Disordered Recognition and Perception of Human Faces in Acute Schizophrenia and Experimental Psychosis

Anne Harrington, Godehard Oepen, and Manfred Spitzer

Three disorders of facial recognition and perception in acute schizophrenia and mescaline-induced psychosis are described and illustrated using original clinical and experimental material: "affective prosopagnosia" or stress-related dysfunctional face recognition; "physiognomization" of the environment or persistent illusions and hallucinations of nonspecific faces; and the "mirror phenomenon" or the experience of inner alienation from one's reflected face, which is perceived as independently alive, sinister, and generally physically distorted. It is proposed that neuropsychology suggests relationships between these phenomena that might otherwise be less apparent. No final neurobiological solution to the problem of dysfunctional facial perception and recognition in psychosis is presented, but various insights and suggestive models from the neurosciences are discussed. Attention is also paid to the conditions under which one might need to combine neuropsychological approaches with hermeneutically oriented analyses.

NO OTHER PART of the human body plays such a fundamental role in personal identity and interpersonal relationships as the human face, yet there have been surprisingly few attempts to analyze what this fact might mean in the context of psychotic experience. The present study attempts to begin such an analysis by calling attention to three disorders of facial recognition and facial perception associated with acute schizophrenia and experimental psychosis. These are (1) a generalized disturbance in the ability to recognize the faces of others under the influence of emotional stress or stimulation (what we call "affective prosopagnosia"); (2) a semi-uncontrollable tendency to "see" faces in surrounding objects, with or without strong affective reaction (the "faces in the fire" phenomenon); and (3) a disturbance in normal perceptual and/or ego-identification processes associated with seeing one's own face in a mirror, frequently accompanied by a frightening sense of self-alienation and/or a sense of having glimpsed one's evil "other self" (what we call the "mirror" phenomenon).

In this report, we adopt an essentially interrogative orientation that combines phenomenological description with critical discussion of a possible neuropsychological explanatory framework. We believe that the neuropsychological explanatory approach in this case has an advantage over certain other forms of explanation in its potential capacity to suggest relationships between phenomena that might otherwise be less apparent. However, we are in no sense trying to solve the problem of disordered facial experience in psychosis by reducing it to its mechanistic substratum. We see no reason why the neurological explanatory and model-building

---

From the Department of Psychology, Harvard University, Cambridge, MA and the Psychiatrische-Universitaetsklinik, Freiburg, FRG.

Supported by the Alexander von Humboldt Foundation and Deutsche Forschungs-Gemeinschaft Grant No. Oe 112/1-2.

Address reprint requests to Anne Harrington, Ph.D., History of Science Dept, Science Center 235, One Oxford St, Harvard University, Cambridge, MA 02138.

0010-440X/89/3005-0008$03.00/0

approach to and explanation of must be a monolithic one that rules out some later possibility of mutually enriching dialogue with other, more hermeneutic approaches.

DESCRIPTION OF THE PHENOMENA

Affective Prosopagnosia

Disturbances in the ability to recognize faces in schizophrenia is rarely reported spontaneously by patients, but is nevertheless well-known and, more recently, experimentally studied.[1-2] Our own neuropsychological experimental findings with schizophrenics have suggested that these disturbances may be at least partially situation-specific, with symptoms intensifying under stress or emotional stimulation. We administered a divided visual field test involving a lexical decision task (left hemisphere [LH]-directed) and a nonverbal face/nonface decision task (right hemisphere [RH]-directed)[3] to a group of acute schizophrenic patients and a group of matched controls. The most significant performance differences between these groups were seen, not in the recognition of LH-directed function words as expected (given the widespread claims for a primary LH dysfunction in schizophrenia), but in the RH-directed face/nonface decision task. More important, the ability of the schizophrenics to correctly decide between the face/nonface material decreased dramatically in trials with additional emotional stimuli, while controls showed an increase in face/nonface decision-making capacity.[4,5]

Notwithstanding these intergroup performance differences between controls and schizophrenics in the laboratory, it is possible that we are dealing with a difference that is quantitative rather than qualitative. There is anecdotal evidence that when otherwise healthy individuals are put in situations of extraordinary emotional strain, they sometimes suffer a deterioration in facial recognition ability, which may or may not be similar to that demonstrated experimentally for schizophrenics. Informal inquiry among colleagues has resulted in a number of cases of individuals who, finding themselves in a situation of severe affective pressure, become temporarily unable to recognize familiar faces: One man spoke of how the faces of friends and acquaintances in a school auditorium appeared to him like "white ovals." Although we refer to this phenomenon as affective prosopagnosia, we do not draw any conclusions about a necessary relationship with the true prosopagnosia associated with organic brain damage.

Physiognomical Illusions

It is well known that many acute schizophrenics tend to "physiognomize" their environment, i.e., to see faces everywhere: in patterns in the hospital wallpaper, in wisps of clouds in the sky, etc.[6] The following description from a male schizophrenic patient under our care will serve to convey something of the nature of this phenomenon:

> ... You've got the blue strip of the street and a pleasant mood of springtime, and suddenly humanlike faces are forming out of the structures of the asphalt path in the street. I describe it so, even though that's not exactly right. This whole thing gets more intense, suddenly my perception of the structure of these faces changes; normal perception basically falls apart. Not completely, I have the condition under control, but I see suddenly grotesque masks [*Fratzen* in German] and faces, not faces in trees and bushes and, yes, well something like that, language is just not a fully adequate

> means of depicting something like this, just because it's a different reality, that we with our language in practical terms can't conventionally experience through poetry or literature . . .

At the request of one of us (G.O.), the same patient produced a few further written reflections on the subject of his physiognomizing compulsion:

> . . . perception of nature is fully normal and corresponds to the fine season. I see the streets, the birch trees, the parking lot. Suddenly shapes reminiscent of faces start forming in the blue strip of the street, in the asphalt, the little pebbles; nature gets distorted, the leaves, the branches of the trees, the pine needles are all contorted in [face-like] grimaces. I know this condition from experience, so I quickly buy a cup of coffee at a kiosk, the caffeine widens the [blood] vessels, helps a little, so I drink two cups. For several hours, my perception is completely altered, I see grimacing creatures in human faces also, especially welling up out of the hair and the eyebrows . . .

Goldstein and Rothman[7] called attention to a more subtle type of physiognomizing compulsion in a patient judged to be suffering from incipient schizophrenia and/or severe anxiety. Application of a Rorschach test prior to electric shock treatment revealed an overwhelming and vivid tendency to see faces, facial parts, people, or characteristic gestures without any clear relation to some person or object (e.g., "The whole thing looks as if reaching out and grabbing somebody"; or "Somebody put something over the mouth so he can't speak"). Almost all of the pictures were experienced as threatening. A second Rorschach test following treatment showed a decrease in physiognomically oriented answers and a generally more balanced emotional profile. In their discussion, Goldstein and Rothman called attention to Kasanin and Hanfmann's[8] belief in the primacy of "the change of the world as to physiognomic aspect in psychosis" and were inclined themselves to interpret these physiognomizing tendencies as one expression of the schizophrenic's fundamentally "concrete attitude" towards the world.

In our recent pilot experiment with mescaline-induced experimental psychosis,[5] otherwise healthy drug-intoxicated subjects also had a tendency to see nonspecific hallucinations and/or illusions of human faces in the environment around them. One of us (M.S.), some ten hours after mescaline ingestion (and after most other effects had worn off), suddenly saw in the haphazard, crooked tiles of a bathroom wall the face of a bearded dwarf. In this context, we would also call attention to the well-known phenomenon of "seeing faces in the fire"—perceiving facelike forms in such unstructured material as flames or clouds. Given that psychotic experiences of physiognomical illusions are often associated with a high level of anxiety, it is interesting that these nonpsychotic tendencies to physiognomize are generally associated with a state of relaxed undirectedness. A possible neuropsychological approach to making sense of this apparent conflict is discussed below.

The "Mirror" Phenomenon

In general terms, the "mirror" phenomenon consists of a strong perceptual impression that one's face in the mirror is changing, distorting, grimacing, or otherwise taking on a life of its own. The expressions produced by this mirror self are almost invariably threatening, rarely or never benevolent. The eyes and mouth especially seem to be affected. Sometimes part of the face or, very rarely, the whole face disappears completely. The perceived reflection is not stable, but usually changes continuously, varying its expression slowly. When the gaze is averted and then returns to the mirror, the face typically starts out looking relatively normal,

only to resume its curiously malevolent grimaces after a short time. The whole experience is remarkable for the tremendous terror it is capable of provoking in the afflicted individual. (Most psychiatrists know of schizophrenic patients who drape the mirrors in their home because they cannot bear the thought of catching a glimpse of their own reflection.) Thus, the patient quoted above described the following experience in reply to the question, "When you look at yourself in a mirror, has anything ever struck you particularly about your own mirror image?":

> . . . Yes, of course. Also an alteration, but I can't properly describe it in words. I'll try, of course. Just a second: as if my facial features were receding before me, as if I had . . . naturally I see my facial features, but I see the face differently, differently, as if the head in practical terms had burst open behind and something were coming out of it; that's nonsense, of course, isn't it. The hair is different, above all the hair gets distorted. The face is like it, for example, sometimes is represented for Mickey Mouse—Mickey Mouse in a temper tantrum. . . . The mouth was normal, yes . . . but the eyes were also, I think, somehow different. . . . Like I said, there's an expression that sets off a panic in me, even though I know absolutely that this condition will probably, most probably only last a few hours. . . .

Another patient seen by one of us (M.S.), a 32-year-old female acute-exacerbated schizophrenic, explained that she had come to the clinic because she had noticed that all the people she had seen in the past few days looked "blind." Asked to elaborate, she said, ". . . The eyes of all the people I was seeing were without expression, and seemed fixed and rigid [*starr* in German]. The faces looked different." When asked, "Did you notice any other changes in these faces or in your own face?" she responded, "Yes, the most frightening thing for me is to look into a mirror. After a moment the eyes get rigid and lifeless and the face begins to grimace." The patient refused to reproduce the phenomenon on request because she considered it too frightening. It should be noted that she complained at the same time of hallucinatory experiences in all five modalities and showed symptoms of depersonalization. The same patient later spontaneously reported physiognomic illusions, which had occurred about 3 weeks before the onset of the acute state.

The mirror phenomenon has also been documented in experimental (drug-induced) psychosis. One male subject from the Beringer[9] pioneer series of mescaline experiments in Freiburg experienced his reflected face as an alien self, "another person" with gestures and movements of its own. In our pilot experiment with mescaline sulfate, nine of 12 healthy male volunteers experienced the phenomenon to some degree. Requested by experimenters to look at their face in an ordinary mirror, subjects found that the image that gazed back at them seemed to take on a life of its own, twisting its features in a demonic manner and leering, although witnesses could confirm that the subjects' actual features had remained motionless. Such distortions of self-perception were normally first perceived at a point approaching the peak of the drug-induced psychosis, were more affectively threatening ("almost unbearable," as the self-report of one subject put it) than any of the distortions perceived in the faces of surrounding persons, and lingered longer than the other hallucinatory and perceptual disturbances provoked by the administration of mescaline.

The last subject in our study was asked, not only to look in a mirror, but to examine a photograph of his own face. He reported perceiving menacing distortions similar to that experienced with the reflected face. While this suggests that the mirror in itself may be less essential than the simple fact of seeing one's own face, it is not yet clear how common this experience may be. One of Beringer's mescaline-

drugged subjects experienced illusions of movement, distortion, and "something cold, pitiless ... almost uncanny" when looking at the photographed faces of relatives, but there is no record of his having looked at his own photograph.[9] Further experiments are needed to cast more light on this issue.

DISCUSSION

The main aim of this report has been to draw attention to a relatively neglected dimension of schizophrenia in the hope that it will inspire others to further clinical and experimental pursuit of the themes we have identified. We believe that it is premature to speculate too extensively on possible causal relationships or neural mechanics underlying the phenomenology of schizophrenic facial misrecognition and misperception. The goal of this discussion is therefore not so much to construct an integrated model or explanatory framework for the problem of the "face" in schizophrenia, as to identify some of the issues that we believe might be addressed by an adequate neurobiological model or framework.

Prosopagnosia and the Neurobiology of Face Recognition

The organic syndrome prosopagnosia, associated with damage to circumscribed right-sided or bilateral cortical areas,[10,11] offers a first clue to the possible brain systems and processes underlying impaired facial recognition in schizophrenia. At the same time, we remain aware of the risks involved in assuming that, just because deficit (D) is associated with damage to brain structure (S), then any new patient class showing deficit D must also have damage at S, or indeed any circumscribed lesion at all. One must be all the more cautious when reasoning from brain-lesioned to psychiatric patients.[12] Although there is evidence for a certain fundamental impairment in facial and mimical recognition capacity in many schizophrenics—which speaks cautiously in favor of the analogy with organic prosopagnosia—we have also stressed the extent to which this impairment seems to be additionally sensitive to emotional stress. This suggests that, even if the comparison between organic prosopagnosia and dysfunctional face recognition in schizophrenia should turn out to be a fruitful one, we are at best dealing with a regionally localizable weakness (producing the base defect) that is then additionally aggravated by widely based affective (and other?) functional changes in the brain. Our model of schizophrenia[4,5] inclines us to envision this process as one in which an irritant (the emotional stimulant) stimulates functionally weak areas on the RH of the brain to a state of pathological hyperactivity, which in turn leads to further RH performance deterioration. Right or wrong, it is fairly clear that any neurobiological model of disordered face recognition in schizophrenia must be prepared to look beyond the data from organic prosopagnosia to incorporate a variety of more dynamic, situation-dependent features.

Physiognomisation and Undirected Brain Activity

The hypothesis linking the breakdown of face recognition performance in schizophrenia with a hyperactivity of responsible functional areas raises the possibility of interpreting schizophrenic physiognomical illusions and schizophrenic perceptual defects in a common framework. The hypothesis would be that the illusions are in some way a "release" phenomenon produced by an undirected

"over-readiness" of the targeted functional system.[13] One possible scenario for how this could develop proposes the following: If it is true that our brains recognize objects in the environment by generating "hypotheses" about the nature of the stimuli we are sensing,[14,15] then it is possible that the functional systems in the schizophrenic brain that are concerned with perceiving and identifying the faces of people might, when hyperstimulated, generate crude or stereotyped hypotheses in the absence of appropriate material. We have suggested that, in the schizophrenic patient, this undirected "face-generating" process might often be provoked or modulated through emotional stimulation. In the course of the discussion, we have generally understood this to mean something similar to anxiety or tension. However, one must again avoid the conclusion that, because stimuli (A) seems to be associated with consequence (B), A is therefore a causal necessity for B. Here we are taking into account the fact that a state of relaxation also seems conducive to semiautomatic construction of faces and other categorical forms in unstructured material. It does not seem too farfetched to suggest that meditative, relaxed states are also associated with undirected brain activity, leading to the phenomenologically surprising coincidence that the acute schizophrenic and the dreamer gazing at the clouds share a tendency to physiognomize their environment.

The highly stereotypical and predictable nature of these physiognomic hallucinations also warrants brief comment. As early as 1928, Kluever[16] concluded that mescaline-induced hallucinations could generally be analyzed in terms of a small number of simple forms or patterns that he called *Formkonstanten.* Other researchers[17-19] have indicated that these stereotyped basic forms appear in the most diverse of cultural settings. Thus, the distorted faces described by drugged experimental subjects are often strikingly similar to the sorts of grimacing expressions found in the sacred masks of various traditional societies—seen above all in the tendency in both instances to distort and exaggerate the eyes and mouth to the exclusion of other features. Why this should be is not entirely clear, but it is intriguing to note that the eyes and mouth are the parts of the face that are most essential for producing any sort of meaningful affective expression, as well as the two parts that are most critical for identification.

This lends circumstantial support to Kluever's conclusion that *Formkonstanten* are not primarily learned, but arise in diverse contexts more or less spontaneously out of some fundamental, neurologically based perceptual bias (Kluever himself was more inclined to speak of specific nerve cells or brain centers). In the context of the present argument, this bias would be associated with the brain's predisposition to generate hypotheses about the meaning of incoming sensorial experience.

Facing One's Self: Between Perception and Identity

The mirror phenomenon is the most difficult and subtle of the phenomenon under consideration; therefore, we will limit ourselves to just a few remarks on possible approaches to modeling or explaining its occurrence and specific features. It is not clear that the categories of neurobiology could ever fully explain this phenomenon. We seem to be dealing instead with something at the intersection of pathological perception (potentially analyzable in terms of brain mechanisms) and egopathology (which is claimed by the explanatory world of hermeneutics or personality psychology). A flexible interdisciplinary approach would thus seem to be the only realistic option.

To this end, it is encouraging that hermeneutically oriented psychologists have not completely overlooked the problem of the mirror phenomenon in psychosis. Beringer, investigating mescaline-induced psychosis in the 1920s, described the phenomenon in quasi-Freudian terms: "narcissism in its purest form"[9]; Abély[20] took a similar tack in the following decade. Feldmann[21] explained the phenomenon in terms of the schizophrenic patient's difficulty in adequately connecting the experience of the mirror image with that of ego-identification; the image thus appears like "a mask with another person or a second self hidden behind." Rosenzweig and Shakow[22] compared the behavior of 51 schizophrenic patients with that of normal controls when set before a mirror. They concluded that only one patient of the former group exhibited what could be considered normal comportment. They volunteered an explanation in terms of unstable ego-identification and a dysfunctional capacity for intersubjectivity (the paradox of the mirror being that it forces us to experience ourselves from the "outside," i.e., shows us ourselves as others see us). More recent researchers have elaborated on this model, distinguishing between *schizophrenic* and *preschizophrenic* mirror behavior, and suggesting that the latter is better regarded less as a pathological symptom in itself than as an attempt through the medium of the mirror to regain contact with a receding ego, i.e., a form of auto-therapy.[23,24]

One of the few early attempts to integrate hermeneutic perspectives with more neuropsychological ones is found in the work of the American "experimental psychoanalyst" Werner Wolff,[25] who tested the emotional reactions of nonpsychotic volunteer subjects to various photographs of both unfamiliar and familiar faces, including their own face. Unknown to the subjects, all the photographs were actually left/left or right/right reconstructed chimeras of the original faces. The subjects had great difficulty recognizing left/left reconstructions of their own faces and, when asked to make a judgement about one of their own unrecognized left/left faces, tended to project material that Wolff interpreted as unconscious, repressed fantasies and/or threatening self-perceptions. This finding was incorporated by Wolff into his theory that the RH of the brain is especially concerned with (Freudian) unconscious processes.[25,26] While Wolff's results remain to be replicated, his approach accords well with our[4,5] model of schizophrenia as a primary state of RH hyperactivity. The well-established association between face recognition skills and RH activity may also be of relevance here.

The neuropsychiatrist interested today in integrating personal insights with those of hermeneutic personality psychology might begin by posing a few questions:

1. How far, and in what way, does visual identification of one's own face interact with one's essential conviction of identity? The idea that the mirror phenomenon confronts us with a genuine problem at the crossroads of neurology and psychology finds support in a 19th-century case of temporal-lobe epilepsy in which the patient was able to provoke an epileptic attack either by posing metaphysical questions about the essence of identity ("Who am I? What am I? Where do I come from?") *or* by gazing in a mirror. The patient would then lose "hold of the universe" and "his relations to time and space" and would experience intense terror "lest he should never become himself again."[27]

2. How might a neurophysiologically associated impairment or distortion of the capacity to perceive or recognize faces (as previously discussed) provoke a crisis of

ego-identification and/or otherwise interact in a destructive manner with the instable ego-identity of a schizophrenic patient confronted with his or her reflection in a mirror?

3. Which specific features of facial perceptual processing seem to be critical to the induction of the mirror phenomenon? How might a drug-intoxicated subject or schizophrenic patient respond to seeing his or her face in profile or upside-down? What would be the effect of confronting such an individual with his or her reflection in a distorting fun-house mirror?

We look forward to further clinical and experimental research that could begin to cast some light on these little-studied themes.

ACKNOWLEDGMENT

We are indebted to Professor B. Maher, Psychology Department, Harvard University, for suggestions for further research; and to Professor W. Blankenburg, Chairman, Psychiatry Department, University of Marburg, for assistance in locating certain rare references.

REFERENCES

1. Berndl K, Cranach MV, Gruesser O-J: Impairment of percept and recognition of faces, mimic expression and gestures in schizophrenic patients. Eur Arch Psychiatry Neurol Sci 235:282-291, 1986

2. Dewdney D: A specific distortion of the human facial percept in childhood schizophrenia. Psychiatr Q 47:82-94, 1973

3. Regard M, Landis T: Affective and cognitive decisions on faces in normals, in Ellis HD, Jeeves MA, Newcombe F, et al (eds): Aspects of Face Processing. Dordrecht, Holland, Nijhoff, 1986, pp 363-369

4. Oepen G, Fünfgeld M, Höll T, et al: Schizophrenia—An emotional hypersensitivity of the right cerebral hemisphere. Int J Psychophysiol 5:261-264, 1987

5. Oepen G, Harrington A, Fünfgeld M, et al: Emotion and the dynamics of hemisphere functioning in schizophrenia and depression. Biol Psychiatry, 1988 (submitted)

6. Conrad K: Die beginnende Schizophrenie. Stuttgart, W Germany, Thieme, 1958

7. Goldstein K, Rothmann E: Physiognomic phenomena in Rorschach responses. Rorschach Res 9:1-7, 1945

8. Kassanin J, Hanfmann E: An experimental study of concept formation in schizophrenia. I: Quantitative analysis of the results. Am J Psychiatry 95:35, 1938

9. Beringer K: Meskalinexperimente [unpublished first-person reports of mescaline experiences]. Psychiatrische Universitaetsklinik Freiburg, 1928-1940

10. Hécaen H, Angeluergues R: Agnosia for faces (prosopagnosia). Arch Neurol 7:92-100, 1962

11. Damasio AR, Damasio H, van Hoesen GW: Prosopagnosia: Anatomical basis and behavioral mechanisms. Neurology 32:331-341, 1982

12. Miller L: A note on the interpretation of data derived from neuropsychological tests. Cortex 19:131-132, 1983

13. Cogan DG: Visual hallucinations as release phenomena. Albrecht v. Graefes Arch Klin Exp Opthal 188:139-150, 1973

14. Gregory RI: Concepts and Mechanisms of Perception. London, Duckworth, 1974

15. Rock I: Perception. New York, Scientific American, 1984

16. Kluever: Mescal. London, Kegan, Paul, Trench, & Trubner, 1928

17. Siegel RK: Hallucinations. Sci Am 237:132-140, 1977

18. Siegel RK: Cocaine hallucinations. Am J Psychiatry 135:309-314, 1978

19. Keeler MH: Kluever's mechanisms of hallucinations as illustrated by the paintings of Max Ernst, in Keup W (ed): Origin and Mechanisms of Hallucinations. New York, Plenum, 1970, pp 205-208

20. Abély P: Le signe du miroir dans les psychoses et plus spécialement dans la démence précoce. Ann Med Psychol (Paris) 88:28-36, 1930

21. Feldmann H: Zur phaenomenologischen Strukturanalyse der Stoerungen des Ichbewusstseins. Arch F Psychiatrie Z Neurol 198:96-102, 1958

22. Rosenzweig S, Shakow D: Mirror behavior in schizophrenic and normal individuals. J Nerv Ment Dis 86:166-174, 1937

23. Blanckenburg W: Psychoses schizophréniques à l'adolescence. Confrontations psychiatriques. 29:221-259, 1987

24. Pankow G: *L'être-là du schizophrène.* Paris, Aubier, 1981

25. Wolff W: Das rechte und das linke Gesicht. Ciba-Z 6:2044-2047, 1953

26. Wolff W: The Threshold of the Abnormal: A Basic Survey of Psychopathology. London, Medical Publications, 1952

27. Crichton-Browne Sir J: The Cavendish Lecture on Dreamy Mental States. London, Bailliere, Tindall & Cox, 1895