfurt/M.: Campus, 1996). Thomas Metzinger, “Wenn die Seele verlorenght. Der Fortschritt in den Neurowissenschaften erfordert eine neue Bewußtseinskultur,” *DIE ZEIT*, no. 45 (1996).

regulated “driver’s license” for the use of LSD and other hallucinogens.¹⁰² A concrete, but formalist suggestion laying out how citizens could gain access to these substances while avoiding the question whether they should and under which circumstances and for what purposes the consumption of hallucinogens might be desirable or disadvantageous. Like Metzinger, I refrain from promoting a particular consciousness culture. Instead I have chosen an ethnographic perspective on an already existent one, that of hallucinogen researchers. This “fieldwork in philosophy” explores their *cultura animi* by being attentive to their relationships with themselves and others and the forms of “care of the self,” the “technologies of the self,” which these neuroscientists practice.¹⁰³ Such observations provide a kind of thickness to the required analysis, which is absent in the abstract considerations of contemporary neuroethics.

NL: What do you gain from hallucinogen experiences?

FXV: Hallucinogens cause a perspectival change. Apart from experiencing a normal state of mind you then also experience a very different perspective. Between these two states a space of reflection opens up. Take the koans in Zen Buddhism, for example. You can’t solve them rationally. But in such states you

¹⁰² Thomas Metzinger, “Intelligente Drogenpolitik für die Zukunft,” *Gehirn & Geist*, no. 1-2 (2006). When testifying in the US Senate in 1966 Timothy Leary suggested the same form of regulation: “I feel constructive legislation is obviously and badly needed, and I recommend respectfully to this committee that you consider legislation which will license responsible adults to use these drugs for serious purposes, such as spiritual growth, pursuit of knowledge, or in their own personal development. To obtain such a license, the applicant, I think, should have to meet physical, intellectual, and emotional criteria. I believe that the criteria for marihuana, which is the mildest of the psychedelic drugs, should be about those which we now use to license people to drive automobiles, whereas the criteria for the licensing of LSD, a much more powerful act, should be much more strict, perhaps the criteria now used for airplane pilots would be appropriate.” Quoted in: Greenfield, *Timothy Leary*, 268-269.

¹⁰³ Cf. Michel Foucault, “Technologies of the Self,” in *Technologies of the Self. A Seminar with Michel Foucault*, ed. Luther Martin, Huck Gutman, and Patrick Hutton (Amherst: University of Massachusetts Press, 1988). Foucault, *The Care of the Self*.

sometimes experience that things which you usually perceive as separate are linked up in one gestalt. You look at gestalts differently, maybe seeing them the way they really are. For instance, normally you can only see one of the two sides of a coin at a time, but it happens that these states allow you to see both sides simultaneously. It's difficult to put that into words, but there are these deep experiences, in which you realize such things. If you manage to integrate them into everyday life it enables you to see things differently. What these perspectival transformations show is how extremely restricted our conception of reality is. All these potentialities. We play with them. On a trip, you can play with thoughts, they turn around, new ones come up, and they bring forth the most absurd forms. This is what it's about. It's about reality and the play of thoughts.

NL: This implies that under the influence of hallucinogens you can experience things usually beyond our imagination.

FXV: Yes, you find answers to questions such as: What does the clapping of one hand sound like? But the image, which comes up then, is not essential. It's not about the content of consciousness, but about experiencing the playfulness of the world, how things fold and unfold, how they manifest and disappear. That's what you can learn. But all this content—forget about it! It only leads to pseudo-religiosity! Abstracting from experience, that's the realization, that's what you're being shown. And not this kind of "Oh, I'm one with everything, everybody likes me, and there is a man with a beard." You can hear such stories constantly. It's all anthropomorphisms and projections. What is liberating about the hallucinogen state resembles the story of the Hindu yogi Maharishi: He is suffering for twenty years until he realizes that suffering is no solution. Then he steers a middle course: he eats, has sex, and enjoys life. It's simply as it is. He enters into the flux of reality. If you tense up in abstraction you become Jesus. [Laughs.] That's not what I'm desperate to do. What I learned from hallucinogens is this playfulness. Every time I come down I'm astonished: All of a sudden, you're neurotic again, you're occupied, running after science, writing grants, etc. That's all important! That's all unimportant! When you break through to this inner calm, this play of nature and the cosmos, then you're one step ahead. That's what you can learn from this whole thing. And that's also why hallucinogen therapies are extremely demanding. There is no enlightenment on LSD. I don't believe that. There is only work with LSD, that's my conviction.

- NL:** What's the difference between enlightenment and learning to see the world as a game and letting go of your attachments?
- FXV:** That's a bit nitpicking. It's a kind of insight. When you see through that and when you jettison these attachments to perceive something deeper then you relativize a lot of things that you usually do. The term enlightenment is used in the sense of a spontaneous mystical experience, which shakes you. But I don't think that such a singular experience can last. The saints have been tempted by the devil again and again.
- NL:** Then hallucinogens serve a work on the self, which eventually leads to such insights...
- FXV:** Which *can* lead to such insights.
- NL:** ... depending on the way in which you work on yourself.
- FXV:** And hallucinogens are not exclusive. There are other ways of throwing ballast overboard: drive-centered Freudian therapies, Jungian interpretation, Buddhist ways, yogi ways, martial arts, etc. You need to ask yourself: Am I doing martial arts to build up muscles and impress young women or because I want to be fit or to learn more about my body. I think such motives need to be analyzed and worked through. That enables you to take things more playfully.
- NL:** That's the result of your work. Others might come to the conclusion that they need to take things more seriously.
- FXV:** Yes, that's very important. I do not want to generalize what I gained from it. I just want to outline where I see promising applications of hallucinogens beyond the medical realm—in bringing things to consciousness in healthy individuals. But that's a crucial question: I like to play and maybe it has always been like this. I just got a different interpretation. That's the crux of undergoing psychoanalysis. Who goes into analysis? It's people who are not just motivated by suffering, but also by the desire to understand. But that can also be tantalizing. That's why I have developed this leaning towards diversity. There are as many interpretations of the world as there are brains.
- NL:** Maybe even more. Eventually, many interpretations fit into one brain.
- FXV:** Right. But that's the crucial question. I've always asked myself why there are so many people in the field of hallucinogen research who do funny things taking drugs all the time and overrating these experiences. They present them as if they

were something ultimate, as if you just had to take these drugs and you got cured and there would be peace in the world. We've already had that in 1968. If it would work these goals would have been achieved long ago. I don't like this kind of glorification. This morning, I wrote a paper listening to Bach. When I write I like Bach. But when I don't have to concentrate I prefer jazz-rock. I have different means to be happy. That's also how it is with hallucinogens. They're no panacea, that's nonsense. And probably they're only for people who're more or less healthy.

NL: At the time when I still took hallucinogens more frequently I realized that I had often been grappling with a particular problem for quite some time—a philosophical or aesthetic question or some difficulty in my personal life—and after a few months I took a trip and suddenly these issues gained an extremely powerful presence. But, of course, that wasn't simply the effect of the drug. The more profound transformation occurs while struggling with some subject matter over a prolonged period of time. This preoccupation is only actualized in the hallucinogen experience. This raises a question, which will probably become one of the leitmotifs of my book: What is the role of experience in this context? This is closely related to the set of problems discussed in contemporary philosophy of mind: What is consciousness good for? Are conscious experiences mere epiphenomena or do they have a function? These questions take a particular form in the context of hallucinogen experiences, but I still don't see any answer on the horizon.

FXV: I think that human beings have a sound curiosity to experience and understand the world. Depending on their level of education in a more or less abstract manner. We're talking about the relationship between mind and brain and the problem of causality here. You can't discuss that with the cleaning lady out there. She would go crazy if you took this away from her. But the attempt to understand is a sign of trying to class things because one hasn't learned yet to take them as they are—with a sense of serenity.

10. Limit-experience and Self-formation

To provide a common framework for the parascientific practices of Honza Samotar, Marco Benz, and Franz Vollenweider I pointed to the nexus of problems, which Husserl summed up as the “Crisis of European Man”: the dissociation of science and the experience of the lifeworld, the simultaneous suffusion of our self-image with scientific knowledge (most prominently in the naturalization of the mind), the alienating intertwinement of these two developments, the consequent loss of meaning, and the failure of modern philosophy to make up for it. The solution to this problematic provided by Husserl’s phenomenology was to restore the original intention of science by unearthing its foundation in the everyday experience of the lifeworld. His diagnosis has offered an initial orientation in the problem space, in which I have situated the three cases presented above. In conclusion, however, I would like to redraw this problem space in critical demarcation from Husserl. The ethnographic material analyzed in this chapter might allude to an exit from the dissatisfying configuration of life, science, and experience to which Husserl responded.

Refractions of Experience

Strongly influenced by phenomenology, the early Foucault was also concerned with the pervasion of our lives and thought by the virulent objectivism of science. Foucault was intimately acquainted with the practices implementing the “naturalization of the mind”: at the beginning of the 1950s, as a young philosophy tutor, he did an internship in an EEG laboratory at the psychiatric hospital Sainte-

Anne in Paris where he also participated in studies as a test subject.¹⁰⁴ This personal background led him to approach the problem of the objectification of man in the process of rationalization from a unique point of view. In his dissertation *Madness and Civilization* published in 1961, he developed a critique of modern reason by examining the discourses, practices, and institutions through which reason excluded its opposite: lunacy. Like Husserl, Foucault perceived the objectifying knowledge of the human sciences as estranging the subject from itself. He conceived of the medicalization of madness through psychiatry as self-alienating because it led the madman to introject the social distance between him and those regarded as healthy: to get better he first had to understand that something was wrong with him, he had to distance himself from himself and his way of experiencing the world. Foucault also followed Husserl in grounding his critique of modern reason in an originary experience. But instead of looking for a solid foundation in the everyday experience of the lifeworld, Foucault chose the limit-experience of madness as an anchoring of his analysis. In contrast to Husserl, he did not want to provide a meaningful foundation to scientific knowledge. In the case of the psychiatric discourse, its embedment in the world of practice seemed all too obvious to him: the concepts of psychiatry served to identify, stigmatize, and correct deviant individuals. Breaking with Husserl's "intentional history," Foucault was not interested in restoring the original sense of psychiatry by bringing to light the goodwill that had led to the medical treatment of the insane. Instead he focused on what he saw as its

¹⁰⁴ David Macey, *The Lives of Michel Foucault* (London: Hutchinson, 1993), 56-58. See also Cornelius Borck, *Hirnströme. Eine Kulturgeschichte der Elektroenzephalographie* (Göttingen: Wallstein, 2005), 213.

effects: self-alienation and social exclusion. As Foucault was highly critical of psychiatry he had no inclination to establish its universal validity as Husserl intended with respect to the “European sciences.” Rather, he wanted to denaturalize its perspective on madness by demonstrating its historical contingency and its failure to grasp the originary experience of madness, which previous ages had acknowledged.¹⁰⁵ It is this critical impulse, a deep-seated distrust of the established social order and the exclusive and narrow-minded normality of the lifeworld, which inspired Foucault’s interest in limit-experiences such as madness. The value he attributed to such experiences lay in their potential to call into question our habitual ways of perceiving and ordering the world. Analogously, the cultural critique and the radical neuropolitics, which the champions of the “psychedelic revolution” initiated in America at about the same time, was based on the peculiar perspectives on life opened up by a drug-induced, but comparable deviation from everyday consciousness.

Like madness, the synthetic experiences elicited by hallucinogens are regarded as limit-experiences. As Felix Hasler explains in an interview with the Zurich university magazine:

From experiments with hallucinogens I learnt how manipulable the psyche is, how fundamentally our whole being and experience depends on our brain chemistry. Smallest amounts of a chemical substance lead to a total restructuralization of the whole consciousness—seeing, feeling, thinking, space, time, ego, environment—everything gets mixed up. That’s fascinating because it relativizes our everyday consciousness. With hallucinogens you can have limit-

¹⁰⁵ Michel Foucault, *Madness and Civilization: A History of Insanity in the Age of Reason* (New York: Random House, 1965).

experiences. Whether one regards such liminal states as mystical experiences or as psychotic delusions is mostly a question of interpretation.¹⁰⁶

The subject ingests the drug and shortly after his or her ego-boundaries begin to dissolve. Often the ensuing states of consciousness are extreme: ecstatic bliss emanating from the amalgamation of self and world or dreadful anxiety in the face of imminent disintegration of the ego and its familiar environment. Since the illegalization of psychedelics this transgression of inner bounds is tantamount to breaking the law—unless it takes place within the confines of the laboratory. Again, the overstepping of these limits can be experienced as both a liberating act of heroic revolt as well as a punishable and therefore frightening violation of the social order. In fact, the association of drug consumption with crime has become so ingrained that even test subjects of perfectly legal clinical trials occasionally hide their participation from friends, relatives, or employers. But the full-blown hallucinogen inebriation is less an experience of willfully overcoming internal and external restrictions, but one of being overwhelmed. The subject suffers a transgression, which it has initiated without being able to control the following onslaught of thoughts, feelings, perceptions, hallucinations, and visions. Such a transgression in the sense of Foucault and the French writer Georges Bataille is an exercise in relativizing our customary conceptions of ourselves and the world.

The limit-experiences provoked by psychedelic drugs provide a very different perspective on existence than everyday life inside and outside the laboratory. One of the recurrent motifs in what Samotar, Benz, and Vollenweider

¹⁰⁶ Hasler, "LSD macht keinen zum Genie," 39.

say about their hallucinogen experiences is that they enable them to look at their lives from new angles. But—and here these present-day scientists differ from Husserl and the early Foucault—they are not looking for an originary experience, neither on the side of the lifeworld nor on that of their drug-induced limit-experiences. None of these poles of the experiential spectrum is regarded as foundational. It is the distance between them that opens up a space of reflection, which the individual researchers traverse in their distinctive ways.

The dividing lines do not only separate such exceptional states of mind from everyday consciousness. The drug effects also call attention to the cracks running through the immediacy and coherence of experience as such. In his book *Bruchlinien der Erfahrung*, the German philosopher Bernhard Waldenfels points out that biotechnologies highlight a certain strangeness or brokenness pervading our subjective lives. Psychotropics remind us of the biological foundation of who we are and how we perceive the world. As Hasler points out in the passage quoted above, hallucinogens allow him to personally experience the malleability of experience and its conditionality on brain processes. But the neural correlates of experience themselves remain unexperientiable and alienating. “I *am* not only my lived body [*Leib*], I *am* also my brain, but in a way that what I am largely escapes me. ‘I is another’ also has a neurophysiological sense,” Waldenfels notes.¹⁰⁷ By disturbing perceptual processes through interventions into brain chemistry hallucinogens point to neurophysiology as a quasi-transcendental condition of experience even though it remains

¹⁰⁷ Bernhard Waldenfels, *Bruchlinien der Erfahrung. Phänomenologie. Psychoanalyse. Phänomenotechnik* (Frankfurt/M.: Suhrkamp, 2002), 417 (my translation—NL).

unassimilable to the consciousness it generates. Apart from misperceptions, hallucinogens are also reported to provoke a sense of depersonalization and derealization (two of the key symptoms of psychosis, even though mystical experiences can be equally unsettling instances of so-called ego-dissolution). This pharmacological alienation effect makes familiar situations and persons appear outlandish and the self seem unreal. Here, the subject and its experience of the lifeworld are not called into question by estranging interpretations of neuroscientific experiments, but they are experienced as illusory at first hand.

However, the neurophenomenology of the hallucinogen experience is not only broken once, but twice. The experience of the unexperientiable neural conditions of inner life, the self-alienation felt when the dependence of our innermost thoughts and feelings on neural processes gone awry becomes apparent, is itself no pure, transparent, and unmediated experience. It presupposes a particular conception of ourselves as cerebral subjects implemented by an anthropological discourse that arose in eighteenth-century Europe alongside practices of anatomical dissections, histological preparations, neurophysiological measurements, psychiatric diagnoses, psychopharmacological medication, etc.¹⁰⁸ When Peruvian or Siberian shamans ingested ayahuasca or an inebriating toadstool they communicated with the spirits or their ancestors. It would not have occurred to them that they experienced aberrant brain processes. Their visions were informed by different self-images and worldviews. In this respect, Marlene Dobkin de Rios spoke of the

¹⁰⁸ Cf. Hagner, *Homo cereбрalis*.

“cultural patterning of hallucinatory experience.”¹⁰⁹ Hasler’s amazement at the fundamental dependency of our existence and experience on brain chemistry is the psychedelic experience of a neurochemical self.

Making up Neurochemical Doubles

Despite the brokenness of the hallucinogen experiences of neurochemical selves they also stabilize the neurochemical identity they presuppose. Following Ian Hacking, I spoke of a looping effect on the level of experience: the discourse on drug experiences affects these experiences and in turn these discursively shaped experiences influence the discourse. This seems to be particularly true in the case of hallucinogen experiences as these drugs increase suggestibility—or at least they are firmly believed to do so. In 1972, the cultural anthropologist Peter Furst argued that “you get out of the drug experience only what you put into it.”¹¹⁰ Such autosuggestive looping effects affirm a particular sense of selfhood. Furst assigns to the uses of hallucinogens in supposedly traditional societies a preeminently conservative function:

Indeed, we can go so far as to say that the psychotropic plants have helped determine the history of culture, inasmuch as it is typically in the ecstatic initiatory trance experience that the individual confirms for himself the validity of tribal traditions he has heard his elders recite from earliest childhood. [...] The magic plants, then, act to validate and reify the culture, not to afford some temporary means of escape from it. The Huichol of Mexico, like the Cahuilla of Southern California or the Tukano of Colombia, returns from his initiatory “trip” to exclaim, “It is as my fathers explained it to me!” One takes peyote, he says, “to learn how one goes being Huichol.”

¹⁰⁹ Dobkin de Rios, “Man, Culture, and Hallucinogens,” 402-407.

¹¹⁰ Furst, “Introduction,” xiv.

But, Furst adds: "It is hardly to learn 'how one goes being American' (or German, or English, or Mexican) in the conventional sense that LSD or DMT are employed in the West."¹¹¹

It is true that hallucinogens do not play a significant role in ethnic identity formation in Switzerland, Germany, or the United States. Considering the clashes of worldviews and value-conflicts sparked off by these substances they rather expose the disunity of national cultures. But compared to the 1960s, the ongoing politicization of psychedelic drugs has moderated considerably. Today, pragmatism seems to prevail in the world of neuropsychodelia, particularly in Switzerland. Felix Hasler explains that their generation differed from Leary's in that they lost a sense of mission. Unlike some of their American colleagues, they have abandoned the messianic hope that drug-induced consciousness expansion will ring in a new age. The Dionysian ecstasy of hallucinogen inebriation is carefully dispensed and measured in the laboratory and integrated in rather Apollonian practices of methodical self-experimentation and a patient care of the self taking place in private.

In these settings, hallucinogens have a consolidating effect on subjects' identities as neurochemical selves. The prevalence of this self-conception is not so much the product of the colonization of a prescientific lifeworld by science, but of a reciprocal interplay of experiences with psychoactive agents and the acquisition of neuropsychopharmacological knowledge. This back and forth invests life with scientific knowledge through and through while suffusing science with some of the animation of drug experiences.

¹¹¹ Furst, *Hallucinogens and Culture*, 16.

But despite the mutual interpenetration of life, science, and experience these domains do not completely blend into each other. The relationships between the para-scientific practices of Samotar, Benz, and Vollenweider and their professional activities are difficult to bring down to a common denominator. Maybe Samotar's methodical self-experimentation, Benz's photographic meditations, and Vollenweider's playful engagement with and reflection on hallucinogen-induced states can also be interpreted as reactions to the limits of contemporary cognitive neuroscience. In these practices, the experiential richness of the first person perspective, which escapes the narrow research questions of science is, brought to bear in a way directly related to their existential concerns. The fact that their lives are imbued with scientific knowledge does not mean that they are perfectly satisfied by a scientific perspective on life or the insights produced by their research.

These refractions of experience by the brain and our knowledge of this organ are characteristic of the problem space that, according to Foucault, opened up in the "Age of Man." In the nineteenth century, he argues in *The Order of Things*, a discursive formation emerged around the epistemic figure of Man as both subject and object of knowledge.¹¹² In Foucault's account, this anthropological thought is not restricted to the discipline of anthropology, but it ties together a multitude of human sciences about to materialize in their modern form around 1800. He highlights linguistics, economy, and biology examining Man as a speaking, working, and living being. But language, labor, and life are

¹¹² Michel Foucault, *The Order of Things. An Archaeology of the Human Sciences* (New York: Random House, 1973).

not only objects of empirical inquiry, but also the quasi-transcendental conditions of any such inquiry. “Quasi-transcendental” for what makes up our humanness is also made up and transformed by human activity. The ongoing topicality of this form of the “empirico-transcendental double” (which has still not disappeared “like a face drawn in sand at the edge of the sea”¹¹³) becomes apparent in Felix Hasler’s epistemological caveat: “Can we investigate the neural basis of different states of consciousness? For this purpose, hallucinogens suggest themselves. However, here the observer and the observed are situated on the same ontological level. This raises the big question: Can a brain study the brain, can consciousness understand consciousness? Can man know himself?”¹¹⁴

The double of the neurochemical subject is a fine specimen of the epistemological species of Man, whom Foucault also described as the “observed spectator.”¹¹⁵ The striking restlessness radiating from this historical ontology of the human is due to the fact that it is tightly coupled with an equally historical epistemology of second-order observation continuously revealing contingencies. The observations of other observers’ observations reveal their blind spots, i.e. their dependency on particular factors that could also be otherwise.¹¹⁶ Instead of establishing a secure foundation of knowledge, this mode of observation produces a patchwork of alternative perspectives, which together constitute the phenomenon in question as an object of thought painted in an almost cubist manner. In the case of brain research, the neuroscientific exploration of the

¹¹³ Ibid., 386.

¹¹⁴ This argument is also made by Singer, *Der Beobachter im Gehirn*, 61.

¹¹⁵ Foucault, *The Order of Things*, 311.

¹¹⁶ Cf. Luhmann, *Observations on Modernity*.

unexperientable, but pharmacologically workable neural conditions of subjective experience has recently produced a pronounced uncertainty and much controversy over the supposedly illusory nature of our inner lives.

Toxic Meditations

Foucault, like Husserl, was concerned about the proliferation of practices aiming at an objectification of the human. But he was equally concerned about the antidote phenomenology advocated. In his eyes, the practices of subjectification (most prominently the confession) urging the subject to look for meaning in every mental event, in each of its acts, and the world at large was a strategy of ensnaring it in a mesh of power relations. Foucault's eager embrace of limit-experiences was due to his flirtation with a total dissolution of the subject. In 1966, Foucault expressed his hope that the figure of Man as the broken subject/object of knowledge would soon disappear from the predominant discursive formation.¹¹⁷

A decade later, the revolutionary zeal and the messianic expectations of the 1960s had given way to more modest and pragmatic outlooks. "[T]he idea of a limit-experience that wrenches the subject from itself" still appealed to Foucault, but his focus had shifted from insanity to the modern experience of sexuality and self-experimentation with drugs such as LSD—intense states, but no ultimate fates.¹¹⁸ His constructions of all-encompassing discursive formations

¹¹⁷ Foucault, *The Order of Things*, 385-387.

¹¹⁸ Michel Foucault, "Interview with Michel Foucault [by Duccio Trombadori]," in *Power. Essential Works of Foucault, 1954-1984*, ed. James Faubion (New York: The New Press, 2000 [1980]), 241.; Michel Foucault, "An Interview by Stephen Riggins," in *Ethics*.

had been replaced by more agonistic accounts emphasizing conflicts in the realms of power, knowledge, and ethics. The gesturing towards a post-anthropological era of thought had given way to the acknowledgment that Man or, rather: men will never cease to constitute themselves as subjects by way of continuously changing forms of objectification. "Men are perpetually engaged in a process that, in constituting objects, at the same time displaces man, deforms, transforms, and transfigures him as a subject."¹¹⁹ Standing somewhat apart from the political and scientific processes reforming the human are practices of self-formation, which the late Foucault began to investigate as sites of relative freedom where individuals could take charge of their own objectification and subjectification by working on themselves as objects of ethical self-fashioning. In his eyes, such practices of self-cultivation still aimed at detaching oneself from oneself (as a beneficial self-alienation), but their goal was a careful transformation instead of a terminal annihilation of the subject.

In his last works, Foucault analyzed the interlacements and the subsequent dissociation of such a care of the self and self-knowledge in ancient philosophy as a guide to a life informed by rational reflection. In his description of the antique practices of self-formation, he pointed to an assembly of maxims and

Subjectivity and Truth. Essential Works of Foucault, 1954-1984, ed. Paul Rabinow (New York: The New Press, 1997 [1982]), 129. James Miller, *The Passion of Michel Foucault* (Cambridge (Mass.): Harvard University Press, 2000), 248-251. At the time, Foucault even considered writing "a study of the culture of drugs or drugs as culture from the beginnings of the 19th century." Macey, *The Lives of Michel Foucault*, 371.

¹¹⁹ Foucault, "Interview with Michel Foucault," 276. See also Gerhard Unterthurner, *Foucaults Archäologie und Kritik der Erfahrung. Wahnsinn – Literatur – Phänomenologie* (Wien: Turia+Kant, 2007), 281. Rabinow coined the term *anthropos* for these historically contingent doublings, of which the epistemic figure of Man was only one transient instantiation, taking on new forms as new practices and *logoi* emerge. Rabinow, *Anthropos Today*, 15.

wise sayings as equipment that was used to take care of the self.¹²⁰ In his own reading, Paul Rabinow sums up Foucault's notion of equipment:

As the name suggests, this equipment was designed to achieve a practical end. These "true discourses," these "logoi," were neither abstractions nor, as we say today, "merely discursive." They had their own materiality, their own concreteness, their own consistency. | What was at stake in the use of this equipment was not primarily a quest for truth about the world or the self. Rather, it was a question of assimilating these true discourses, in an almost physiological sense, as aids in confronting and coping with external events and internal passions. The challenge was not just to learn these maxims, often banal in themselves, but to make them an embodied dimension of one's existence.¹²¹

These *logoi* serve a particular kind of meditation as an exercise of thought that aims at a transformation of the subject, at its self-constitution as an ethical subject of truth. By the twentieth century, however, Rabinow argues with respect to modern urban planning, "'equipment' had become the subject matter of method" as a way to truth that—unlike insights gained and incorporated in meditation—did not require a privileged ethical state achieved in a lifelong work on the self. "In a parallel fashion," he adds, "one could say that the subject had equally become an object of method."

Next to the domain of social technologies that Rabinow is talking about, neuropsychopharmacology constitutes an almost paradigmatic field in which human subjects are treated as objects of methodical knowledge acquisition as well as normalization and enhancement through neurochemical interventions. Chapters 4 to 6 have shown how hallucinogens are currently being used as

¹²⁰ Michel Foucault, "Self Writing," in *Ethics: Subjectivity and Truth*, ed. Paul Rabinow (New York: The New Press, 1997). Foucault, *The Hermeneutics of the Subject*.

¹²¹ Rabinow, *Anthropos Today*, 10.

equipment for a systematic survey of the neural correlates of consciousness and its altered states. According to Husserl, this gradual naturalization of the mind has brought about the current spiritual crisis of “European culture.” In a less alarmist vocabulary, one might say that it has contributed to a profound and longstanding problematization of experience (both “crisis” and “problematization” refer to a situation of conflict, doubt, and uncertainty). My own response to this problematization picks up and modifies the incentive of Rabinow’s *Reflections on Modern Equipment* to think about “how it might be possible to transfigure elements of the equipment of modern method into a form of modern meditation.”¹²² In my work, the equipment at stake is a particular class of psychoactive agents.

The parascientific activities of Samotar, Benz, and Vollenweider can be read as instances of a *cultura animi* or culture of the mind in the age of cognitive neuroscience where drugs have come to complement the toolkit available to contemporary technicians of the self in new ways.¹²³ Here, hallucinogens are used in the context of (quasi-) philosophical reflections on who we are and what form we should give to our existence. Their self-conceptions mark Honza Samotar, Marco Benz, and Franz Vollenweider as neurochemical selves—at least the idiom of molecular neuroscience is one lens through which they make sense of their lives. Consequentially, brain chemistry is also one of the levels on

¹²² Ibid., 12.

¹²³ Of course, drugs have been an integral part in a broad spectrum of practices of self-formation in many different cultures and throughout history. For a wide-ranging, if superficial overview, see Jay, ed., *Artificial Paradises*. A prominent example of a drug-related culture of the self in modern history is the use of inebriants as sources of artistic inspiration. Cf. Plant, *Writing on Drugs*.

which they intervene when resuming the philosophical tasks of knowing oneself and taking care of oneself.

What seems peculiar though is the use of intoxicants as equipment to this end. The derailment of neurophysiological processes for the purpose of self-formation and self-exploration turns this contemporary *cultura animi* into a “philosophy of error.” In his essay “A New Concept of Pathology: Error,” Foucault’s thesis advisor Georges Canguilhem traces the history of this biological concept from its inception in 1909 when the term referred to an inborn deviation from normal metabolic pathways to its reformulation in the vocabulary of the “genetic code” in the second half of the twentieth century. Canguilhem emphasized that metabolic errors and mutations do not necessarily have a detrimental effect on the organism. Under certain conditions, they can even be beneficial.¹²⁴ If life is situated in an unstable, highly dynamic milieu demanding constant adaptation (a view that arose in the nineteenth century) then some of its aberrations can be better adjusted than those life forms that have come to be seen as the norm. The same is true for the conceptual tools that human beings devise to respond to particular problems posed by particular environments. Canguilhem stressed that the concepts of the life sciences are not *about* life, but situated *in* life itself. They are not scientific abstractions from “lived experience,” but tools or equipment serving the task of living, of both survival (as in medicine)

¹²⁴ Glucose-6-phosphate-dehydrogenase deficiency, for example, is a hereditary disease, but it endows the carrier with an increased resistance to malaria, which is advantageous in areas where malaria is endemic. Georges Canguilhem, “A New Concept of Pathology: Error,” in *The Normal and the Pathological*, ed. Georges Canguilhem (New York: Zone Books, 1991), 282.

and “the good life” (as in so-called cosmetic psychopharmacology and the quest for intensification pursued in the experimental lives of venturesome psychonauts). If such equipment does not do its job it needs to be replaced. As Canguilhem put it: “Life overcomes error through further trials (and by ‘error’ I mean simply a dead end).”¹²⁵ It is this openness to future corrections through trial and error—on the level of life forms as well as on the level of their conceptual equipment—which Canguilhem regarded as health.¹²⁶ In a homage to his academic mentor, “Life: Experience and Science,” Foucault presented this “philosophy of error, of the concept of the living” in opposition to phenomenology “as a different way of approaching the notion of life.”¹²⁷ In response to Husserl’s diagnosis of a spiritual crisis of European Man brought about by the abstractions of science, Foucault maintained:

The fact that man lives in a conceptually structured environment does not prove that he has turned away from life, or that a historical drama has separated him from it—just that he lives in a certain way, that he has a relationship with his environment such that he has no set point of view toward it, that he is mobile on an undefined or rather broadly defined territory, that he has to move around to gather information, that he has to move things relative to one another to make them useful. Forming concepts is a way of living, not of killing life; it is a way to live in a relative mobility and not a way to immobilize life.¹²⁸

Following Canguilhem’s peculiar brand of vitalism, Foucault defined life as “that which is capable of error” and picks up the semantic relationship of error and erring in the sense of a wandering accompanied by adventure when he adds that

¹²⁵ Georges Canguilhem, *A Vital Rationalist. Selected Writing from Georges Canguilhem* (New York: Zone Books, 2000), 318.

¹²⁶ *Ibid.*, 352.

¹²⁷ Michel Foucault, “Life: Experience and Science,” in *Aesthetics, Method, and Epistemology. Essential Works of Foucault. 1954-1984*, ed. James Faubion (New York: The New Press, 1998), 477.

¹²⁸ *Ibid.*, 475.

“with man, life has led to a living being that is never completely in the right place, that is destined to ‘err’ and to be ‘wrong.’” Or, as Canguilhem put it in 1968:

In fact, human error is probably one with human errancy. Man makes mistakes because he does not know where to settle. He makes mistakes when he chooses the wrong spot for receiving the kind of information he is after. [...] Knowledge, then, is an anxious quest for the greatest possible quantity and variety of information. If the *a priori* is in things, if the concept is in life, then to be a subject of knowledge is simply to be dissatisfied with the meaning one finds ready at hand. Subjectivity is therefore nothing other than dissatisfaction. Perhaps that is what life is.¹²⁹

The described attempts to acquire self-knowledge through the induction of neurometabolic errors, to range deep into the space of mental possibilities by disrupting the beaten tracks of everyday experience, to give a new form to one’s existence by putting it at risk, and to take care of oneself by willfully shaking the comforting familiarity of the lifeworld indicate a discontent with the given. The forms this searching restlessness currently takes differ from those of the 1960s, but the use of intoxicants still plays a role. Here, *anthropos* does not appear as a species the biological life of which is solely geared toward self-preservation or pleasure. Providing an overview and a detailed analysis of the full spectrum of motivations and applications of hallucinogens (especially in the experimental drug scene developing and sampling novel compounds) would take another book. Having focused on academic hallucinogen research, I have confined myself to selecting the highly idiosyncratic practices of self-formation and -exploration of three scientists I encountered during my fieldwork (the activities and ideas of other members of Vollenweider’s bustling lab would have been equally interesting). The manner in which they have incorporated hallucinogens

¹²⁹ Canguilhem, *A Vital Rationalist*, 319.

and psychopharmacological knowledge into their ways of life can be read as tentative efforts to turn elements of the equipment of modern method into singular forms of modern meditation—responses to what Husserl regarded as the spiritual crisis of European Man and what I have described as an ongoing problematization of experience.

Felix Hasler, however, also points to the limits of such uses of hallucinogens: “Some people are said to take the hallucinogen psilocybin when they need to take an important decision in their lives. I’m not so sure though whether that really works. A psilocybin inebriation is difficult to steer into a specific direction, for example to meditate deliberately over a particular problem.”¹³⁰ These toxic meditations are no acts of self-empowerment, but pharmacologically framed and facilitated occasions of letting the mind go astray.

As to the hallucinogen experiences themselves, neither the insights nor the delusions, neither the mystical oneness with the cosmos nor the horror of the occasional bad trip will last. Unlike genetic aberrations these errors are transitory states, not traits. As limit-experiences they are intense, but short-lived. And yet, as the ethnographic material presented in this chapter has shown, they are not necessarily aesthetic escapes from the world. The reflective integration of hallucinogen experiences into a contemporary *cultura animi* has led to vivid experimentation with new ways of integrating life and science in the milieu of neuropsychopharmacological brain research.

¹³⁰ Hasler, “LSD macht keinen zum Genie,” 39.

Beyond the Tranquility of the Lifeworld

The crisis Husserl diagnosed was also a crisis of philosophy, which could no longer be said to play an essential role in the development of the sciences. Vollenweider's desire to operationalize philosophical questions in neuroscientific experiments might call this concern into question—if these attempts were only more successful. At present, the relationship between neuroscientists and philosophers is complex and multifarious, marked by both mutual attraction as well as fierce antagonism. An empirical investigation of the significance of philosophy in the fields of cognitive neuroscience and consciousness studies is still a desideratum and can certainly not be established on the basis of a single ethnographic case study of two laboratories. Whether or not certain kinds of philosophy can still make important contributions to our understanding of the nature of the mind, one genuinely philosophical task will definitely live on: to reflect on the place of science in human life.

Husserl's attempt to demonstrate and shed light on the foundation of science in the experience of the lifeworld represents one way of taking on this job—but, as I have already indicated, not the one I wish to pursue any further. In my discussion of the problematization of experience in the context of cognitive neuroscience, I have been reluctant to take a stand. As a social scientific observer I do not want my own views to take center stage. But, as this book is drawing to a close, I would like to shed some of my restraints and at least rule out one response to this problematization, which I personally regard as intellectually dishonest: the defense of a prescientific lifeworld against its

neuroscientific colonization. The pretheoretical naturalness, the “fullness and luxuriance of a mythical paradise” attributed to the lifeworld is, as Hans Blumenberg pointed out, a fiction.¹³¹ The lifeworld is not the world we live in. Its description is the fabrication of something we have always already left behind.¹³² As a “universe of pregiven self-evidence” it disappears the moment it is called into question. But asking questions about a world that usually seems perfectly natural to us is exactly what science and philosophy are about. “[T]he lifeworld is the state of consciousness under absolute exclusion of philosophy,”¹³³ Blumenberg sharply contended. It is the opposite of thought. Hence, categorical defenses of our “whole way of experiencing the lifeworld” against its problematization in cognitive neuroscience are signs of an anti-intellectual nostalgia for brainless certainty.

The point is not to uncritically accept the “new image of man” (the singular is already questionable) currently in the making in neuroscience, but to take up the challenge and to engage with and reflect on the research conducted in this field from the perspectives of both first- and second-order observation.¹³⁴ My own way of approaching this task has been a combination of anthropological fieldwork, historical inquiry, and philosophical analysis of the *logoi* of *anthropos* and associated practices of objectification and subjectification currently emerging

¹³¹ Hans Blumenberg, “Lebenswelt und Technisierung unter Aspekten der Phänomenologie,” in *Wirklichkeiten, in denen wir leben. Aufsätze und eine Rede* (Stuttgart: Reclam, 1981 [1963]), 23, 25.

¹³² Hans Blumenberg, *Lebenszeit und Weltzeit* (Frankfurt/M.: Suhrkamp, 2001 [1986]), 22.

¹³³ *Ibid.*, 32 (my translation—NL).

¹³⁴ Cf. Hannah Monyer et al., “Das Manifest. Elf führende Neurowissenschaftler über Gegenwart und Zukunft der Hirnforschung” *Gehirn & Geist*, no. 6 (2004).

in cognitive neuroscience in general and contemporary hallucinogen research in particular—an enterprise that could be looked at as a philosophical anthropology of the second order. Or, as the anthropologist Paul Rabinow called it: a “fieldwork in philosophy.” This enterprise does not seek to change the way scientific research is done, but to scrutinize its implications for how we conceive of ourselves and how we wish to conduct our lives.

My focus on a problematization in the sense of Foucault and Rabinow is orthogonal to the foundation of science in a tranquilizing lifeworld. Examining the multiplicity of perspectives and the antagonistic responses molding a particular problem undermines any sense of a stable univocal ground of meaning, on which our lives rest. This is mirrored by the pharmacological alienation effect of hallucinogens. The denaturalization of what we take for granted, the multiplication of viewpoints, and the ensuing loss of certainties can make the world appear a precarious place. But the flip side of the existential disquiet accompanying such questioning of the seemingly self-evident is the playfulness, which Vollenweider has cultivated in his hallucinogen experiences. From the far side of consciousness and from the reserved perspective of second-order observation, our fixed self-conceptions and our habitual experience of an imaginary lifeworld do seem to be illusory or constructed. But this momentary detachment provides the latitude necessary to pause, think, and reorient ourselves—and then meet the demands of the day again.

Bibliography

- Aarburg, Hans-Peter von, and Michael Stauffacher. "From Law Enforcement to Care. Changed Benefits and Harm of Heroin Use in Switzerland through a Shift in Drug Policy." In *European Studies on Drugs and Drug Policy. Selected Readings from the 14th International Conference of the European Society for Social Drug Research (ESSD)*, edited by Tom Decorte and Dirk Korf, 21-47. Brussels: VUB University Press, 2004.
- Agamben, Giorgio. *Infancy and History. Essays on the Destruction of Experience*. New York: Verso, 1993.
- . *The Open. Man and Animal* Stanford: Stanford University Press, 2004.
- Angst, Jules. "Gefahren des LSD." *Schweizer medizinische Wochenschrift* 97, no. 42 (1967): 1404.
- . "Halluzinogen-Abusus." *Schweizer medizinische Wochenschrift* 100, no. 16 (1970): 710-715.
- Ankeny, Rachel. "Fashioning Descriptive Models in Biology: Of Worms and Wiring Diagrams." *Philosophy of Science* 67 (2000): 260-272.
- . *Wormy Logic: Model Organisms As Case-Based Reasoning*, 2006 [cited 5 July 2006]. Available from <http://www.lse.ac.uk/collections/economichistory/>.
- Austin, John. "A Plea for Excuses." In *Philosophical Papers*, edited by J. O. Urmson and G. J. Warnock. Oxford: Oxford University Press, 1970.
- Baars, Bernard. "How Brain Reveals Mind. Neural Studies Support the Fundamental Role of Conscious Experience." *Journal of Consciousness Studies* 10, no. 9-10 (2003): 100-114.
- . "The Double Life of B.F. Skinner. Inner Conflict, Dissociation and the Scientific Taboo against Consciousness." *Journal of Consciousness Studies* 10, no. 1 (2003): 5-25.
- Bachelard, Gaston. *Die Bildung des wissenschaftlichen Geistes*. Frankfurt/M.: Suhrkamp, 1984.
- Baecker, Dirk. *Wozu Kultur?* Berlin: Kulturverlag Kadmos, 2000.
- Barondes, Samuel. *Better Than Prozac. Creating the Next Generation of Psychiatric Drugs*. New York: Oxford University Press, 2003.
- Basara, Lisa, and Michael Montagne. *Searching for Magic Bullets: Orphan Drugs, Consumer Activism, and Pharmaceutical Development*. New York: Pharmaceutical Product Press, 1994.
- Beaulieu, Anne. "Images Are Not the (Only) Truth: Brain Mapping, Visual Knowledge, and Iconoclasm." *Science, Technology, & Human Values* 27, no. 1 (2002): 53-86.
- . "The Brain at the End of the Rainbow. The Promises of Brain Scans in the Research Field and in the Media." In *Wild Science. Reading Feminism, Medicine and the Media*, edited by Janine Marchessault and Kim Sawchuk. London: Routledge, 2000.
- Becker, Howard. *Outsiders. Studies in the Sociology of Deviance*. London: The Free Press of Glencoe, 1963.

- Bellah, Robert. "Max Weber and World-Denying Love: A Look at the Historical Sociology of Religion." Humanities Center and Burke Lectureship on Religion and Society, University of California, 30 October 1997.
- Benz, Marco. *Mindscales*. Introduction [cited 28 March 2007]. Available from <http://www.mindscales.ch/intro.htm>.
- Beringer, Kurt. *Der Meskalinrausch. Seine Geschichte und Erscheinungsweise*. Berlin: Julius Springer, 1927.
- Betancourt, Michael. "A Taxonomy of Abstract Form Using Studies of Synesthesia and Hallucination." *Leonardo* 40, no. 1 (2007).
- Bezzel, Chris. *Wittgenstein zur Einführung*. Hamburg: Junius, 1988.
- Birkenhauer, Theresia. "'Der Text ist der Coyote. [...]' Und man weiß nicht, wie er sich verhält.'" In *Der Text ist der Coyote*. Heiner Müller. Bestandsaufnahme, edited by Christian Schulte and Brigitte Maria Mayer, 11-34. Frankfurt/M.: Suhrkamp, 2004.
- Bleuler, Eugen. *Dementia Praecox or The Group of Schizophrenias*. New York: International Universities Press, 1950 [1911].
- Blum, Richard. "Conclusions and Commentary." In *Utopiastes. The Use and Users of LSD-25*, edited by Richard Blum, 265-293. New York: Atherton, 1964.
- Blumenberg, Hans. *Die Legitimität der Neuzeit*. Frankfurt/M.: Suhrkamp, 1988.
- . "Lebenswelt und Technisierung unter Aspekten der Phänomenologie." In *Wirklichkeiten, in denen wir leben. Aufsätze und eine Rede*, 7-54. Stuttgart: Reclam, 1981 [1963].
- . *Lebenszeit und Weltzeit*. Frankfurt/M.: Suhrkamp, 2001 [1986].
- Boguski, Mark. "Comparative genomics: The mouse that roared." *Nature* 420 (2002): 515-516.
- Borck, Cornelius. *Hirnströme. Eine Kulturgeschichte der Elektroenzephalographie*. Göttingen: Wallstein, 2005.
- Bourdieu, Pierre. "'Fieldwork in Philosophy'." In *In Other Words. Essays Towards a Reflexive Sociology*, 3-33. Stanford: Stanford University Press, 1990.
- Bourguignon, Erika. *Religion, altered states of consciousness, and social change*. Columbus: Ohio University Press, 1973.
- Braden, William. "LSD and the Press." In *Psychedelics: The Uses and Implications of Hallucinogenic Drugs*, edited by Bernard Aaronson and Humphry Osmond, 400-418. Garden City (NY): Anchor Books, 1970.
- . "LSD and the Press." In *The Manufacture of News. A Reader*, edited by Stanley Cohen and Jock Mac Young, 248-262. Beverly Hills (CA): Sage Publications, 1973 ??? 1981 ???
- Bressloff, Paul, Jack Cowan, Martin Golubitsky, and Peter Thomas. "What geometric visual hallucinations tell us about the visual cortex." *Neural Comput.* 14, no. 3 (2002): 473-491.
- Bressloff, Paul, Jack Cowan, Martin Golubitsky, Peter Thomas, and Matthew Wiener. "Geometric visual hallucinations, Euclidean symmetry and the functional architecture of the striate cortex." *Philosophical Transactions of the Royal Society* 356, no. 1407 (2001): 299-339.

- Brickman, Ronald, Sheila Jasanoff, and Thomas Ilgen. *Controlling Chemicals. The Politics of Regulation in Europe and the United States*. Ithaca: Cornell University Press, 1985.
- Briggs, John Raleigh. "'Muscale Buttons'—Physiological Effects—Personal Experience." *The Medical Register. A Weekly Journal of Medicine and Surgery* 1 (1887): 276-277.
- Bühler, Benjamin, and Stefan Rieger. *Vom Übertier. Ein Bestiarium des Wissens*. Frankfurt/M.: Suhrkamp, 2006.
- Burt, Jonathan. *Rat*. London: Reaktion Books, 2006.
- Bush, George H. W. Presidential Proclamation 6158 18 July, 1990. Available from <http://www.loc.gov/loc/brain/proclaim.html>.
- Büttner, Jean-Martin. "Halluzinogene als Medikament und Sakrament." *Tages-Anzeiger*, 18 January 2006.
- Cahn, Rael. "Neurophysiological Correlates to Sensory and Cognitive Processing in Altered States of Consciousness." Ph.D. thesis, University of California, San Diego, 2006.
- . "Neurophysiological Correlates to the Experience of Self and Binocular Rivalry Stimulus Processing as Modulated by Meditation and Psilocybin Administration [unpublished study proposal]." 2005.
- Canguilhem, Georges. "A New Concept of Pathology: Error." In *The Normal and the Pathological*, edited by Georges Canguilhem, 275-287. New York: Zone Books, 1991.
- . *A Vital Rationalist. Selected Writing from Georges Canguilhem*. New York: Zone Books, 2000.
- . *Das Experimentieren in der Tierbiologie* (Preprint 189). Translated by Henning Schmidgen. Berlin: Max Planck Institute for the History of Science, [1965, orig.].
- . *The Normal and the Pathological*. New York: Zone Books, 1989.
- Carter, Olivia, John Pettigrew, Felix Hasler, Guy Wallis, Guang Liu, Daniel Hell, and Franz Vollenweider. "Modulating the Rate and Rhythmicity of Perceptual Rivalry Alternations with the Mixed 5-HT_{2A} and 5-HT_{1A} Agonist Psilocybin." *Neuropsychopharmacology* 30 (2005): 1154-1162.
- Castaneda, Carlos. *A Separate Reality: Further Conversations with Don Juan*. New York: Simon and Schuster, 1971.
- . *Journey to Ixtlan*. New York: Simon and Schuster, 1972.
- . *The Teachings of Don Juan. A Yaqui Way of Knowledge*. Berkeley: University of California Press, 1968.
- Chalmers, David. *The Conscious Mind. In Search of a Fundamental Theory*. New York: Oxford University Press, 1996.
- Christen, Markus. "The Role of Spike Patterns in Neuronal Information Processing. A Historically Embedded Conceptual Clarification " Ph.D. thesis, Swiss Federal Institute of Technology, 2006.
- Churchland, Patricia. *Neurophilosophy. Toward a Unified Science of the Mind-Brain*. Cambridge (Mass.): The MIT Press, 1986.
- Clausberg, Karl. *Neuronale Kunstgeschichte. Selbstdarstellung als Gestaltungsprinzip*. Wien: Springer, 1999.

- Clifford, James. *Routes. Travel and Translation in the Late Twentieth Century*. Cambridge (Mass.): Harvard University Press, 1997.
- Cohen, Sidney. *The Beyond Within. The LSD Story*. New York: Atheneum, 1972.
- Cohn, Simon. "Increasing resolution, intensifying ambiguity: an ethnographic account of seeing life in brain scans." *Economy and Society* 33, no. 1 (2004): 52-76.
- Council on Spiritual Practices [cited 28 February 2007]. Available from www.csp.org.
- Cowell, Alan. "Oxford Seeks More Curbs on Protests to Aid Animals." *New York Times*, 19 May 2006.
- Crick, Francis. *The Astonishing Hypothesis. The Scientific Search for the Soul*. New York: Touchstone, 1995.
- . *What Mad Pursuit. A Personal View of Scientific Discovery*. New York: Basic Books, 1990.
- Crick, Francis, and Christof Koch. "Towards a neurobiological theory of consciousness." *Seminars in the Neurosciences* 2 (1990): 263-275.
- Daston, Lorraine. "Die kognitiven Leidenschaften: Staunen und Neugier im Europa der frühen Neuzeit." In *Wunder, Beweise und Tatsachen. Zur Geschichte der Rationalität*, 77-97. Frankfurt/M.: Fischer, 2001.
- . *Eine kurze Geschichte der wissenschaftlichen Aufmerksamkeit*. München: Carl Friedrich von Siemens Stiftung, 2000.
- . "Objectivity and the Escape from Perspective." *Social Studies of Science* 22 (1992): 592-618.
- Daston, Lorraine, and Peter Galison. "The Image of Objectivity." *Representations* 40 (1992): 81-128.
- Daston, Lorraine, and Fernando Vidal, eds. *The Moral Authority of Nature*. Chicago: University of Chicago Press, 2004.
- Davenport-Hines, Richard. *The Pursuit of Oblivion. A Social History of Drugs*. London: Phoenix, 2002.
- Dennett, Daniel. "Animal Consciousness. What Matters and Why?" In *Brainchildren. Essays on Designing Minds*, 337-350. Cambridge (Mass.): MIT Press, 1998.
- Dierse, U. "Einsamkeit." In *Historisches Wörterbuch der Philosophie*, edited by Joachim Ritter, 408-413. Basel: Schwabe & Co., 1972.
- Dittrich, Adolf. *Ätiologie-unabhängige Strukturen veränderter Wachbewußtseinszustände. Ergebnisse empirischer Untersuchungen über Halluzinogene I. und II. Ordnung, sensorische Deprivation, hypnagoge Zustände, hypnotische Verfahren sowie Reizüberflutung*. Stuttgart: Ferdinand Enke Verlag, 1985.
- . "Psychological Aspects of Altered States of Consciousness of the LSD Type: Measurement of their Basic Dimensions and Prediction of Individual Differences." In *50 Years of LSD. Current Status and Perspectives of Hallucinogens*, edited by A. Pletscher and Dieter Ladewig. New York: The Parthenon Publishing Group, 1994.

- Dobkin de Rios, Marlene. "Man, Culture, and Hallucinogens: An Overview." In *Cannabis and Culture*, edited by Vera Rubin, 401-416. The Hague: Mouton Publishers, 1975.
- . "The Anthropology of Drug-induced Altered States of Consciousness. Some Theoretical Considerations." *Sociologus* 1, no. 21 (1972): 147-151.
- . *Visionary Vine. Hallucinogenic Healing in the Peruvian Amazon*. San Francisco: Chandler Publishing, 1972.
- Dobkin de Rios, Marlene, and Fred Katz. "Some Relationships between Music and Hallucinogenic Ritual: The 'Jungle Gym' in Consciousness." *Ethos* 3, no. 1 (1975): 64-76.
- Doblin, Richard. "Regulation of the Medical Use of Psychedelics and Marijuana." Harvard University, 2000.
- Dodd, James. *Crisis and Reflection. An Essay of Husserl's 'Crisis of the European Sciences'*. Dordrecht: Kluwer Academic Publishers, 2004.
- Doyle, Richard. "Hyberbolic: Divining Ayahuasca." *Discourse* 27, no. 1 (2005): 6-33.
- . "LSDNA: Rhetoric, Consciousness Expansion, and the Emergence of Biotechnology." *Philosophy and Rhetoric* 35, no. 2 (2002): 153-174.
- Dreyfus, Hubert. *Being-in-the-World. A Commentary on Heidegger's *Being in the World*, Division I*. Cambridge (Mass.): The MIT Press, 1991.
- Dreyfus, Hubert, and Paul Rabinow. *Michel Foucault. Beyond Structuralism and Hermeneutics*. Chicago: The University of Chicago Press, 1982.
- Dror, Otniel. "The Affect of Experiment. The Turn to Emotions in Anglo-American Physiology, 1900-1940." *Isis* 90, no. 2 (1999): 205-237.
- Drug Enforcement Agency. *LSD, 2006* [cited 13 December 2006]. Available from <http://www.dea.gov/concern/lsd.html>.
- . *Pickard And Apperson Sentenced On LSD Charges. Largest LSD Lab Seizure In DEA History, ??? Available from* <http://www.usdoj.gov/dea/pubs/states/newsrel/sanfran112403.html>.
- Dumit, Joseph. *Picturing Personhood: Brain Scans and Biomedical Identity*. Princeton: Princeton University Press, 2004.
- Dyck, Erika. "Flashback: Psychiatric Experimentation with LSD in Historical Perspective." *The Canadian Journal of Psychiatry* 50, no. 7 (2005): 381-388.
- Edelman, Gerald. *Bright Air, Brilliant Fire. On the Matter of the Mind*. New York: Basic Books, 1992.
- . *Wider Than the Sky. The Phenomenal Gift of Consciousness*. New Haven: Yale University Press, 2004.
- Edmond, Andrew. "Pioneers of the Virtual Underground. A History of our Culture." *The Resonance Project*, no. 1 (1997).
- Emboden, William. *Narcotic Plants*. New York: Macmillan, 1972.
- Estroff, Sue. *Making It Crazy. An Ethnography of Psychiatric Clients in an American Community*. Berkeley: University of California Press, 1981.
- Fernandez, James. "Tabernanthe iboga. Narcotic Ecstasy and the Work of the Ancestors." In *Flesh of the Gods. The Ritual Use of Hallucinogens*, edited by Peter Furst. New York: Praeger, 1972.

- Ferrari, Michel, and Adrien Pinard. "Death and Resurrection of a Disciplined Science of Consciousness." *Journal of Consciousness Studies* 13, no. 12 (2006): 75-96.
- Fischer, Roland, F. Georgi, and P. Weber. "Psychophysische Korrelationen. VIII. Modellversuche zum Schizophrenieproblem. Lysergsäurediäthylamid und Mescaline." *Schweizer medizinische Wochenschrift* 81 (1951): 817-818.
- Foucault, Michel. "An Interview by Stephen Riggins." In *Ethics. Subjectivity and Truth. Essential Works of Foucault, 1954-1984*, edited by Paul Rabinow, 121-133. New York: The New Press, 1997 [1982].
- . *Discipline and Punish: The Birth of the Prison*. New York: Vintage Books, 1977.
- . "Interview with Michel Foucault [by Duccio Trombadori]." In *Power. Essential Works of Foucault, 1954-1984*, edited by James Faubion, 239-297. New York: The New Press, 2000 [1980].
- . "Life: Experience and Science." In *Aesthetics, Method, and Epistemology. Essential Works of Foucault. 1954-1984*, edited by James Faubion, 465-478. New York: The New Press, 1998.
- . *Madness and Civilization: A History of Insanity in the Age of Reason*. New York: Random House, 1965.
- . "Preface to The History of Sexuality, Volume Two." In *Essential Works of Michel Foucault, vol. 1, Ethics: Subjectivity and Truth*, edited by Paul Rabinow, 199-205. New York: The New Press, 1997.
- . *Sécurité, Territoire, Population. Cours au Collège de France, 1977-78*. Paris: Seuil/Gallimard, 2004.
- . "Security, Terror, and Population." In *Ethics. Subjectivity and Truth. Essential Works of Foucault, 1954-1984*, edited by Paul Rabinow, 67-71. New York: The New Press, 1997.
- . "Self Writing." In *Ethics: Subjectivity and Truth*, edited by Paul Rabinow, 207-222. New York: The New Press, 1997.
- . *Society Must Be Defended. Lectures at the Collège de France, 1975-76*. New York: Picador, 2003.
- . "Technologies of the Self." In *Technologies of the Self. A Seminar with Michel Foucault*, edited by Luther Martin, Huck Gutman and Patrick Hutton, 16-49. Amherst: University of Massachusetts Press, 1988.
- . *The Care of the Self. The History of Sexuality. Vol. 3*. New York: Vintage Books, 1986.
- . *The Hermeneutics of the Subject. Lectures at the Collège de France, 1981-1982*. New York: Palgrave Macmillan, 2005.
- . *The History of Sexuality. Vol. I, An Introduction*. Translated by Robert Hurley. New York: Vintage Books, 1978.
- . *The Order of Things. An Archaeology of the Human Sciences*. New York: Random House, 1973.
- . *The Use of Pleasure. The History of Sexuality. Vol. 2*. New York: Vintage Books, 1985.
- Francom, P., D. Andrenyak, H. K. Lim, R. R. Bridges, R. L. Foltz, and Reese Jones. "Determination of LSD in urine by capillary column gas

- chromatography and electron impact mass spectrometry." *Journal of Analytical Toxicology* 12, no. 1 (1988): 1-8.
- Franklin, Sarah. "Stem Cells R Us. Emergent Life Forms and the Global Biological." In *Global Assemblages. Technology, Politics, and Ethics as Anthropological Problems*, edited by Aihwa Ong and Stephen Collier, 59-78. Malden (MA): Blackwell Publishing, 2005.
- Freud, Sigmund. "Das Unbehagen in der Kultur." In *Gesammelte Werke*, 419-506. Frankfurt/M.: Fischer, 1999 [1930].
- Fujimura, Joan. "Constructing 'Do-Able' Problems in Cancer Research: Articulating Alignment." *Social Studies of Science* 17, no. 2 (1987): 257-293.
- Fuller, Robert. *Stairways to Heaven. Drugs in American Religious History*. Boulder (CO): Westview Press, 2000.
- Furst, Peter. *Flesh of the Gods. The Ritual Use of Hallucinogens*. New York: Praeger, 1972.
- . *Hallucinogens and Culture*. San Francisco: Chandler & Sharp, 1976.
- . "Introduction." In *Flesh of the Gods. The Ritual Use of Hallucinogens*, edited by Peter Furst, vii-xvi. New York: Praeger Publishers, 1972.
- Gaiger, Jason. "Schiller's Theory of Landscape Depiction." *Journal of the History of Ideas* 61, no. 1 (2000): 115-132.
- Galison, Peter. "Trading Zone. Coordinating Action and Belief." In *The Science Studies Reader*, edited by Mario Biagioli, 137-160. New York: Routledge, 1999.
- Gamma, Alex, Dietrich Lehmann, Edi Frei, Kazuki Iwata, Roberto Pascual-Marqui, and Franz Vollenweider. "Comparison of Simultaneously Recorded [H215O]-PET and LORETA During Cognitive and Pharmacological Activation " *Human Brain Mapping* 22 (2004): 83-96.
- Geertz, Clifford. *Available Light. Anthropological Reflections on Philosophical Topics*. Princeton: Princeton University Press, 2000.
- Genz, Henning. *Gedankenexperimente*. Hamburg: Rowohlt, 2005.
- Geyer, Christian. "Vorwort." In *Hirnforschung und Willensfreiheit. Zur Deutung der neuesten Experimente*, edited by Christian Geyer, 9-19. Frankfurt/M.: Suhrkamp, 2004.
- , ed. *Hirnforschung und Willensfreiheit. Zur Deutung der neuesten Experimente*. Frankfurt/M.: Suhrkamp, 2004.
- Geyer, Mark. "Why Study Hallucinogenic Drugs in Animals?" *The Heffter Review of Psychedelic Research* 1 (1998): 33-38.
- Geyer, Mark, and Kirsten Krebs. "Serotonin Receptor Involvement in an Animal Model of the Acute Effects of Hallucinogens." In *Hallucinogens: An Update (NIDA Research Monograph 146)*, edited by G. C. Lin and R. A. Glennon, 124-156, 1994.
- Geyer, Mark, and Bitá Moghaddam. "Animal Models Relevant to Schizophrenia Disorders." In *Neuropsychopharmacology. The Fifth Generation of Progress*, edited by Kenneth Davis, Dennis Charney, Joseph Coyle and Charles Nemeroff, 689-701. Philadelphia (PA): Lippincott, Williams, and Wilkins, 2002.

- Giere, Ronald. "How Models Are Used to Represent Reality." *Philosophy of Science* 71 (2004): 742-752.
- Gouzoulis-Mayfrank, Euphrosyne, Karsten Heekeren, Anna Neukirch, Martin Stoll, Carsten Stock, Jörg Daumann, Maja Obradovic, and Karl-Artur Kovar. "Inhibition of Return in the Human 5HT(2A) Agonist and NMDA Antagonist Model of Psychosis." *Neuropsychopharmacology* 31, no. 2 (2006): 431-441.
- Gouzoulis-Mayfrank, Euphrosyne, Karsten Heekeren, Anna Neukirch, Martin Stoll, Carsten Stock, Maja Obradovic, and Karl-Artur Kovar. "Psychological Effects of (S)-Ketamine and N,N-Dimethyltryptamine (DMT): A Double-Blind, Cross-Over Study in Healthy Volunteers." *Pharmacopsychiatry* 38 (2005): 301-311.
- Gouzoulis-Mayfrank, Euphrosyne, Karsten Heekeren, Bernhard Thelen, H. Lindenblatt, Karl-Artur Kovar, Henning Sass, and Mark Geyer. "Effects of the hallucinogen psilocybin on habituation and prepulse inhibition of the startle reflex in humans." *Behavioural Pharmacology* 9, no. 7 (1998): 561-566.
- Gouzoulis-Mayfrank, Euphrosyne, Leo Hermle, and Henning Sass. "Psychedelische Erlebnisse zu Beginn produktiver Episoden endogener Psychosen." *Der Nervenarzt* 65 (1994): 198-201.
- Gouzoulis-Mayfrank, Euphrosyne, Leo Hermle, Bernhard Thelen, and Henning Sass. "History, Rationale and Potential of Human Experimental Hallucinogenic Drug Research in Psychiatry." *Pharmacopsychiatry* 31 (1998): 63-68.
- Graham, F. "The more or less startling effects of weak prestimulation." *Psychophysiology* 12 (1975): 238-248.
- Grandin, Temple, and Catherine Johnson. *Animals in Translation. Using the Mysteries of Autism to Decode Animal Behavior* New York: Scribner, 2005.
- Gray, Jeffrey. *Consciousness: Creeping up on the Hard Problem*. Oxford: Oxford University Press, 2004.
- Greenfield, Robert. *Timothy Leary. A Biography*. Orlando: Harcourt, 2006.
- Grey, Alex. *Alex Grey on Cyberart as a Visionary Tool*. Interview with Karen St. Pierre, 1995 [cited 11 April 2007]. Available from <http://alexgrey.net/interviews/cyberart.html>.
- . *The Mission of Art*. Boston: Shambhala, 2001.
- Griffiths, Roland, William Richards, U. McCann, and R. Jesse. "Psilocybin can occasion mystical-type experiences having substantial and sustained personal meaning and spiritual significance." *Psychopharmacology* 187, no. 3 (2006): 268-283.
- Grinspoon, Lester, and James Bakalar. *Psychedelic Drugs Reconsidered*. New York: Basic Books, 1979.
- , eds. *Psychedelic Reflections*. New York: Human Sciences Press, 1983.
- Grob, Charles. "Psychiatric Research with Hallucinogens: What Have We Learned?" In *Hallucinogens. A Reader*, edited by Charles Grob, 263-291. New York: Jeremy P. Tarcher / Putnam, 2002.

- . "The Psychology of Ayahuasca." In *Hallucinogens. A Reader*, edited by Charles Grob, 185-216. New York: Jeremy P. Tarcher / Putnam, 2002.
- Grob, Charles, Dennis McKenna, James Callaway, Glacus Brito, Edison Neves, Guilherme Oberlaender, Oswaldo Saide, Elizieu Labigalini, Cristiane Tacla, Claudio Miranda, Rick Strassman, and Kyle Boone. "Human Psychopharmacology of Hoasca, A Plant Hallucinogen Used in Ritual Context in Brazil." *The Journal of Nervous and Mental Disease* 184, no. 2 (1996): 86-94.
- Grof, Stanislav. *Realms of the Human Unconscious. Observations from LSD Research*. New York: Viking Press, 1975.
- Grunenberg, Christoph, ed. *Summer of Love. Psychedelische Kunst der 60er Jahre*. Ostfildern-Ruit: Hatje Cantz Verlag, 2005.
- Guerrini, Anita. *Experimenting with Humans and Animals. From Galen to Animal Rights*. Baltimore: Johns Hopkins University Press, 2003.
- . "The Ethics of Animal Experimentation in Seventeenth-Century England." *Journal of the History of Ideas* 50, no. 3 (1989): 391-407.
- Habermas, Jürgen. *Zwischen Naturalismus und Religion. Philosophische Aufsätze*. Frankfurt/M.: Suhrkamp, 2005.
- Hacking, Ian. "The Looping Effects of Human Kinds." In *Causal Cognition: An Multidisciplinary Debate*, edited by Dan Sperber, David Premack and Ann Premack, 351–383. Oxford: Oxford University Press, 1995.
- Hadot, Pierre. *Philosophy as a Way of Life. Spiritual Exercises from Socrates to Foucault*. Oxford: Blackwell, 1995.
- Häggqvist, Sören. *Thought Experiments in Philosophy*. Stockholm: Almqvist & Wiksell International, 1996.
- Hagner, Michael. *Der Geist bei der Arbeit. Historische Untersuchungen zur Hirnforschung*. Göttingen: Wallstein, 2006.
- . *Homo cereбрalis. Der Wandel vom Seelenorgan zum Gehirn*. Frankfurt/M.: Insel, 2000.
- Halpern, John, and Harrison Pope. "Hallucinogens on the Internet. A Vast New Source of Underground Drug Information." *American Journal of Psychiatry* 158 (2001): 481-483.
- Halter, Martin. "Alles ist erleuchtet." *Frankfurter Allgemeine Zeitung*, 20 January 2006, 34.
- Hampe, Michael, and Maria-Sibylla Lotter. "Einleitung: Enttäuschende Erfahrungen." In *'Die Erfahrungen, die wir machen, sprechen gegen die Erfahrungen, die wir haben': über Formen der Erfahrung in den Wissenschaften*, edited by Michael Hampe and Maria-Sibylla Lotter. Berlin: Duncker und Humblot, 2000.
- Harner, Michael. "Preface." In *Hallucinogens and Shamanism*, edited by Michael Harner. Oxford: Oxford University Press, 1973.
- . "The Sound of Rushing Water." In *Hallucinogens and Shamanism*, edited by Michael Harner, 15-27. London: Oxford University Press, 1973.
- , ed. *Hallucinogens and Shamanism*. Oxford: Oxford University Press, 1973.
- Harrison, Ann. "LSD: The Geek's Wonder Drug?" *WIRED*, 16 January 2006.

- Hartman, Alan, and Leo Hollister. "Effect of Mescaline, Lysergic Acid Diethylamide and Psilocybin on Color Perception." *Psychopharmacologia* 4 (1963): 441-451.
- Hasler, Felix. "Alle lieben Albert." *Die Weltwoche*, 19 January 2006, 12-14.
- . "Ein Gefühl, schöner als Glück." *Weltwoche*, no. 50 (2005).
- . "LSD macht keinen zum Genie [interview by Thomas Gull and Roger Nickl]." *Unimagazin*, no. 2 (2007): 39-42.
- Healy, David. *The Antidepressant Era*. Cambridge (Mass.): Harvard University Press, 1997.
- . *The Creation of Psychopharmacology*. Cambridge (Mass.): Harvard University Press, 2002.
- . *The Psychopharmacologists*. Vol. II. London: Chapman & Hall, 1998.
- Hecht, Jennifer Michael. *The End of the Soul. Scientific Modernity, Atheism, and Anthropology in France*. New York: Columbia University Press, 2003.
- Heffter Research Institute. *Research at the Frontiers of the Mind. Case for Support*, N.D.
- Henderson, Leigh. "LSD Use and LSD Users. Questions and Answers About LSD." In *LSD. Still With Us After All These Years*, edited by Leigh Henderson and William Glass, 77-98. San Francisco: Jossey-Bass Publishers, 1994.
- Hermle, Leo, Matthias Fünfgeld, Godehard Oepen, Hanno Botsch, Dieter Borchardt, Euphrosyne Gouzoulis, Rose Fehrenbach, and Manfred Spitzer. "Mescaline-Induced Psychopathological, Neuropsychological, and Neurometabolic Effects in Normal Subjects: Experimental Psychosis as a Tool for Psychiatric Research." *Biological Psychiatry* 32 (1992): 976-991.
- Hermle, Leo, Euphrosyne Gouzoulis, Godehard Oepen, Manfred Spitzer, Karl-Artur Kovar, Dieter Borchardt, Matthias Fünfgeld, and M. Berger. "Zur Bedeutung der historischen und aktuellen Halluzinogenforschung in der Psychiatrie." *Der Nervenarzt* 64 (1993): 562-571.
- Hermle, Leo, Godehard Oepen, and Manfred Spitzer. "Zur Bedeutung der Modellpsychosen." *Fortschritte der Neurologie, Psychiatrie* 56 (1988): 48-58.
- Hermle, Leo, Manfred Spitzer, D Borchardt, and Euphrosyne Gouzoulis. "Beziehungen der Modell- bzw. Drogenpsychosen zu schizophrenen Erkrankungen." *Fortschritte der Neurologie, Psychiatrie* 60 (1992): 383-92.
- Hettling, Manfred. "Bürgerlichkeit. Eine ungesellige Geselligkeit." In *Eine kleine Geschichte der Schweiz. Der Bundesstaat und seine Traditionen*, edited by Manfred Hettling, Mario König, Martin Schaffner, Andreas Suter and Jakob Tanner, 227-264. Frankfurt/M.: Suhrkamp, 1998.
- Hilts, Philip. *Protecting America's Health: The FDA, Business, and One Hundred Years of Regulation*. New York: Alfred A. Knopf, 2003.
- Hoffer, Abram, and Humphry Osmond. "The adrenochrome model and schizophrenia." *The Journal of Nervous and Mental Disease* 128, no. 1 (1959): 18-35.

- Hoffer, Abram, Humphry Osmond, and John Smythies. "Schizophrenia: A New Approach. II. Result of a Year's Research." *Journal of Mental Science* 100, no. 418 (1954): 29-45.
- Hofmann, Albert. *LSD. My Problem Child*. New York: McGraw-Hill, 1980.
- Hollister, Leo. "Drug-induced psychoses and schizophrenic reactions, a critical comparison." *Annals of the New York Academy of Sciences* 96 (1962): 80-88.
- Holmes, Douglas, and George Marcus. "Cultures of Expertise and the Management of Globalization: Toward the Re-Functioning of Ethnography." In *Global Assemblages. Technology, Politics, and Ethics as Anthropological Problems*, edited by Stephen Collier and Aihwa Ong, 235-252. London: Blackwell, 2004.
- Horgan, John. *Rational Mysticism. Dispatches from the Border between Science and Spirituality*. Boston: Houghton Mifflin Company, 2003.
- Husserl, Edmund. *Die Krisis der europäischen Wissenschaften und die transzendente Phänomenologie. Eine Einleitung in die phänomenologische Philosophie. Vol. VI, Husserliana. Gesammelte Werke*. The Hague: Martinus Nijhoff, 1976.
- Huxley, Aldous. *Heaven and Hell*. London: Chatto & Windus, 1956.
- . *Island*. New York: Harper & Row, 1962.
- . *Moksha. Writings on Psychedelics and the Visionary Experience 1931-1963*. London: Chatto & Windus, 1980.
- . *The Doors of Perception*. London: Chatto & Windus, 1954.
- . *The Perennial Philosophy*. New York: Harpers & Brothers Publishers, 1944.
- Jack, Anthony, and Andreas Roepstorff. "Why Trust the Subject?" *Journal of Consciousness Studies* 10, no. 9–10 (2003): v–xx.
- , eds. *Trusting the Subject? The Use of Introspective Evidence in Cognitive Science*. 2 vols. Charlottesville (VA): Imprint Academic, 2004.
- James, William. *Essays in Radical Empiricism*. New York: Dover Publications, 2003.
- . "Human Immortality: Two Supposed Objections to the Doctrine. Preface to Second Edition." In *William James. Writings 1878-1999*, edited by Gerald Myers, 1098-1127. New York: The Library of America, 1999 [1898].
- Jaspers, Karl. *Allgemeine Psychopathologie*. Berlin: Springer, 1923.
- . *General Psychopathology*. Translated by J. Hoenig and Marian Hamilton. Manchester: Manchester University Press, 1963.
- Jay, Martin. *Songs of Experience. Modern American and European Variations on a Universal Theme*. Berkeley: University of California Press, 2005.
- Jay, Mike, ed. *Artificial Paradises. A Drugs Reader*. London: Penguin, 1999.
- Jenkins, Philip. *Synthetic Panics. The Symbolic Politics of Designer Drugs*. New York: New York University Press, 1999.
- Jonnes, Jill. *Hep-Cats, Narcs, and Pipe-Dreams. A History of America's Romance with Illegal Drugs*. Baltimore: Johns Hopkins University Press, 1996.

- Kersting, Wolfgang, and Claus Langbehn, eds. *Kritik der Lebenskunst*. Frankfurt/M.: Suhrkamp, 2007.
- Klerman, Gerald. "Psychotropic Hedonism vs. Pharmacological Calvinism." *Hastings Center Report* 2, no. 3 (1972).
- Klüver, Heinrich. *Mescal and Mechanisms of Hallucination*. Chicago: University of Chicago Press, 1966.
- . *Mescal and the Mechanisms of Hallucination*. Chicago: University of Chicago Press, 1966.
- . *Mescal: The 'Divine' Plant and Its Psychological Effects*. London: Kegan Paul, Trench, Trubner, and Company, 1928.
- Koerner, Jon, and James Appel. "Psilocybin as a discriminative stimulus: lack of specificity in an animal behavior model for 'hallucinogens'." *Psychopharmacology* 76, no. 2 (1982): 130-135.
- Kometer, Michael. "Elektrophysiologische Korrelate visueller und kognitiver Prozesse und deren Modulation durch Psilocybin." *Lizentiatsarbeit*, University of Zurich, 2006.
- Kraepelin, Emil. *Ueber die Beeinflussung einfacher psychischer Vorgänge durch einige Arzneimittel. Experimentelle Untersuchungen*. Jena: Gustav Fischer, 1892.
- Krämer, Sybille. "Einleitung." In *Bewußtsein. Philosophische Beiträge*, edited by Sybille Krämer, 9-15. Frankfurt/M.: Suhrkamp, 1996.
- Kühne, Ulrich. *Die Methode des Gedankenexperiments*. Frankfurt/M.: Suhrkamp, 2005.
- Lakoff, Andrew. *Pharmaceutical Reason. Knowledge and Value in Global Psychiatry*. Cambridge (UK): Cambridge University Press, 2005.
- Lakoff, Andrew, and Stephen Collier. "Ethics and the Anthropology of Modern Reason." *Anthropological Theory* 4, no. 4 (2004): 419-434.
- Langlitz, Nicolas. *Die Zeit der Psychoanalyse. Lacan und das Problem der Sitzungsdauer*. Frankfurt/M.: Suhrkamp, 2005.
- . "Tripping in Solitude. Introducing Honza Samotar by Way of John Lilly." In *Introspective Self-Rapports. Shaping Ethical and Aesthetic Concepts, 1850-2006 (Preprint 322)*, edited by Katrin Solhdju, 81-92. Berlin: Max-Planck-Institut für Wissenschaftsgeschichte, 2006.
- Latour, Bruno. "What Rules of Method for the New Socio-Scientific Experiments?" In *Experimental Cultures: Configurations between Science, Art, and Technology, 1830-1950 (Preprint 213)*, 123-135. Berlin: Max-Planck-Institut für Wissenschaftsgeschichte, 2001.
- Leary, Timothy. *Flashbacks. A Personal and Cultural History of an Era. An Autobiography*. New York: G. P. Putnam's Sons, 1983.
- . *Politik der Ekstase*. Hamburg: Christian Wegner Verlag, 1970 [1968].
- . *The Politics of Ecstasy*. London: MacGibbon & Kee, 1970.
- Leary, Timothy, George Litwin, and Ralph Metzner. "Reactions to Psilocybin Administered in a Supportive Environment." *Journal of Nervous and Mental Disease* 137, no. 6 (1963): 561-573.

- Leary, Timothy, Ralph Metzner, and Richard Alpert. *The Psychedelic Experience. A Manual Based on the Tibetan Book of the Dead*. New Hyde Park (NY): University Books, 1964.
- Lee, Martin, and Bruce Shlain. *Acid Dreams. The Complete Social History of LSD: The CIA, the Sixties, and Beyond*. New York: Grove Press, 1992.
- Lemov, Rebecca. *World as Laboratory. Experiments with Mice, Mazes, and Men*. New York: Hill & Wang, 2005.
- Letcher, Andy. *Shroom. A Cultural History of the Magic Mushroom*. London: Faber and Faber, 2006.
- Leuner, Hanscarl. *Die experimentelle Psychose. Ihre Psychopharmakologie, Phänomenologie und Dynamik in Beziehung zur Person*. Berlin: Springer, 1962.
- . *Halluzinogene. Psychische Grenzzustände in Forschung und Psychotherapie*. Bern: Huber, 1981.
- Levine, Joseph. "Materialism and Qualia: The Explanatory Gap." *Pacific Philosophical Quarterly* 64 (1983): 354-361.
- Libet, Benjamin. *Mind Time. The Temporal Factor in Consciousness*. Boston: Harvard University Press, 2004.
- Libet, Benjamin, E. W. Wright, and C. A. Gleason. "Readiness-potentials preceding unrestricted 'spontaneous' vs. pre-planned voluntary acts." *Electroencephalography and Clinical Neurophysiology* 54, no. 3 (1982): 322-35.
- Lilly, John. *Das tiefe Selbst*. Basel: Sphinx, 1988.
- . *Programming and Metaprogramming in the Human Biocomputer. Theory and Experiments*. New York: The Julian Press, 1972.
- . *The Center of the Cyclone. An Autobiography of Inner Space*. New York: Julian Press, 1972.
- . *The Scientist. A Novel Autobiography*. Philadelphia: J. B. Lippincott Company, 1978.
- Lim, H. K., D. Andrenyak, P. Francom, R. L. Foltz, and Reese Jones. "Quantification of LSD and N-demethyl-LSD in urine by gas chromatography/resonance electron capture ionization mass spectrometry." *Analytical Chemistry* 60, no. 14 (1988): 1420-1425.
- Luhmann, Niklas. "Die Soziologie des Wissens: Probleme ihrer theoretischen Konstruktion." In *Gesellschaftsstruktur und Semantik. Studien zur Wissenssoziologie der modernen Gesellschaft*, 151-180. Frankfurt/M.: Suhrkamp, 1999.
- . *Observations on Modernity*. Stanford: Stanford University Press, 1998.
- . "Soziologische Aufklärung." In *Soziologische Aufklärung. Aufsätze zur Theorie sozialer Systeme*, 66-91. Opladen: Westdeutscher Verlag, 1970.
- Luhmann, Niklas, and Peter Fuchs. *Reden und Schweigen*. Frankfurt/M.: Suhrkamp, 1989.
- Lynch, Michael. "Sacrifice and the Transformation of the Animal Body into a Scientific Object: Laboratory Culture and Ritual Practice in the Neurosciences." *Social Studies of Science* 18, no. 2 (1988): 265-289.

- Lyotard, Jean-François. *The Postmodern Condition. A Report on Knowledge*. Minneapolis: University of Minnesota Press, 1984.
- Macey, David. *The Lives of Michel Foucault*. London: Hutchinson, 1993.
- Macho, Thomas, and Annette Wunschel, eds. *Science & Fiction. Über Gedankenexperimente in Wissenschaft, Philosophie und Literatur*. Frankfurt/M.: Fischer, 2004.
- MacIntyre, Alasdair. *After Virtue. A Study in Moral Theory*. Notre Dame: University of Notre Dame Press, 1984.
- Maehle, Andreas-Holger. *Kritik und Verteidigung des Tierversuchs. Die Anfänge der Diskussion im 17. und 18. Jahrhundert*. Stuttgart: Franz Steiner Verlag, 1992.
- . "Selbstversuche und subjektive Erfahrung in der Opiumforschung des 18. Jahrhunderts." *Würzburger Medizinhistorische Mitteilungen* 13 (1995): 287-297.
- Mark, Lisa, ed. *Ecstasy. In and About Altered States*. Los Angeles: The Museum of Contemporary Art, 2005.
- Markoff, John. *What the Dormouse Said. How the 60s Counterculture Shaped the Personal Computer Industry*. London: Viking, 2005.
- Masters, Robert, and Jean Houston. *Psychedelic Art*. New York: Grove Press, 1968.
- . *Psychedelische Kunst*. München: Droemer Knaur, 1969.
- . *The Varieties of Psychedelic Experience. The Classic Guide to the Effects of LSD on the Human Psyche*. 2000 [1966]: Park Street Press, 2000 [1966].
- McAllister, William. *Drug Diplomacy in the Twentieth Century. An International History*. New York: Routledge, 2000.
- McDermott, John. *The Culture of Experience. Philosophical Essays in the American Grain*. New York: New York University Press, 1976.
- McGee, Glenn. "Shroom Science: Safe and Effective? Fifty years after its introduction to science, psilocybin returns to mainstream clinical research." *The Scientist* 21, no. 2 (2007): 24.
- Meincke, Ulrich, Euphrosyne Gouzoulis-Mayfrank, and Henning Sass. "Der Startle-Reflex in der Schizophrenieforschung." *Der Nervenarzt* 72, no. 11 (2001): 844-852.
- Metzinger, Thomas. *Being No One. The Self-Model Theory of Subjectivity*. Cambridge (Mass.): MIT Press, 2003.
- . "Hirnforschung, Neurotechnologie, Bewußtseinskultur. Medizin-ethische, anthropologische und sozialphilosophische Fragen der Zukunft." In *Die Zukunft der Medizin. Neue Wege zur Gesundheit?*, edited by Gert Kaiser, Johannes Siegrist, Eva Rosenfeld and Katharina Wetzel-Vandai, 301-312. Frankfurt/M.: Campus, 1996.
- . "Intelligente Drogenpolitik für die Zukunft." *Gehirn & Geist*, no. 1-2 (2006): 32-37.
- . "Introduction: Consciousness Research at the End of the Twentieth Century." In *Neural Correlates of Consciousness. Empirical and*

- Conceptual Questions, edited by Thomas Metzinger, 1-16. Cambridge (Mass.): MIT Press, 2000.
- . Subjekt und Selbstmodell. Die Perspektivität phänomenalen Bewußtseins vor dem Hintergrund einer naturalistischen Theorie mentaler Repräsentationen. Paderborn: mentis Verlag, 1999.
- . "Wenn die Seele verlorengeht. Der Fortschritt in den Neurowissenschaften erfordert eine neue Bewußtseinskultur." *DIE ZEIT*, no. 45 (1996): 46.
- Miller, James. *The Passion of Michel Foucault*. Cambridge (Mass.): Harvard University Press, 2000.
- Monastersky, Richard. "Religion on the Brain." *The Chronicle of Higher Education* 52, no. 38 (2006): A14.
- Monyer, Hannah, Frank Rösler, Gerhard Roth, Henning Scheich, Wolf Singer, Christian Elger, Angela Friederici, Christof Koch, Heiko Luhmann, Christoph von der Malsburg, and Randolph Menzel. "Das Manifest. Elf führende Neurowissenschaftler über Gegenwart und Zukunft der Hirnforschung." *Gehirn & Geist*, no. 6 (2004): 30-37.
- Moreno, Francisco, Christopher Wiegand, Keolani Taitano, and Pedro Delgado. "Safety, Tolerability, and Efficacy of Psilocybin in 9 Patients With Obsessive-Compulsive Disorder." *Journal of Clinical Psychiatry* 67, no. 11 (2006): 1735-1740.
- Murple. Sulfurous Samadhi. An Investigation of 2C-T-2 & 2C-T-7 Erowid.org, 2001 [cited 27 July 2005]. Available from <http://www.erowid.org/chemicals/2ct7/article1/article1.shtml>.
- Myerhoff, Barbara. "Peyote and Huichol Worldview: The Structure of a Mystic Vision." In *Cannabis and Culture*, edited by Vera Rubin, 417-438. The Hague: Mouton Publishers, 1975.
- . *Peyote Hunt. The Sacred Journey of the Huichol Indians*. Ithaca: Cornell University Press, 1974.
- Myers, Gerald. *William James. His Life and Thought*. New Haven: Yale University Press, 1986.
- Nagel, Thomas. "What is it like to be a bat?" *The Philosophical Review* 83, no. 4 (1974): 435-450.
- Nichols, David. "Hallucinogens." *Pharmacology & Therapeutics*, no. 101 (2004): 131-181.
- . "The Molecule That Changed the World." *Gaia Media News* (2006): 1-5.
- Nietzsche, Friedrich. *On the Genealogy of Morals*. Translated by Walter Kaufman and R. J. Hollingdale. New York: Vintage Books, 1967.
- Novak, Steven. "LSD before Leary. Sidney Cohen's Critique of 1950s Psychedelic Drug Research." *Isis* 88, no. 1 (1997): 87-110.
- Olf, Sabine. "Leises Comeback von LSD und Co. Halluzinogene werden wieder zur Behandlung von Ängsten und Traumata eingesetzt." *SonntagsZeitung*, 8 January 2006, 68.
- Ong, Aihwa, and Stephen Collier. "Global Assemblages, Anthropological Problems." In *Global Assemblages. Technology, Politics, and Ethics as*

- Anthropological Problems, edited by Aihwa Ong and Stephen Collier, 3-21. Malden (MA): Blackwell Publishing, 2005.
- Orlands, Barbara, Tom Beauchamp, Rebecca Dresser, David Morton, and John Gluck. *The Human Use of Animals. Case Studies in Ethical Choice*. New York: Oxford University Press, 1998.
- Osmond, Humphry. "A Review of the Clinical Effects of Psychotomimetic Agents." *Annals of the New York Academy of Sciences* 66, no. 3 (1957): 418-434.
- Osmond, Humphry, and John Smythies. "Schizophrenia: a new approach." *J. Mental Sci* 98 (1952): 309-315.
- Pauen, Michael. *Was ist der Mensch? Die Entdeckung der Natur des Geistes*. München: Deutsche Verlags-Anstalt, 2007.
- Perler, Dominik, and Markus Wild. "Der Geist der Tiere – eine Einführung." In *Der Geist der Tiere. Philosophische Texte zu einer aktuellen Diskussion*, edited by Dominik Perler and Markus Wild, 10-74. Frankfurt/M.: Suhrkamp, 2005.
- Perrine, Daniel. "Visions of the Night. Western Medicine Meets Peyote, 1887-1899." *The Heffter Review of Psychedelic Research* 2 (2001): 6-52.
- Petryna, Adriana. "Ethical variability. Drug development and globalizing clinical trials." *American Ethnologist* 32, no. 2 (2005): 183-197.
- Pieper, Werner, ed. *Kurt Beringer und die Heidelberger Drogenforschung der 20er Jahre*. Löhrbach: Edition RauschKunde, 1999.
- Plant, Sadie. *Writing on Drugs*. New York: Farrar, Straus and Giroux, 1999.
- Platoni, Kara. "2C-T-7's Bad Trip." *East Bay Express*, May 5, 2002 2002.
- Rabinow, Paul. *Anthropos Today. Reflections on Modern Equipment*. Princeton: Princeton University Press, 2003.
- . *French DNA. Trouble in Purgatory*. Chicago: University of Chicago Press, 1999.
- . "French Enlightenment: truth and life." *Economy and Society* 27, no. 2&3 (1998): 193-201.
- . *French Modern. Norms and Forms of the Social Environment*. Chicago: The University of Chicago Press, 1989.
- . *Marking Time. On the Anthropology of the Contemporary*, forthcoming.
- . "Toward an Anthropology of the Contemporary Moral Terrain." 2004 [unpublished manuscript].
- Racine, Eric, Ofek Bar-Ilan, and Judy Illes. "Brain Imaging. A Decade of Coverage in the Print Media." *Science Communication* 28, no. 1 (2006): 122-143.
- Rader, Karen. *Making Mice. Standardizing Animals for American Biomedical Research, 1900-1955*. Princeton: Princeton University Press, 2004.
- Radner, Daisie. "Heterophenomenology. Learning about the Birds and the Bees." *Journal of Philosophy* 91 (1994): 389-403.
- Revonsuo, Antti. "Prospects for a Scientific Research Program on Consciousness." In *Neural Correlates of Consciousness*, edited by Thomas Metzinger, 57-75. Cambridge (Mass.): MIT Press, 2000.

- Reynolds, Simon. *Generation Ecstasy. Into the World of Techno and Rave Culture*. New York: Routledge, 1999.
- Rheinberger, Hans-Jörg. *Epistemologie des Konkreten. Studien zur Geschichte der modernen Biologie*. Frankfurt/M.: Suhrkamp, 2006.
- . "Experimental Systems. Historiality, Narration, and Deconstruction." In *The Science Studies Reader*, edited by Mario Biagioli. New York: Routledge, 1999.
- . *Toward a History of Epistemic Things: Synthesizing Proteins in the Test Tube*. Stanford: Stanford University Press, 1997.
- Ricaurte, George, Jie Yuan, George Hatzidimitriou, Branden Cord, and Una McCann. "Retraction." *Science* 297 (2003): 1479.
- . "Severe Dopaminergic Neurotoxicity in Primates After a Common Recreational Dose Regimen of MDMA ("Ecstasy")." *Science* 297 (2002): 2260-2263.
- Ritvo, Harriet. "Plus Ça Change: Anti-Vivisection Then and Now." *Science, Technology, & Human Values* 9, no. 2 (1984): 57-66.
- Roepstorff, Andreas. "A Double Dissociation in Twentieth Century Psychology? A commentary on Bernard Baars: The Double Life of B.F. Skinner." *Journal of Consciousness Studies* 10, no. 1 (2003): 62-67.
- . "Brains in scanners: An Umwelt of cognitive neuroscience." *Semiotica* 134, no. 1/4 (2001): 747-765.
- . "Mapping Brain Mappers: An Ethnographic Coda." In *Human Brain Function*, edited by Richard Frackowiak, John Ashburner, William Penny, Semir Zeki, Karl Friston, Christopher Frith, Raymond Dolan and Cathy Price, 1105-1117. San Diego: Elsevier, 2004.
- . "Outlining the Sandpit of Consciousness Studies: A Question of Foundations or of Style?" *Bulletin fra Forum for Antropologisk Psykologi* 13 (2003): 44-52.
- Romero, Dennis. "Sasha Shulgin, Psychedelic Chemist." *Los Angeles Times*, September 5, 1995 1995.
- Rose, Nikolas. *Powers of Freedom: Reframing Political Thought*. Cambridge: Cambridge University Press, 1999.
- . "The Neurochemical Self and its Anomalies." In *Risk and Morality*, edited by R. Ericson, 407-437. Toronto: Toronto University Press, 2003.
- . *The Politics of Life Itself. Biomedicine, Power, and Subjectivity in the Twenty-First Century*. Princeton: Princeton University Press, 2007.
- Rose, Nikolas, and Carlos Novas. "Biological Citizenship." In *Global Assemblages. Technology, Politics, and Ethics as Anthropological Problems*, edited by Stephen Collier and Aihwa Ong, 439-463. London: Blackwell, 2005.
- Rosenfeld, Seth. "William Pickard's long, strange trip. Suspected LSD trail leads from the Bay Area's psychedelics era to a missile silo in Kansas " *San Francisco Chronicle*, 10 June 2001, A-1.
- Rothman, David. *Strangers at the Bedside. A History of How Law and Bioethics Transformed Medical Decision Making*. New York: Aldine de Gruyter, 1991.

- Rubin, Vera, ed. *Cannabis and Culture*. The Hague: Mouton Publishers, 1975.
- Rühle, Alex. "LSD-Kongress in Basel. Kinners, mir wird so blümerant." *Süddeutsche Zeitung*, 17 January 2006.
- Samotar, Honza. "Tripping in Solitude." In *Introspective Self-Rapports. Shaping Ethical and Aesthetic Concepts, 1850-2006* (Preprint 322), edited by Katrin Solhdju, 93-103. Berlin: Max-Planck-Institut für Wissenschaftsgeschichte, 2006.
- Saner, Luc, ed. *Auf dem Weg zu einer neuen Drogenpolitik*. Basel: Helbing & Lichtenhahn, 1998.
- Schluchter, Wolfgang. *Unversöhnte Moderne*. Frankfurt/M.: Suhrkamp, 1996.
- Schmidgen, Henning. "A Roaring Silence: Encountering the Body Without Organs in Time Experiments around 1900." In *Experimental Cultures: Configurations between Science, Art, and Technology 1830-1950* (Preprint 213), 65-80. Berlin: Max-Planck-Institut für Wissenschaftsgeschichte, 2001.
- Schüle, Christian. "Geld lehrt beten. Wie die amerikanische Templeton Foundation ihren Reichtum einsetzt, um die Wissenschaft auf den Weg des Glaubens zu bringen." *DIE ZEIT*, 4 May 2006.
- Seifert, Heribert. "Wissen kann kaum schaden. Mediale Konjunktur der Naturwissenschaft." *Neue Zürcher Zeitung*, 28 January 2005.
- Sewell, Andrew, John Halpern, and Harrison Pope. "Response of cluster headache to psilocybin and LSD." *Neurology* 66 (2006): 1920-1922.
- Shapin, Steven. *A Social History of Truth. Civility and Science in Seventeenth Century England*. Chicago: University of Chicago Press, 1994.
- Shulgin, Alexander, and Ann Shulgin. *PIHKAL: A Chemical Love Story*. Berkeley: Transform Press, 1991.
- . *TIHKAL: The Continuation*. Berkeley: Transform Press, 1997.
- Silverman, Julian. "Research with Psychedelics. Some Biopsychological Concepts and Clinical Applications." *Archives of General Psychiatry* 25 (1971): 498-510.
- Singer, Wolf. *Der Beobachter im Gehirn. Essays zur Hirnforschung*. Frankfurt/M.: Suhrkamp, 2002.
- . "Neurobiologische Anmerkungen zum Wesen und zur Notwendigkeit der Kunst." In *Der Beobachter im Gehirn. Essays zur Hirnforschung*, 211-234. Frankfurt/M.: Suhrkamp, 2002.
- Sloterdijk, Peter. *Selbstversuch. Ein Gespräch mit Carlos Oliveira*. München: Carl Hanser Verlag, 1996.
- Smith, Huston. "Do Drugs Have Religious Import?" *The Journal of Philosophy* 61, no. 18 (1964): 517-530.
- Smith, Huston, and Reuben Snake. *One Nation Under God. The Triumph of the Native American Church*. Santa Fe: Clear Light Publishers, 1996.
- Snow, C. P. *The Two Cultures*. Cambridge University Press: Cambridge, 1964.
- Snyder, Solomon. *Drugs and the Brain*. New York: Scientific American Books, 1986.
- Spinatsch, Markus. *Eine neue Suchtpolitik für die Schweiz? Grundlagen und Materialien für eine verstärkte Integration der suchtpolitischen Aktivitäten*

- des Bundes. Kurzfassung eines Berichts zuhanden des Bundesamtes für Gesundheit 26 April, 2004. Available from <http://www.bag.admin.ch/evaluation/01759/02066/02339/index.html?lang=de#>.
- Spitzer, Manfred. *The Mind within the Net*. Cambridge (Mass.): The MIT Press, 1999.
- Stevenson, Jay. *Storming Heaven. LSD and the American Dream*. New York: The Atlantic Monthly Press, 1987.
- Stewart, Omer. *Peyote Religion. A History*. Norman: University of Oklahoma Press, 1987.
- Stockinger, Günther. "Pille zu Gott." *Der Spiegel*, 14 August 2006, 133.
- Strassman, Rick. *DMT: The Spirit Molecule. A Doctor's Revolutionary Research into the Biology of Near-Death and Mystical Experiences*. Rochester: Park Street Press, 2001.
- Strathern, Marilyn. "Introduction: new accountabilities." In *Audit Cultures: Anthropological studies in accountability, ethics and the academy*, edited by Marilyn Strathern, 1-18. London: Routledge, 2000.
- , ed. *Audit Cultures. Anthropological Studies in Accountability, Ethics, and the Academy*. London: Routledge, 2000.
- Strickland, Stuart Walker. "The Ideology of Self-Knowledge and the Practice of Self-Experimentation." *Eighteenth-Century Studies* 31, no. 4 (1998): 453-471.
- Suter, Andreas. "Neutralität. Prinzip, Praxis und Geschichtsbewußtsein." In *Eine kleine Geschichte der Schweiz. Der Bundesstaat und seine Traditionen*, edited by Manfred Hettling, Mario König, Martin Schaffner, Andreas Suter and Jakob Tanner, 133-188. Frankfurt/M.: Suhrkamp, 1998.
- Tanner, Jakob. "Rauschgiftgefahr und Revolutionstrauma. Drogenkonsum und Betäubungsmittelgesetzgebung in der Schweiz der 1920er Jahre " In *Schweiz im Wandel. Studien zur neueren Gesellschaftsgeschichte*, edited by Sebastian Brändli, 397-416. Basel, 1990.
- Taylor, Charles. *Sources of the Self. The Making of the Modern Identity*. Cambridge (Mass.): Harvard University Press, 1992.
- The Fetzer Institute. Mission Statement [cited 8 May 2007]. Available from <http://www.fetzer.org/AboutUs.aspx?PageID=About&NavID=7>.
- Unterthurner, Gerhard. *Foucaults Archäologie und Kritik der Erfahrung. Wahnsinn – Literatur – Phänomenologie*. Wien: Turia+Kant, 2007.
- Uttal, William. *The New Phrenology. The Limits of Localizing Cognitive Processes in the Brain*. Cambridge (Mass.): MIT Press, 2001.
- Vahland, Joachim. *Max Webers entzauberte Welt*. Würzburg: Königshausen & Neumann, 2001.
- Vannini, Claudio, and Maurizio Venturini. *Halluzinogene. Entwicklung der Forschung, 1938 bis in die Gegenwart. Schwerpunkt Schweiz*. Berlin: VWB – Verlag für Wissenschaft und Bildung, 1999.
- Vollenweider, Franz. "Recent Advances and Concepts in the Search for Biological Correlates of Hallucinogen-induced Altered States of

- Consciousness." *The Heffter Review of Psychedelic Research* 1 (1998): 21-32.
- Vollenweider, Franz, K. Leenders, Christian Scharfetter, A. Antonini, P. Maguire, J. Missimer, and Jules Angst. "Metabolic hyperfrontality and psychopathology in the ketamine model of psychosis using positron emission tomography (PET) and [18F]fluorodeoxyglucose (FDG)." *European Neuropsychopharmacology* 7, no. 1 (1997): 9-24.
- Vollenweider, Franz, K. Leenders, Christian Scharfetter, P. Maguire, O. Stadelmann, and Jules Angst. "Positron emission tomography and fluorodeoxyglucose studies of metabolic hyperfrontality and psychopathology in the psilocybin model of psychosis." *Neuropsychopharmacology* 16, no. 5 (1997): 357-372.
- Vollenweider, Franz, S. Remensberger, Daniel Hell, and Mark Geyer. "Opposite effects of 3,4-methylenedioxymethamphetamine (MDMA) on sensorimotor gating in rats versus healthy humans." *Psychopharmacology* 143, no. 3 (1999): 365-372.
- Waldenfels, Bernhard. *Bruchlinien der Erfahrung. Phänomenologie. Psychoanalyse. Phänomentechnik*. Frankfurt/M.: Suhrkamp, 2002.
- Wartofsky, Marx. *Models. Representation and the Scientific Understanding*. Dordrecht: D. Reidel Publishing Company, 1979.
- Wax, Paul. "Just a Click Away. Recreational Drug Web Sites on the Internet." *Pediatrics* 109 (2002).
- Weber, Max. "Die drei reinen Typen der legitimen Herrschaft. Eine soziologische Studie." In Max Weber. *Schriften, 1894-1922*, edited by Dirk Kaesler, 717-733. Stuttgart: Alfred Kröner Verlag, 2002.
- . "Objectivity in the Social Sciences." In *The Methodology of the Social Sciences*, xxx-xxx. New York: The Free Press, 1949.
- . "Religious Rejections of the World and Their Directions." In *From Max Weber: Essays in Sociology*, edited by H. H. Gerth and C. Wright Mills, 323-359. New York: Oxford University Press, 1946.
- . "Religious Rejections of the World and Their Directions." In *From Max Weber: Essays in Sociology*, edited by H. H. Gerth and C. Wright Mills, 323-359. New York: Oxford University Press, 1958.
- . "Science as a Vocation." In *From Max Weber: Essays in Sociology*, edited by H. H. Gerth and C. Wright Mills, 129-146. New York: Oxford University Press, 1958.
- . *The Protestant Ethic and the Spirit of Capitalism*. New York: Penguin Classics, 2002.
- Weil, Andrew. *The Natural Mind. An Investigation of Drugs and the Higher Consciousness*. Boston: Houghton Mifflin Company, 1972.
- Winslow, Ron. "Go Ask Alice: Mushroom Drug Is Studied Anew." *The Wall Street Journal*, 11 July 2006, B1.
- Wittgenstein, Ludwig. *Tractatus Logico-Philosophicus*. Translated by David Pears and Brian McGuinness. London: Routledge, 2001.
- Wittmann, Marc, Olivia Carter, Felix Hasler, Rael Cahn, Ulrike Grimberg, Philipp Spring, Daniel Hell, Hans Flohr, and Franz Vollenweider. "Effects of

- psilocybin on time perception and temporal control of behaviour in humans." *Journal of Psychopharmacology* 21, no. 1 (2007): 50-64.
- Wundt, Wilhelm. *Principles of Physiological Psychology*. London: Swan Sonnenschein, 1904.
- Zeki, Semir. "Splendours and miseries of the brain." *Philosophical Transactions of the Royal Society* 354 (1999): 2053-2065.
- Ziff, Stewart. "Beyond the Context. Landscapes, Pictures, and the Epistemology of Image-Making." *Leonardo* 28, no. 5 (1995): 437-439.
- Zuckerman, Marvin. *Behavioral expressions and biosocial bases of sensation seeking*. Cambridge (UK): Cambridge University Press, 1994.
- Zuckerman, Marvin, D. Schultz, and T. Hopkins. "Sensation seeking and volunteering for sensory deprivation and hypnosis experiments." *Journal of Consult and Clinical Psychology* 31, no. 4 (1967): 358-63.