

THE EFFECTS OF LSD-25 AND DEXTROAMPHETAMINE ON THE USE OF DEFENSIVE LANGUAGE

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Verified that psychotomimetics attenuate verbal defense mechanisms. This was accomplished by reanalyzing the 5-minute monologues of 7 neurotic depressives who participated in a project (Mechanek, Feldstein, Dahlberg, & Jaffe, 1968) that examined the effects of LSD and dextroamphetamine on timing aspects of speech. Dosages were subhallucinatory: 15-25mg dextroamphetamine, 50-100mg LSD, and a matching placebo. Volunteers received each drug (double-blind) seven or eight times on a random schedule over a 1½-year period; there was a 3-week intertrial interval. The patient provided 5-minute monologues both before and after drug effects. The monologues were transcribed and scored for formal measures of defensive language. Results indicated that LSD caused individuals to make more personal statements and to use explanation and evaluations less often. Dextroamphetamine was found to decrease the use of nonpersonal references.

Initial interest in the facilitative use of psychotomimetics (LSD and dextroamphetamine) was based on the claim that these drugs affect certain processes presumed important in the psychotherapeutic process: Augmentation and intensification of recall, loosening of defenses, enriching of associations, and an overall improvement in the patient's basic way of relating (Abramson, 1959, 1967). What is the empirical evidence for these clinical inferences? It has been suggested that examination of the effects of psychotomimetics on the linguistic and content aspects of speech can answer directly this question (Abramson, 1967). Fink (1974), in a summary of 25 years of EEG-behavior research, has defined a "neurophysiologic adaptive" hypothesis in which language changes accompany EEG synchronization/desynchronization. Fink claims that psychotomimetics (LSD and dextroamphetamine) are accompanied by a decrease in defensive language behaviors that usually are exacerbated by ECT. Defensive language as defined by Fink and associates included formal aspects of language such as use of third-person reference as opposed to first-person reference, use of qualifiers, and past tense instead of present tense. Unfortunately, Fink's data were observational, and confirmatory statistics were not presented.

Landon and Fisher (1970) have presented data on a single *S* who ingested psilocybin on four different occasions (80-200 µg/kg); these authors compared drug and nondrug samples of written prose. They found that the drug had effects on several linguistic dimensions: Use of concrete as opposed to abstract nouns, increased sentence length, and the loss of topical organization of subject matter. Martindale and Fisher (in press) recently have reanalyzed these same data using a computerized dictionary and show that psilocybin increases the use of primary process language (drive, regression cognition, defensive symbolization, sensation, Icarian imagery).

To date, the most comprehensive and objective examination of the effects of psychotomimetics on speech has been the studies performed by Gottschalk and Gleser (1964, 1969). These investigators systematically gathered 5-minute spontaneous monologues from human volunteers under the influence of psilocybin and LSD, which subsequently were scored in an objective fashion for degree of

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schizophrenic disorganization and cognitive impairment. The findings of these verbal behavior studies could be summarized as follows: Speech indicative of disorientation and denial was increased by the psycholytics, but language indicative of schizophrenic disorganization was not affected. In other words, the results of the verbal behavior analysis reveal that LSD and psilocybin induce a disorientation more similar to organic brain syndrome than to a psychosis.

The above-cited research makes it clear that there is little objective evidence that supports the clinically based theories (Abramson, 1967; Shlien, 1967) of drug (psychotomimetic)-induced changes in speech. The goal of the present study was to provide basic data on the effect of two types of psychotomimetics (LSD and dextroamphetamine) on verbal behavior.

We have reported previously the effects of LSD and dextroamphetamine on the sound-silence pattern of extemporaneous monologues (Jaffe, Wahlberg, Luria, Breskin, Chorosh, & Lorrnick, 1972) and dialogues (Jaffe, Dahlberg, Luria, & Chorosh, 1973) of 7 psychotherapy patients (the interested reader is referred to Mechaneck et al. (1968) for a thorough description of the original research project). Our research group recently has concentrated its efforts on assessing the effect of LSD and dextroamphetamine on some content aspects of speech. Patient monologues were keypunched and computer analyzed by Martindale's Regressive Imagery Dictionary (1973, 1975). Contrary to our expectations, it was found that LSD and dextroamphetamine did not affect the use of "primary process" language, but did cause 1 patient to increase and another to decrease their use of secondary process (intellectualizing) language (Natale, Dahlberg, & Jaffe, 1978). This finding does provide some modest support for an effect of psychotomimetics on a patient's verbalizations. In this light, we decided to perform a more extensive analysis of the effects of LSD and dextroamphetamine on the content of verbal behavior. We chose to focus on defensive language behavior for two reasons: (1) The psychological mechanism of defense is central to the psychodynamic theories of LSD-induced behavioral changes; and (2) Weintraub and Aronson (1962, 1964, 1965, 1967, 1974) have demonstrated a reliable and valid procedure for scoring defensive language from speech samples.

Over a decade ago, Waskow (1967) stated that for the above-cited reasons, researchers should use Weintraub and Aronson's defensive language scoring system to assess the psychological effects of drugs. Apropos, we recently have scored for defensive language patient monologues that were obtained in LSD, dextroamphetamine and placebo conditions. As stated above, these speech samples originally were obtained for a project that examined the physiological effects of LSD and dextroamphetamine on speech (Jaffe et al., 1972, 1973; Mechaneck et al., 1968).

METHOD

Subjects and Procedure

The data analyzed in the present study were adapted from a large project that examined the effect of LSD, dextroamphetamine and placebo on the timing aspects of speech during 5-minute monologues for 7 volunteers (Jaffe et al., 1972). The present investigation was concerned with the reanalysis of these same LSD, dextroamphetamine and placebo monologues for defensive language behavior. The following is a brief description of the procedure used in the project; the interested reader is referred to Jaffe et al. (1972) and Mechaneck et al. (1968) for details.

Three males and 4 females, 22 to 44 years of age, volunteered to participate in a project in which they would receive LSD, dextroamphetamine, and placebo doses. All were white, college-educated and functioning normally in the community; none was hospitalized for mental illness. The volunteer received each drug (LSD, dextroamphetamine or placebo) seven or eight times on a randomized schedule over a period of approximately 1-1/2 years. Between experimental sessions there was a 3-week interval to eliminate the possibility of a "carry-over" effect. The

doses were subhallucinatory (LSD—50-100 mcg; dextroamphetamine—15-25mg) and were administered in a double-blind paradigm.

After the patient had received a capsule (LSD, dextroamphetamine or placebo), the patient was told by a research assistant that he or she would be left alone for 5 minutes and should talk about any topic that came to mind. Monologues were recorded immediately after the drug ingestion (pre) and after a 2/14-hour interval (post). It should be noted that the drugs were inactive in all pre-monologues (this was confirmed in prior research—Jaffe et al., 1972).

Speech Measures

The recorded monologues were transcribed verbatim and scored for categories of defensive language behavior by a method that has been described in detail and shown to be a highly reliable technique when transcripts contain at least 200 words (Weintraub & Aronson, 1962). All transcripts scored in the present study contained at least 250 words. The following is a summary of the language categories chosen with their standard scoring procedure.

1. *Nonpersonal reference.* Personal clauses contain a subject conceivably known to the speaker, including references to the speaker himself. All other clauses are defined to be nonpersonal.

2. *Negators.* All negatives were scored.

3. *Qualifiers.* Any clause, phrase, or word that indicated uncertainty, modified the forcefulness of a statement, or introduced a sense of vagueness.

4. *Retractors.* Any phrase or clause that detracted from an immediately preceding statement.

5. *Explaining.* Any unit of speech that implied a causal relationship or a reason for action.

6. *Expressions of feeling.* This was scored any time the speaker described himself as experiencing affect.

7. *Evaluators.* Any value judgment (e.g., like-dislike) was scored.

All of the above-described categories were converted by a correction factor that indicated frequency per 1000 words, with the exception of nonpersonal reference, which was scored on a similar quotient for clauses.

RESULTS

Analysis of Data

A separate analysis was performed for each dependent variable. The mean of each patient's performance during LSD, dextroamphetamine, and placebo sessions for a pre- and post-monologue served as the basic data for the present study. A two-way analysis was performed: Drug (LSD, dextroamphetamine, placebo) $\times$ trial (pre, post). It was expected that drug conditions would not differ in the pretrial, but that in the posttrial defensive language would have a higher incidence in the placebo condition when compared to LSD or dextroamphetamine. The planned comparisons were performed by use of Dunn's procedure (Kirk, 1968).

To verify the methodological soundness of the present study, two procedural checks were performed: (1) It should be noted that each defensive language index was defined on a "per 1000 word" basis. This procedure necessarily defines word productivity to be a covariate. In all cases, the legitimacy of a dependent variable rests on a nonsystematic relationship with the covariate (Kirk, 1968). In other words, the language indices used in the present study should be uncorrelated with word productivity. This was shown to be the case for all dependent variables in the present study (product-moment correlations ranged from $-.18$ to $+.09$). (2) The dependent variables, i.e., defensive language measures, were correlated with each other. This correlation matrix did not yield one single significant re-

relationship (correlations ranged from $-.07$ to $+.18$). This finding supports the notion that the separate analyses performed in the present study were independent of each other.

Theoretical Findings

As expected, there were no differences in the use of defensive language across treatment groups in the pre condition. In the post condition, the patients under the influence of LSD significantly decreased their use of nonpersonal references, explanatory remarks, and evaluative statements as compared to placebo (see Table 1). It was also the case that dextroamphetamine, when compared to placebo in the post condition, significantly decreased patients' use of nonpersonal reference.

TABLE 1
MEANS AND STANDARD DEVIATIONS OF PATIENTS' DEFENSIVE
LANGUAGE BEHAVIOR DURING 5-MINUTE MONOLOGUES

Speech measure	Drug conditions					
	Pre monologues			Post monologues		
	LSD	Dextro- amphetamine	Placebo	LSD	Dextro- amphetamine	Placebo
Nonpersonal reference						
<i>M</i>	829.5	787.1	808.7	687.3**	741.8*	808.7
<i>SD</i>	130.7	130.1	146.2	131.7	169.8	133.6
Negator						
<i>M</i>	13.5	16.4	13.5	12.8	14.7	15.4
<i>SD</i>	5.0	9.0	6.4	2.8	8.6	8.5
Retractor						
<i>M</i>	3.2	2.8	3.3	2.3	2.3	3.3
<i>SD</i>	1.7	1.8	2.7	1.6	1.9	2.6
Qualifier						
<i>M</i>	7.4	5.2	6.3	5.7	6.3	6.5
<i>SD</i>	2.5	3.0	2.5	2.6	3.0	4.4
Explaining						
<i>M</i>	2.2	2.5	2.6	1.0*	3.3	2.7
<i>SD</i>	1.4	.9	.8	.6	1.3	1.6
Feeling						
<i>M</i>	1.2	.8	1.0	2.3	2.0	.8
<i>SD</i>	1.5	1.0	1.0	3.3	1.9	1.3
Evaluations						
<i>M</i>	5.6	8.0	5.2	2.6*	4.3	4.8
<i>SD</i>	1.5	5.7	.5	1.9	1.3	.5

Note.—Each drug group (LSD, Dextroamphetamine) was compared singly to placebo within the pre and post condition by use of Dunn's comparison procedure. One-tailed tests were performed.

* $p < .05$.

** $p < .01$.

DISCUSSION

Stated briefly, the major finding of the present study was that subhallucinatory doses of LSD caused individuals to make more personal statements and to

use explanation and evaluations less often. Dextroamphetamine was found to be less potent in that use of only one defensive language behavior, i.e., nonpersonal references, was lessened. These simple and straightforward findings provide some empirical support for the hypothesized clinical effects of psychotomimetics on patient's verbalizations. The present findings were obtained on patient *monologues*. This was performed so that the interactive effects of the therapist could be eliminated in examining the effect of the psychotomimetics on patient verbalizations. Future research must obtain empirical support for the effect of psychotomimetics on patient verbalizations in the therapy situation.

REFERENCES

- ABRAMSON, H. A. (Ed.) *The use of LSD in psychotherapy: Transactions of a conference on d-lysergic acid diethylamine (LSD-25)*. New York: Joshua Macy Jr. Foundation, 1959.
- ABRAMSON, H. A. (Ed.) *The use of LSD in psychotherapy and alcoholism*. New York: Bobbs-Merrill, 1967.
- FINK, M. Brain function, verbal behavior, and psychotherapy. *Comprehensive Psychiatry*, 1974, 15, 257-266.
- GOTTSCHALK, L. A., & GLENER, G. C. Distinguishing characteristics of verbal communication with schizophrenics. In D. M. Rioch (Ed.), *Disorders of communication*. Baltimore, Md.: Williams & Wilkins, 1964.
- GOTTSCHALK, L. A., & GLENER, G. C. *Measurement of states through content analysis*. Los Angeles: University of California Press, 1969.
- JAFFE, J., DAHLBERG, C. C., LURIA, J., BRESKIN, S., CHOROSH, J., & LORRICK, E. Speech rhythms in patient monologues: The influence of LSD-25 and dextroamphetamine. *Biological Psychiatry*, 1972, 4, 243-246.
- JAFFE, J., DAHLBERG, C. C., LURIA, J., & CHOROSH, J. Effects of LSD-25 and dextroamphetamine on speech rhythms in psychotherapy dialogues. *Biological Psychiatry*, 1973, 5, 93-96.
- KIRK, R. E. *Experimental design: Procedures for the behavioral sciences*. Belmont, Calif.: Brooks/Cole, 1968.
- LANDON, M., & FISHER, R. On similar linguistic structures in creative performance and psilocybin-induced experience. *Confinia Psychiatrica*, 1970, 13, 115-138.
- MARTINDALE, S. COUNT: A PL/1 program for content analysis of natural language. *Behavioral Sciences*, 1973, 18, 148.
- MARTINDALE, C. *Romantic progression: The psychology of literary change*. Washington: Hemisphere Press, 1975.
- MARTINDALE, C., & FISHER, R. The effects of psilocybin on primary process content in language. *Confinia Psychiatrica*, in press.
- MECHANICK, R., FELDSTEIN, S., DAHLBERG, C. C., & JAFFE, J. Experimental investigation of LSD as a psychotherapeutic adjunct. *Comprehensive Psychiatry*, 1968, 9, 490-498.
- NATALE, M., DAHLBERG, C. C., & JAFFE, J. The effect of psychotomimetics (LSD and dextroamphetamine) on the use of primary and secondary-process language. *Journal of Consulting and Clinical Psychology*, 1978, 46, 352-353.
- SHLIEN, W. (Ed.) *Research in psychotherapy* (Vol. 3). Washington: American Psychological Association, 1967.
- WASKOW, I. E. The effects of drug on speech: A review. In K. Salzinger & S. Salzinger (Eds.), *Research in verbal behavior and some neurophysiological implications*. New York: Academic Press, 1967.
- WEINTRAUB, W., & ARONSON, H. The application of verbal behavior analysis to the study of psychological defense mechanisms: Methodology and preliminary report. *Journal of Nervous and Mental Disorders*, 1962, 134, 169-181.
- WEINTRAUB, W., & ARONSON, H. The application of verbal behavior analysis to the study of psychological defense mechanisms. II. Speech patterns associated with impulsive behavior. *Journal of Nervous and Mental Disorders*, 1964, 139, 75-82.
- WEINTRAUB, W., & ARONSON, H. The application of verbal behavior analysis to the study of psychological defense mechanisms. III. Speech patterns associated with delusional behavior. *Journal of Nervous and Mental Disorders*, 1965, 141, 172-179.
- WEINTRAUB, W., & ARONSON, H. The application of verbal behavior analysis to the study of psychological defense mechanisms. IV. Speech patterns associated with depressive behavior. *Journal of Nervous and Mental Disorders*, 1967, 144, 22-28.
- WEINTRAUB, W., & ARONSON, H. The application of verbal behavior analysis to the study of psychological defense mechanisms. V. Speech patterns associated with overeating. *Archives of General Psychiatry*, 1974, 21, 739-744.