AN INVESTIGATION OF INTERACTIONS AMONG LSD, DEXTROAMPHETAMINE, AND VERBAL BEHAVIOR IN MONOLOGUES AND DIALOGUES

by

JEFFRY LURIA

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Chairman of Examining Committee

date

Executive Officer

Louis J. Gerstman, Ph.D.

Alden Wessman, Ph.D.

John Bauer, Ph.D.

Supervisory Committee

The City University of New York

Abstract

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JEFFRY LURIA

Adviser: Arnold Bernstein

The present monograph examines some of the classical approaches to drug research and discusses a new model for such research.

Patients under the influence of LSD, dextroamphetamine, and an inactive placebo, ingested in random order, are recorded in monologues and therapeutic dialogues. Comparisons of speech rhythms, specifically transitional pause probabilities, in monologues and therapeutic dialogues were made to test the following three hypotheses: First, with respect to drug effects as measured by transitional pause probabilities, there will be differences between monologues and dialogues. Second, LSD which increases pauses in monologues should be attenuated in respective dialogues, while dextroamphetamine which decreases pauses in monologues should be intensified in respective dialogues. Third, with respect to placebo, both LSD and dextroamphetamine should decrease mean transitional pause probabilities.

The three hypotheses were confirmed. The dichotomy between "social" and "personality" variables is examined and a different approach is suggested.

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CHAPTER I

It is probable that we are presently living in the most drugged culture ever found among civilized men. According to Lennard et al. (1971):

> Last year, 202 million legal prescriptions for psychoactive drugs--stimulants, sedatives, tranquilizers, antidepressants--were filled in pharmacies for persons who saw their physicians first. During a time when the attention of both the public and most officials is concentrated upon the use of 'illegal' drugs, this steady, marked increase in the giving and taking of legally prescribed or purchased psychoactive drugs has gone relatively unnoticed (Lennard et al., 1971, p. vi).

Brecher (1972) provides a more detailed breakdown of the drug use in this country and arrives at a figure of 260 million prescriptions for psychoactive drugs per year. If the use of over-the-counter drugs is included it is estimated that some 80-90 million people out of an adult population of 122 million had used a psychoactive drug at some time. These figures describe only legal use. With the addition of illegal use or so-called "drug abuse" the figures would be nothing short of astounding. This current popularity of drug use is, whatever else, a social phenomenon of massive proportions. It seems clear that whether or not such widespread drug use is considered a "problem," research on the use of drugs and their interaction with social systems is clearly mandated by the inroads drugs have already made into the culture.

Relevance of Social Variables

Although there is abundant drug research dealing with such areas

as perception, personality, pharmacology, and physiology etc., there is a dearth of research in the area of drugs and their interaction with social variables. For example, what might be the effect of a member of a family who is taking a psychoactive drug on the other members of that family? What might be the effect of a family on the drug-taking member of that family? Another example is found in the recent article in the New York Times (April 24, 1973) reporting a surprisingly high rate of both formal and de facto rehabilitation of heroin addicts returning from Vietnam. These rates differ markedly from the usual reported rates of recovery in the States and led one of the researchers to comment: "We now know that recovery from heroin dependence is not impossible . . . and further that the myth perpetuated in medical school, that anyone who ever tried heroin was instantly and perpetually hooked, had been exploded (Finney, April 24, 1973, p. 1)."

The report strongly implied but left unanswered a major question. What was the reason for this high rate of cure? The heroin available in Vietnam is much purer than that found in the United States and should be more quickly and intensely addictive. In addition, the report indicated that these men were not highly deviant. Although inconclusive, it seems likely that socio-psychological factors present in both the Vietnamese environment and the radical change in coming back to the United States played an important role in these results.

The present effort examined speaker pausing in monologues and psychotherapeutic dialogues in order to ascertain if drug effects were modifiable by changes in social situation. The general thesis of the present work is that social as well as psychological variables are crucial for understanding drug effects. Drugs not only effect the people who take them, but also effect and are affected by individuals

with whom the drug taker interacts. Thus, finding and elucidating an effective model of drug action is likely to be inextricably bound to appropriate personality models. The real question is not simply what a particular drug does to a particular personality or even vice versa, but rather what do we imply when we speak of "personality?"

In the following section: traditional drug models are examined; then the work of Schacter (1966, 1970) is discussed as an example of a more recent and pivotal approach, and lastly, the sociopharmacological approach of Lennard et al. (1971) is described.

Theoretical Considerations

Classical Approaches

The work of Fisher (1970) and Zubin and Katz (1964) are examples of the more traditional approaches.

In a particularly comprehensive article Zubin and Katz (1964) demarcate certain relevant personality concepts as well as measures appropriate to drug research. The authors state:

> The study of personality, concerned as it is with such phenomena as motivations, feelings, organizing principles of experience and behavior, suffers greatly from a lack of adequate criteria with which to measure its characteristics. The history of personality measurement has involved a continuing search for those external behaviors which are most relevant to the understanding of the intervening internal phenomena. In seeking appropriate techniques of investigation in this field, the following elements require attention: (1) the behavior to be measured; (2) the environmental situation in which the behavior takes place; (3) the individual under observation, and (4) the chemical agent (Zubin and Katz, 1964, p. 376).

The authors accept a classical personality model which is conceptually framed as a relatively closed system separate from the external environment. This conceptual difficulty, a dilemma not only

for drug research but much of personality research, is acknowledged in the following statement: "In a discussion of the effects of drugs on personality or indeed a discussion of whether or not there is, or can be, any experimental evidence for such effects--the present vague status of the concept of 'personality' has to be dealt with (Zubin and Katz, 1964, p. 368)."

Fisher (1970) takes a more orthodox position, but indicates the importance of non-specific factors. He outlines four principles as follows:

> Principle No. 1: The more the response system being measured involves cortical processes such as awareness, consciousness, and subjective feelings, the greater will be the role of non-specific factors influencing drug response.
>
> Principle No. 2: Many apparent non-specific influences may be reducible to (i.e., explained by) simple physiologic and pharmacologic factors.
>
> Principle No. 3: The more 'potent' a drug is, the less sensitive it will be to non-specific factors.
>
> Principle No. 4: Most available clinical data suggest that the maximum drug response can be obtained by administering the drug in the presence of the most favorable 'placebo-genic' factors (Fisher, 1970; pp. 35-37).

Schacter (1966; 1970) has outlined a significant departure from the approaches discussed above. His views may be regarded as a pivot between the traditional and sociopharmacological approaches. Schacter (1966) summarizes his position as follows:

> To begin with, let us grant on the basis of much evidence that a general pattern of sympathetic discharge is characteristic of emotional states. Given such a state of arousal, it is suggested that one labels, interprets, and identifies this stirred-up state in terms of the characteristics of the precipitating situation and one's apperceptive mass. This suggests, then that an emotional state may be considered a function of a state of physiological arousal and of a cognition appropriate to this state of arousal. The cognition, in a sense, exerts a steering function. Cognitions, arising from the immediate situation as interpreted by past experience provide the framework within which one understands and labels his feelings. It is the cognition which determines whether the state of physiological arousal will be labeled 'anger,' 'joy,' or whatever (Schacter, 1966; pp. 194-195).

Two questions arise from his work. First, what is the exact nature of the relationship between cognitions and arousal? Schacter seems to be saying that arousal precedes interpretation (his experiments may possibly induce this), but it is likely that cognitive processing at least on some elementary level, must take place prior to arousal. Second, what is the meaning of "cognition?" Schacter's "cognitions," though taking social variables into account, nevertheless remain imbedded in the person, theoretically isolated from social reality.

Mischel (1973) in a recent article summarized the classical trait personality position as follows:

> It has generally been assumed that personality dispositions or traits--the basic units of personality study--are relatively stable, highly consistent attributes that exert widely <u>generalized</u> causal effects on behavior. Whether one uses the language of factors, or of habits, or of basic attitudes, or of dynamics and character structure, this fundamental assumption has been shared: personality comprises broad underlying dispositions which pervasively influence the individual's behavior across many situations and lead to consistency in his behavior. These dispositions are not directly observed but are inferred from behavioral signs (trait indicators) either directly or indirectly. Guided by this assumption, personality research has been a quest for such underlying broad dimensions, for basic factors, or for pervasive motives, or for characteristic life styles. In personality assessment the trait assumptions regarding structure are seen in the existence of hundreds of tests designed to infer dispositions and almost none to measure situations (Mischel, 1973, p. 253).

The crux of the issue is succinctly stated by Lennard and Bernstein (1969):

> The crucial issue to which our investigation addresses itself revolves around the extent to which interactional behavior is context-derived and context-contingent, and the extent to which it is a function of enduring individual and personality attributes. To what extent is human behavior generated by the social contexts in which it occurs and to what extent do individuals create a "portable" reality that determines their behavior, irrespective of the situation in which they find themselves (Lennard and Bernstein, 1969, p. 2)?

In summary, what can be broadly conceived as the classical

personality trait or psychopharmacological approaches do not adequately assess the contribution of social variables. What then could be a viable alternative? A partial answer might lie in the work of George Herbert Mead (1934) and Lennard et al. (1971).

Sociopharmacological Approach

Mead succinctly introduced his approach as follows:

> The point of approach which I wish to suggest is that of dealing with experience from the standpoint of society, at least from the standpoint of communication as essential to the social order. Social psychology, on this view, presupposes an approach to experience from the standpoint of the individual, but undertakes to determine in particular that which belongs to this experience because the individual himself belongs to a social structure, a social order (Mead, 1934, p. 1).

In his introduction to Mead's work, Morris (1962) stated:

> Mead's endeavor is to show that mind and the self are without residue social emergents; and that language, in the form of the vocal gesture, provides the mechanism for their emergence (Morris, 1963, p. xiv).

And further:

> He does not neglect with the traditional psychologist the social process in which human development takes place; he does not neglect with the traditional social scientist the biological level of the social process by falling back upon a mentalistic and subjective conception of society as being lived in antecedent minds. Both extremes are avoided by an appeal to an ongoing social process of interacting biological organisms, within which process, through the internalization of the conversation of gestures (in the form of the vocal gesture), mind and selves arise. And a third extreme of biological individualism is avoided through the recognition of the social nature of the underlying biological process in which minds arise (Morris, 1962, p. xv).

> It is because experience has a social dimension, because the self or organism is given in a field with others that Mead is entitled to start with the social act and to ground his social psychology upon a social behaviorism (Morris, 1962, p. xix).

> Instead of beginning with individual minds and working out to society, Mead starts with an objective social process and works inward through the importation of the social process of

> communication into the individual by the medium of the vocal gesture (Morris, 1962, p. xxii).

In sum, Mead's work implies that social fields and context are not merely sufficient but necessary conditions for examining any behavior or activity. The work of Lennard et al. (1971) not only continues in this framework but enlarges it to fit present day drug research. The influence of Mead (1934) on Lennard et al. (1971) can be seen in the following passages from Mystification and Drug Misuse.

> Although research by social scientists has suggested that specific experiences resulting from the use of illegal drugs, such as marajuana, are socially learned, social scientists do not appear to question the assumption that psychoactive drugs prescribed within the context of medical practice have the specific effects they are prescribed for. Social scientists appear to be reluctant to trespass upon what they evidently believe to be within the purview of the practice of medicine. But to comprehend the issues involved, it is essential to bear in mind a distinction between pharmacological effects and behavioral effects of psychoactive drugs (Lennard et al., 1971, p. 57).

And in summary:

> The final dimension influencing a person while he is on a drug is the nature of the social context. Aside from the atmosphere of expectation implicit in any setting, when other participants know someone is on a drug, a variety of elements in the context contribute to the eventual experience: how the context is peopled (that is, who is present); the demands for response and action felt by the drug taker; the tasks he is required to perform; the amount of information he must process; and the physical surroundings to which he must relate (Lennard et al., 1971, p. 66).

Lennard et al. (1971) touch the core of the problem when they question the classic drug research paradigm based on the "magic bullet" metaphor. In other words, does a drug specifically focus on the target for which it is intended, like a surgeon's knife excising the diseased organ without damaging healthy tissue? They state:

> Drugs designed to change experience or behavior not only alter internal body processes, as revealed by the range of possible side effects, but also the complex of psychological and social processes connecting the individual to his physical and human environment (Lennard et al., 1971, p. 81).

A concise account of their model is available in the following two paragraphs:

> The model appropriate to psychoactive drug effects is more like the following. One takes a drug, thereby introducing specific changes in his physiological state. These changes, however, do not trigger specific or uniform psychological or behavioral consequences. A specific emotional response is then generated both by the social context (the surrounding social and environmental cues) and by one's set (one's past experiences with similarly patterned experience). How one labels this inner experience depends largely upon the nature of the situation and knowledge of how similar feelings were labeled in the past (Lennard et al., 1971; pp. 83-84).

> Just as the introduction of a drug produces a range of systemic alterations in the physiological system of an organism (alterations which require the individual to interpret and label them), so the administration of a psychoactive agent affects the social systems in which the user participates and results both in changes in the system as a whole and in the interpretation of these changes by the participants. Any changes in the psychological state and social behavior of a member of a social system or group inevitably has the consequences for the other members of that system and for the system as a whole (Lennard et al., 1971, pp. 84-85).

Though the theoretical approach outlined above is both provocative and thoughtful, there is at present little empirical substantiation of the position. The following section discusses some of this research.

Research in Sociopharmacology

Nowlis and Nowlis (1956) reported that the mood of partners (male college students) in group settings in which drugs were taken (Benzedrine, Seconal, Dramamine and others) influenced the behavioral effects of those drugs taken. Apropos of this they state:

> . . ., we set our subjects in social groups of four men, not primarily in order to study the effects of drugs on group dynamics, important as this would be, but to control and vary the social situation in order to reveal the socially relevant effects of the drug on individuals. Obviously, this could not be done in an isolated individual. Moreover, drugs taken in everyday life act on individuals who are frequently involved in social situations (Nowlis and Nowlis, 1956, p. 348).

Starkweather (1959) investigated the effects of individual and situational differences on drug effects. Starkweather discovered a number of interesting effects of social interaction on drugs, but the most dramatic was that the drug taken by the partner of the target subject was very important in the prediction of the effect in the subject. Starkweather (1959) states:

> The partner who took the stimulant, amphetamine, consistently produced a slowing in the subject's performance while the partner who took the depressant, phenobarbitol had the effect of speeding the subject's performance. This was true no matter what the subject himself took and even though he had already shown the 'typical' drug effect earlier (Starkweather, 1959, p. 170).
>
> I should like to pose the question of whether the perception of a drug effect in another, even by an admittedly competitive and watchful medical student, can be a strong enough influence to cancel and reverse the direct drug effect. Perhaps the question should be restated, should the doctor take a drug in order to influence the patient (Starkweather, 1959, p. 170)?

Lennard et al. (1967) using "natural" groups and Chlorpromazine also investigated the effect of psychoactive drugs on social interaction processes. In their introduction they ask several general questions. These questions provide an additional focus for the present work. They are:

> 1) What is the effect of the drug on the behavior patterns of the individual who is taking it?
> 2) What changes, if any, are there in the behavior patterns of other persons involved in interaction with an individual who is taking a drug, especially in the behavior they direct toward him?
> 3) Does the structure and process of a social group change as a result of administering a psychoactive drug to one of its members?
> 4) Conversely, to what extent do the characteristics of the group of which the 'drugged' individual is a member affect how his behavior and that of the other group members is modified by the introduction of the drug?
> 5) What changes in interaction patterns are perceived by group members when one member has been administered a psychoactive drug (Lennard et al., 1967, p. 69)?

They demonstrated that not only do the drug taking members of a group initiate less verbal interaction but they are the objects or targets of

less verbal interaction emanating from the other members of the group. The authors state:

> Social scientists suggest that behavior is the result of expectational and evaluational processes on the part of interacting individuals. From this perspective, changes in the direction and flow of behavior between group members may result from changes in interpretations and evaluations made by group members under the different study conditions. This position would imply that group members were, in some degree, aware of whether they or others received a drug or placebo and adjusted their behavior in the light of this judgment--much more specifically--whether group members noted a decrease in activity or responsiveness on the part of themselves or others and, therefore, shifted the direction of their communications (Lennard et al., 1967, p. 75).

Although specific research paradigms directed at the influence of social variables are scarce; marajuana research implicitly if not explicitly utilizes this approach. Since marijuana effects are somewhat similar to the effects of LSD-25, a discussion of research in the area, may help to further explicate the importance of social variables in drug research.

Marijuana Research

In a book dealing with social deviance Becker (1963) dealt at length with marijuana use. Two aspects of his work are germane to the present discussion: first, the general inadequacy of classical personality models to deal with cause, effects, and maintenance of drug use; second, a more accurate explication of the role of social context in drug research, and use. In regard to the first, Becker (1963) states:

> Attempts to account for the use of marijuana lean heavily on the premise that the presence of any particular kind of behavior in an individual can best be explained as the result of some trait which predispose or motivates him to engage in that behavior. In the case of marijuana use, this trait is usually identified as psychological, as a need for fantasy and escape from psychological problems the individual cannot face (Becker, 1963, pp. 41-42).

In regard to the second, he states:

> To put a complex argument in a few words: instead of the deviant motives leading to the deviant behavior, it is the other way around; the deviant impulses and desires--in this case, probably most frequently a curiosity about the kind of experience the drug will produce--are transformed into definite patterns of action through the social interpretation of a physical experience which is in itself ambiguous. Marijuana use is a function of the individual's conception of marijuana and of the uses to which it can be put, and this conception develops as the individual's experience with the drug increases (Becker, 1963, p. 42).

Becker (1963), too, is indebted to Mead (1934) as evidenced in a footnote to that effect based on the above statement. In a more precise exposition Becker (1963) commented:

> The research I am about to report was not so designed that it could constitute a crucial test of the theories that relate marijuana use to some psychological trait of the user. However, it does show that psychological explanations are not in themselves sufficient to account for marijuana use and that they are, perhaps, not even necessary. Researchers attempting to prove such psychological theories have run into two great difficulties, never satisfactorily resolved, which the theory presented here avoids. In the first place, theories based on the existence of some predisposing psychological trait have difficulty in accounting for that group of users, who turn up in sizeable numbers in every study, who do not exhibit the trait or traits which are considered to cause the behavior. Second, psychological theories have difficulty in accounting for the great variability over time of a given individual's behavior with reference to the drug. The same person will at one time be unable to use the drug for pleasure, at a later stage be able and willing to do so, and still later again be unable to use it in this way. These changes, difficult to explain from a theory based on the user's need for "escape" are readily understandable as consequences of changes in his conception of the drug. Similarly, if we think of the marijuana user as someone who has learned to view marijuana as something that can give him pleasure, we have no difficulty in understanding the existence of psychologically "normal" users (Becker, 1963, p. 44).

Becker (1963) summed up his position in the following paragraph:

> In summary, an individual will be able to use marijuana for pleasure only when he goes through a process of learning to conceive of it as an object which can be used in this way. No one becomes a user without (1) learning to smoke the drug in a way which will produce the real effects; (2) learning to recognize the effects and connect them with drug use (learning in other words, to get high); and (3) learning to enjoy the sensations he perceives. In the

> course of this process he develops a disposition or motivation to use marijuana which was not and could not have been present when he began to use, for it involves and depends on conceptions of the drug which could only grow out of the kind of actual experience detailed above. On completion of this process he is willing and able to use marijuana for pleasure (Becker, 1963, p. 58).

A weakness in Becker's (1963) position is his separation of fantasy and social motivations.

Another investigation has explored the social context and its relationship with drug usage. Goode (1969) asserted that marijuana was unique as a "sociogenic" drug. Although in an important exception he speculated that LSD might also be subject to the same variables. He presented seven criteria for ascertaining whether or not a drug was "sociogenic." These are:

> (1) the drug is typically used in a group; (2) the other persons with whom one share the drug experience are usually intimates, intimates of intimates, or potential intimates, rather than strangers; (3) the relations that the user has with others in the group are generally long-term continuing social relations; (4) the group share many of the same values; (5) a value convergence will occur as a result of progressive group involvement; (6) in turn, the drug-oriented activity of the group continually reaffirms its solidarity; (7) participants view the activity as a legitimate basis for identity--they define themselves as well as others, partly on the basis of whether they have participated in the activity or not (Goode, 1969, p. 61).

Goode supports the main contentions of Becker (1963) with respect to the social factors surrounding drug usage. The critical point is that social phenomena are necessary conditions not only for evaluating, describing and predicting drug effects, but for examining any aspect of reality. Certainly drug effects are themselves social phenomena which inevitably produce social consequences.

Relationship of Marijuana and LSD

There is much evidence available which suggests that marijuana and

LSD are both subject to similar social variables as well as sharing similar behavioral consequences. Barber (1970) states the following:

> . . . LSD-type drugs commonly produce a dreamy-detached feeling, changes in time perception, and changes in mood (either or both anxiety and euphoria). The effects of marijuana tend to resemble these LSD-type effects; a substantial number of subjects who have smoked one to four marijuana cigarettes state that they feel dizzy, detached, or as if they are in a dreamlike state; they feel that time is passing slowly; and they feel either or both anxious and happy (Barber, 1970; p. 93).

The close relationship between marijuana and LSD is discussed by Becker (1969) as well. He stated.

> In what follows, I consider the reports of LSD-induced psychoses and try to relate them to what is known of the social psychology and sociology of drug use. By this means I hope to add both to our understanding of the current controversy over LSD and to our general knowledge of the social character of drug use (Becker, 1969; p. 164).

> In particular, I will make use of a comparison between LSD use and marijuana use, suggested by the early history of marijuana in this country. That history contains the same reports of "psychotic episodes" now current with respect to LSD. But reports os such episodes disappeared at the same time as the number of marijuana users increased greatly. This suggests the utility of considering the historical dimension of drug use (Becker, 1969; p. 164).

As with marijuana, there is strong evidence for the influence of social or situational variables on the effects of LSD. Barber states the following with respect to these influences:

> There appears to be a consensus among workers in this area that situational variables play an important role in determining the nature and magnitude of the effects associated with LSD-type drugs. The following are considered situational variables: the role that the experimenter or therapist assumes, including what he expects the drug reactions to be, what explicit or implicit suggestions he gives, and what types of responses he reinforces; whether the subject receives the drug in a clinical or experimental setting; whether the drug is administered to a group of individuals or to one subject alone; and what types of activities are required of the subject after he has taken the drug. It is rather surprising that very few experiments have been designed to assess the effects of these situational variables. In fact, there appear to be only two experiments that explicitly manipulated situational variables. The situational antecedent variable that was manipulated in both

studies was direct, explicit suggestion from the experimenter (Barber, 1970, p. 14).

In a paragraph which could easily be talking about LSD research, Barber (1970) states the following:

> It appears likely that the effects are dependent not only on the grade and dose of the marijuana but also on such extra-drug variables as the situation, subject's set (for example, his expectations and motivations for taking the drug), and the subject's personality. Although these extra-drug variables probably affect the nature of the marijuana experience, unfortunately no experimental studies have as yet been reported which delineated the main effects and the interactive effects of drug dose, situation, set and personality. Studies are clearly needed which experimentally manipulate situational variables, which assess the subject's set and his personality characteristics, and which use various dose levels of marijuana (Barber, 1970; p. 86).

The point is that much of the effects of marijuana are induced if not directly at least in part through social forces and that LSD may in fact be subject to these same forces. Whether LSD, marijuana, or any drug is at issue, research on situational variables, specifically subjects in isolation versus subjects in groups is needed. This is the general purpose of the present work.

In summary, classical trait models of personality as well as classical drug research paradigms are conceptually inadequate to deal with social contexts as critical factors in research. Secondly, drugs are given and taken within particular social contexts which in turn affect their action. Thirdly, individuals, acting within these contexts bring expectancies which in turn interact with drug responses. These individuals are in turn effected by the demand characteristics of the contexts in which they participate. Finally, the point of the present effort is to attempt to substantiate the critical role of social context in evaluating activity or behavior especially drug action. It will hopefully help to elucidate the research and conceptual leverage of the sociopharmacological framework (Lennard et al., 1971).

It is at this point that a more thorough presentation of the independent and dependent variables used in the present study is necessitated. First, the physiological, phenomenological, and general psychological effects of LSD and dextroamphetamine will be briefly stated. Second, the several verbal interaction methods including the one used in the present study, will be outlined. Third, since the present thesis assumes that a speech parameter i.e., transitional pause probabilities will reflect change in both social context and drug effects, the general use of speech parameters in drug research will be discussed. Finally, a brief discussion of transitional pause probabilities as a dependent variable will be undertaken.

Clinical and Pharmacological Aspects of LSD

In 1938 Stoll and Hofmann succeeded in synthesizing LSD from alkaloids of the ergonovine type. It was not until April of 1943 that Hofmann, while working with the tartrate of LSD, accidently inhaled some of the fumes and became intoxicated in the now familiar state of LSD. Hofmann described this as follows:

> In the afternoon of 16 April, 1943, when I was working on this problem, I was seized by a peculiar sensation of vertigo and restlessness. Objects, as well as the shape of my associate in the laboratory, appeared to undergo optical changes. I was unable to concentrate on my work. In my dream-like state I left for home where an irresistible urge to lie down overcame me. I drew the curtains and immediately fell into a peculiar state similar to a drunkenness, characterized by an exaggerated imagination. With my eyes closed, fantastic pictures of extraordinary plasticity and intensive color seemed to surge towards me. After two hours this stage gradually wore off (Hofmann, 1959).

In 1947 Stoll reported on a clinical study which administered LSD on 29 occasions to 16 normal subjects and on 20 occasions to 6 schizophrenics. In 1950 Busch and Johnson published the first article

on the use of LSD in psychotherapy. With this seemingly inauspicious beginning, investigations using LSD in paychotherapy proliferated. The primary thrust of the investigations was to facilitate the psychotherapeutic process (Sandison, R. A., Spencer, A. M., Whitelaw, J. D. A., 1954; Abramson, H. A., 1955; Savage, C., 1956). Although a good deal of research on LSD as an adjunct in psychotherapy had been completed, the question of what effects, if any, did LSD have on the communications of therapist and patient, remained unanswered. Such a basic question needed an answer. In 1962, Dahlberg, Jaffe, and Feldstein began an intensive long-term investigation into such effects. Their study provides the research background from which the present work is derived.

Various physiological effects have been reported as a result of ingesting LSD. According to Jarvik (1970), "The significant effects of LSD are almost entirely upon the central nervous system." These effects according to Hollister include dilation of pupils, hyperflexia, increased muscle tension, incoordination, and ataxia. Other effects include hyperthermia, mild hypertension (Hollister, 1968). Subjective sensations include tingling of the extremities, feelings of chilliness, anorexia, nausea, vomiting (rarely) and flushing (Cohen, 1968).

Neurophysiological effects have been noted by Fink (1969) to include increased fast activity and decreased amplitude of the alpha rhythms of the EEG. Winters (1969) claims that the EEG responses in rhombencephalic sleep states are similar to LSD states. That is, they are hypersynchronous. In addition, he states that such states can lead to peripheral unresponsiveness as a consequence not of depression but occlusion. Gross psychological effects include altered shapes, colors, focusing difficulty, increased auditory sensitivity as well as alterations

in mood, tension, time sense distortion, difficulty in expressing thoughts, depersonalization, dream-like feelings and visual hallucinations (Hollister, 1968).

Katz, Waskow and Olsson (1968) conducted a study using the inmates of a correctional institute and found the following subjective effects: ambivalent feelings, feelings of detachment and unreal quality of perceptions, fear of loss of control of thoughts, feelings and behavior, giddiness, excitement and euphoria, feelings of sensory and perceptual sharpness, sense of impaired cognition, psychomotor performance and the perception of time and jittery, tense feelings.

Dextroamphetamine as a drug is essentially similar to LSD in that both are CNS stimulants. Dextroamphetamine, however, is not classified as hallucinogenic (Winters, 1969). It was considered an active placebo in the larger study from which the present work is taken.

Though the above findings have in general been confirmed, wide variations do exist. These variations are probably due to not only differences in subject variables, but also to differences in social context variables.

Verbal Interaction Studies

The attempt to deal with the verbal patterns of speakers both descriptively and as dependent variables dates back at least as far as 1938 (Norwine, A. C. and Murphy, O. J., 1938).

The first use of interaction chronography was in the investigation of personality (Chapple, E. D., 1939). Chapple's (1940) rationalization of his approach is significant for it explains much of why the present work utilizes speech patterns as the dependent variables.

> We all know, as a matter of observation, that people have different rates (timing) of interaction. Some of our friends or acquaintances seem to talk and act very speedily as compared to ourselves; others are slow and deliberate. These characteristics of individuals are something we intuitively recognize, and we often are at variance with the rates at which others act. For example, where there are two people in interaction, one whose actions are quick and speech voluble, and the other, slow and given to long well-rounded phrases, we are apt to find that the speedy one keeps interrupting the slow one, jumping in when the other pauses, and so on (pp. 31-32).

Saslow and Matarazzo (1962) in a summary of their work with the interaction chronograph state the following:

> The statements listed above, taken together, seem to meet the essential conditions stated by Edwards and Cronbach for research in psychotherapy (or, for that matter, research on the effects of drugs, psychosurgery, use of therapists of differing levels of experience, differing theoretical frames of reference, the effects of planned modifications in the interviewer's behavior analogous to operant conditioning procedures, etc.). It may well be possible to design experiments dealing with psychotherapy (and other experimenter manipulanda) in which a limited number of stimulus variables and organismic variables is defined, and specified interviewee as well as interviewer response variables are measured by use of this highly reliable method (p. 157).

Matarazzo, Saslow, Matarazzo, and Wiens (1968) later worked with the on-off patterns of speech using a human judgmental procedure which they felt was reliable and accurate enough.

Several systems have been utilized with widely varying classification schemes as well (Hargreaves, W. A. and Starkweather, J. A., 1959; Kasl, S. and Mahl, G. A., 1956). Matarazzo, et al. (1968) have also employed the on-off characteristics of speech to investigate the now verbal parameters of psychotherapy (Matarazzo, Wiens, Matarazzo, and Saslow, 1968).

Jaffe and Feldstein (1970) developed an almost completely automated system to analyze the on-off characteristics of speech in monologues and dialogues. It was this system which was used in the present study. In their introduction they state the following:

> Our initial interest was the study of dyadic interaction in the framework of psychotherapy research. This application dictated a focus upon certain interpersonal or system features of conversation that might be relevant to the communication of mood, to the phenomenon of 'empathy' and to the breakdown of effective dialogue. Investigations of such problems are confronted with a mass of clinical interview material which, in all its richness, is largely unmanageable. Expediency, therefore, led us to concentrate on the on-off patterns of vocal signals in face-to-face conversation. This restriction simplified the transduction of signals via the use of voice-actuated relays, and made large scale automated data processing possible. We realized, however, that the meaningful pursuit of our initial interest called for a comparable body of knowledge about the temporal structure of nonclinical conversations (Jaffe & Feldstein, 1970, p. 2).

Named the Automatic Vocal Transaction Analyzer, it works as follows: two channel tape recordings are fed into the system which encodes the sounds and silences in each channel (i.e., of each speaker). The analog voltage signal of each channel activates a relay which is periodically sampled for presence or absence of speech. In addition, they have demonstrated the efficacy of a model for describing the patterns of speech. In brief, their findings are as follows:

> (1) A completely automated system can encode the on-off characteristics of conversation more reliably than a human observer and in a form suitable for deeper mathematical analysis.
>
> (2) The temporal patterns of conversation have a formal structure, unambiguously definable by an automated system as a sequence of units in time. This structure shows certain mathematical properties which are relatively invariant in the conversations we have examined.
>
> (3) The mean values of some of these units are stable characteristics of speakers; others are less stable and consequently serve as sensitive indices of the interaction.
>
> (4) The mean values can be systematically modified as a function of social context.
>
> (5) A key feature of the dialogic rhythm is the fact that one speaker at a time holds the floor with concomitant suppression of simultaneous speech. We presume this phenomenon to be a linguistic universal, to a great extent neurophysiologically obligatory, and based on the information processing limitations of the nervous system. Simultaneous speaking and listening is extremely difficult without dysfluency and/or loss of comprehension.
>
> (6) There is a strong tendency for speakers in conversation to match the average durations of the pauses that they alternately exhibit while speaking. This is not generally true of the durations of their respective vocalizations (as we measure them). This

> pause matching phenomenon is probably responsible for the positive correlations which several investigators have obtained between the average lengths of time that interacting speakers 'hold the floor' (Matarazzo, Wiens, Saslow, Allen, and Weitman, 1964). The mutual pacing is referable to a belateral adjustment of silence intervals, and this may correlate with phenomena such as empathy or communication of mood. It is a conceivable mechanism for adjusting the linguistic information processing rates of the speakers to each other.
>
> (7) We have succeeded in modeling the simple sound-silence sequence of both monologue and dialogue as stochastic processes, and have demonstrated the utility of a rule, first proposed by Jaffe and Norman (1964), which specifies the interdependence of the participants in a dialogue. The implications for monologue, viewed as a two-state Markov chain with but a 300 millisecond constraint between transitions, are that over the range that the model fits (98% of the pause and vocalization events) the durations of adjacent pauses and vocalizations must be statistically independent. Furthermore, continuing to pause or speak should be independent of how long one has been doing so. This raises questions regarding recent observations of long range constraints in an on-off pattern of monologue (Goldman-Eisler, 1968), and suggests that the phenomena are attributable to random fluctuations rather than underlying cognitive states of the speaker (Schwartz and Jaffe, 1968; Jaffe and Feldstein, 1970).

The present work sought to examine the effects of social context on the speech behavior of individuals influenced by drugs. The relationship between drugs and speech is therefore of importance. The following section examines some of the bases for utilizing speech parameters as indices of drug effects.

Speech Parameters as Indices of Drug Effects

The use of speech parameters as indices of change in drug studies is by no means rare. As recently as 1967 a review was published on just this subject (Waskow, I. E., 1967). Waskow points to two ways in which drugs and speech may be utilized.

> One reason for studying the effects of drugs on speech is for the purpose of drug evaluation. Psychotropic drugs are said to have effects on psychomotor, cognitive, affective and complex interpersonal and psychodynamic processes. Measures based on the speech of patients would seem to be an ideal means for studying such effects since speech, as Goldman-Eisler, has pointed out (1958), is the meeting-ground for many events and processes,

that take place in the organism (p. 355).

> A second reason for studying the effect of drugs on speech has more to do with basic psychological questions than with the evaluation of drugs. Here drugs may be used to establish a particular state in the organism, so that the researcher may explore the relationships between this state and various speech processes. For example, certain drugs may be perceived as producing stress in the organism and it is the relationship of this stressful state to speech processes that is of interest. Where some of the specific physiological and/or biochemical effects of a drug are known, researchers may be interested in relating these specific reactions to hypothetically related cognitive or affective events as they are reflected in speech (p. 356).

Several studies are relevant: Amarel and Cheek (1965) using LSD, reported that in individual settings there was a decrease of verbal output while in group interactions there was an increase. Lennard et al. (1956) suggested that interactions in a task setting under LSD were shorter in duration. He also found that subjects tended not to finish their statements. Waskow (1967) speculated that subjects under LSD started more often but did not finish. The implication seems to be that something, possibly shifts in attention, were interfering.

Waskow (1967) summed up these approaches as follows:

> The study of the effects of drugs on interpersonal behavior is of importance in understanding a drug's action on normal interaction as well as in evaluating the effects of drug treatment on disturbed interpersonal behavior and on therapeutically oriented interactions. Speech is by definition interpersonal in nature, and few interactions can take place without it; thus the systematic study of a person's speech either in an interview or in a group setting would seem to be the most appropriate means of studying changes in a person's ability to interact with others and in the quality of his interactions (p. 367).

Partly on the basis of these assertions, the monologues of patients on LSD, dextroamphetamine and a placebo were examined to test the hypothesis that LSD would decrease vocalizations and increase pause times (Jaffe, Dahlberg, Luria, Breskin, Chorosh, and Lorke, 1972). In short, the findings showed that LSD produced greater mean pause lengths. It

was suggested that a shift in attention to inner cognitive processes rather than overt verbalizations was the cause of this effect.

It was also suggested that the dialogues of these subjects be examined to ascertain if the results of the monologues could be replicated in dialogues. A pilot study confirming this was conducted. The present effort is a detailed elaboration of that work (Jaffe et al., 1973).

The dependent variable used in the present study is transitional pause probability. This is a measure of the probability of an individual continuing to pause in speech. Prior research has used several kinds of pause measures, especially mean pause time, which is a linear transformation of the transitional pause probability (Jaffe and Feldstein, 1970). For ease of computation and simplification analysis of the present data was performed using transitional pause probabilities. It has been demonstrated that the distribution of transitional pause probabilities is independent of the distribution of transitional vocalization probabilities.

Hypotheses

Is there a basis for asserting that social context influences drug action, and if so, in what ways does it influence this action?

The present investigation makes use of two different social contexts i.e., monologues and dialogues. Classical trait theories of personality as well as certain traditional psychopharmacological approaches tend to predict consistency irrespective of changes in social context. Hence, changes from monologues to dialogues with respect to drug effects on verbal behavior should not be significant.

Since differential drug effects have been found within the monologue

condition (Jaffe et al., 1972), a simple replication of those findings in the dialogue condition would lend support to the classical, personality trait approach i.e., social context is not a critical variable. A finding of changes between these conditions would strongly suggest the relevance of social context.

Hence, the first hypothesis is:

With respect to drug effects, as measured by transitional pause probabilities, there will be differences between monologues and dialogues.

The present research design allows us to pursue this problem further. If we find changes between monologue and dialogue conditions, we have broadly established a case for the sociopharmacological approach. In short, we have demonstrated its descriptive utility. If we can demonstrate its predictive utility a far stronger case would be established. In brief, if we specify in social-cognitive terms the properties of the dialogue system such that we can predict the direction of the changes it causes we have demonstrated the predictive utility of the sociopharmacological approach. The question is, given significant changes between monologues and dialogues with respect to drug action can a sociopharmacological framework explain and predict the direction of these changes? It is necessary to examine the dialogues in just this manner.

The dialogues of the present thesis are not only conversations but formal conversations, the rules of which define them as meetings in classical psychoanalysis. Psychoanalysis involves a number of formal conditions, notably its emphasis on the "free associations" of one of the participants. In other words, an uncensored free-flowing verbalized

report is the characteristic demand on the patient. The patient is there to talk and the analyst to listen. Hence the expectations of both participants are well defined. The demand characteristic of the psychoanalytic dialogue--i.e., that the patient talk--should tend to decrease the pause times. A patient who is pausing and at the same time wishes to meet the expectations of the situation will tend to move out of the pause i.e., vocalize faster than when he is in a monologue which ostensibly makes no such demand.

In brief, as compared to monologues the psychoanalytic dialogues should be characterized by a decrease in pausing. Jaffe et al. (1972) has established that in monologues LSD increases mean pause times and dextroamphetamine decreases mean pause times with respect to a placebo. Our dialogues are characterized by a demand situation which is opposite to already established drug effects in monologues. The hypothesis based on this additive model is:

LSD as a transitional pause increaser in monologues should be attenuated in respective dialogues while dextroamphetamine as a transitional pause decreaser in monologues should be intensified in respective dialogues.

Schacter's (1966) work would predict a slightly more exquisite model which we will label interactive. Schacter's thesis is that the cognitive variables i.e., expectancies and demand characteristics appreciably alter the subject's labelling of his internal states. In fact, since both LSD and dextroamphetamine are CNS stimulants i.e., strong arousal agents, if these are utilized for the task at hand, namely, greater verbalizing, we have the following hypothesis:

In dialogues, with respect to placebo both LSD and dextroamphetamine should decrease mean transitional pause probabilities.

In any case, if either one of the latter two hypothesis is supported a strong case for not only the descriptive but predictive utility of the sociopharmacological approach has been made.

CHAPTER II

METHODS

In brief, the monologues and therapeutic dialogues of seven patients in individual psychotherapy were recorded. All were seen by a single therapist. Prior to the first monologue, patients ingested either LSD, dextroamphetamine, or an inactive placebo given in random order over a period of one and one-half years. The recordings were processed automatically and transitional pause probabilities were obtained for the second, fourth, and sixth drug sessions, for each drug, for each patient, and as well as the analyst.

Subjects--The subjects included not only the seven patients but the therapist who treated them.

a. Psychotherapist. All the clinical work was done by the same psychotherapist, with patients he was regularly treating. He was a 50 year old Board certified psychiatrist, and possessed a certificate in psychoanalysis from the William Alanson White Institute where he is now a training and supervisory analyst.

b. Patients. The other subjects were three male and four female private patients who were being regularly seen by the analyst three times a week in individual psychotherapy. They were white, middle-class, well-educated, functioning adequately in the community, spoke English as their native language, had no speech disorders and were considered to be typical patients of a private New York psychoanalytic practice. None had ever been hospitalized for mental illness and all were judged to be not

easily disorganized or potentially suicidal depressives. Their ages ranged from 23-34 years. They were selected on the basis of their willingness to participate and their agreement that they would complete the experiment. No diagnostic criterion other than the above was used.

Four of the patients were recruited from the therapist's regular practice and had been in treatment for much longer than three months before the experiment started. The other three patients entered the experiment as soon as they were ready. In the three or more months before the experiment the following preparatory work was done: (a) Each patient was led to believe that on each occasion he would be given varying small doses of LSD, and that the therapist had ultimate control over maximum dosage, but no control over what dose below the maximum would be given; (b) each patient filled out a medical questionnaire about previous illnesses, drug reactions, and possible contraindications to the use of LSD and dextroamphetamine; (c) each patient was asked to sign a release for the use of LSD and the audiotape recordings to insure informed consent. They were encouraged to discuss the release with their lawyer or other interested party, and have it witnessed by a person close to them; (d) all of the patients reported that they were unaware of the use of other drugs.

Drugs--The drugs were LSD (L), dextroamphetamine (D), and an inactive placebo (P). The drugs were given according to a modified randomization schedule which prevented the same drug from being given more than twice consecutively. All drugs were administered orally in indistinguishable capsules. The LSD dose ranged from 50-129 mcg with the initial dose calculated at one mcg per kilogram of body weight to the nearest 10 mcg. An important feature of this study is the low maximum dose utilized, the aim being to maintain communication. Dextroamphetamine was given in doses beginning with 5 mgm and subsequently in doses adjusted to the individual's

requirements, never exceeding 25 mgm.

Each "experimental week" consisted of two consecutive 50-minute sessions on the drug day plus the drug-free psychotherapy sessions immediately preceding and following the drug day. We defined a "drug set" as the two consecutive 50-minute sessions on the drug day. The four sessions of the experimental week were labeled Pre, D_1, D_2, and Post with D_1 and D_2 as the first and second sessions in the drug set. In all, there are 21 experimental weeks and therefore 21 drug sets consisting of seven dextroamphetamine and seven placebo and seven LSD sessions.

Figure 1 shows a paradigmatic experimental week including one complete experimental session. Although variations occurred in almost every case, each experimental week occurred within a span of five or six days. The procedure for the experimental session was as follows:

Starting at midnight prior to the experimental session day the patient was instructed not to take solid food, medication or alcohol. At 1:00 p.m. he swallowed the capsule handed to him by the therapist, was greeted by the psychologist and escorted to a private room equipped with a tape recorder for the pretherapy monologues. Monologues were restricted to innocuous areas suggested on a written list. At 1:15 p.m. the first five-minute monologue was recorded, and at 3:20 the patient recorded the second monologue. Since it was considered that the LSD experience would be highly unusual and possibly unsettling, the therapist "babysat" with the patient during the entire waiting period for a few drug sets until he thought the patient had actually received LSD. Following these he stayed with the patient only during the second half of the waiting period until he thought the patient had received a second LSD dose. During the "babysitting" time, the therapist discouraged conversation, offered reassurance if necessary, and engaged in activities such as journal reading. Thereafter he regularly

Fig. 1. Example of Typical Experimental Week

Friday	"Post" session (taped)
Thursday	(Attendant does rating scale after patient retires)
Wednesday	Two Hour Experimental Session 6:00 Patient leaves with attendant who stays with him until next morning. 5:20 Second hour ends D_2 4:30 Second hour (D_2) begins Ten minutes break (tape changed) 4:20 First Hour ends D_1 3:30 First Hour (D_1) begins 3:20 Second Monologue 1:15 First Monologue 1:00 Arrives at office and takes drug capsule.
Tuesday	No solid food after midnight. No medication of any sort including alcohol.
Monday	"Pre" session (taped)

looked in on the patient briefly at about the midpoint of the waiting period. At 3:30 p.m. the patient entered the analyst's office beginning his first 50-minute drug session. At 5:25 p.m. the patient returned to the private room for paper and pencil tests administered by the psychologist, and at 6:00 p.m. left for home with an attendant of the same sex who stayed overnight.

The patient remained in the office premises during the acute phase of drug effects and was constantly accompanied by an attendant (clinical psychology graduate student) for the 12 hour period following the release from the experimental session. Both the therapist and another psychiatrist were available throughout this period to answer any questions by the subject and, if necessary, to administer intramuscular chlorpromazine and sedation. A hospital was also available for serious untoward reactions, but its use never became necessary.

Approximately one year after the first patient had been started in the experiment, the first report of chromosomal aberrations from LSD use was published. All patients were apprised of this information, chose to remain in the experiment, and began having chromosomal testing.*

The therapist, without actual knowledge of the randomization schedule, helped plan the double-blind design and the following procedure was devised, allowing him to control dosage without being informed of the dose or drug on any particular occasion: At the end of each drug session he made two statements as part of the formal case record:

a) If the drug used was LSD, the next dosage for LSD should be _____.

---

*Chromosome studies were done by Lissy Jarvik, M. D. in the Cyrogenetic Laboratory of New York State Psychiatric Institute. Funds for this aspect of the study were provided by the John Lindsley Foundation.

b) If the drug used was dextroamphetamine, the next dosage for dextroamphetamine should be _____.

The blank was filled in with a specific increase, decrease, or "no change." If the session was not an inactive placebo session, the appropriate instruction was followed for the next occurring L or D session; if it was an inactive placebo session the previous relevant instructions were followed.

Experimental Procedure--The typical course of a patient during the experiment is outlined in Figure 1. "Experimental Week 2," arbitrarily selected, is extensively detailed in Figure 2.

A total of 126 psychotherapy sessions were processed. The second, fourth, sixth sessions of each drug, placebo, dextroamphetamine, and LSD were chosen both for the first drug hour and the second drug hour for each patient. Thus, there are 18 hours for each patient--three hours of each drug condition for each drug hour (3 x 3 x 2).

These are assigned randomly in order of processing, with the processor blind as to what condition he was processing.

Thirteen thousand counts were chosen as a sample for each hour or 43'45" of real time. Since no hour ended before 45 minutes this worked out nicely. A count was, in reality, an electronic window which examined relays for either an open or closed state. These open and closed states defined whether a verbalization was taking place. At the conclusion of the thirteen thousand "looks" a computer on-line with the Automatic Vocal Transaction Analyzer system, printed out a matrix containing the transitional pause probabilities for both patient and therapist.

In addition, those monologues appropriately related to the second, fourth, and sixth sessions of each drug dialogue were analyzed (Jaffe et al., 1972). This includes the pre-drug monologue or first monologue

and the post-drug monologue or second monologue. A total of 18 monologues per subject was therefore available.

Fig. 2. Typical Activities of Patients Over Course of Experiment

Three months, or more for initial screening and initiation of treatment.	Sixteen to Twenty-Two Months	Length of time in therapy after experiment varies
(1) Independent psychiatric consultation. (2) Initial patient description by analyst.	Experimental week #1 (discarded) Experimental Week #2: Mon. Tues. Wed. Thurs. Fri.; Pre, D_1, D_2, Post Experimental week #3 Experimental week #22	

Note: Since no experimental session precedes session #1, it is considered unique and is not used in statistical computations. Drug types (placebo "P," dextroamphetamine "D," or LSD "L") are randomly assigned 7 times each among the 21 sessions following session #1, 3.g., 2-22. Roughly 2 normal weeks passed between experimental weeks.

CHAPTER III

RESULTS

Let us briefly summarize the data base available for analysis.

First, seven patients produced pre and post drug monologues for each of three drugs and each of three sessions (a session was either the second, fourth, or sixth occurrence of each drug condition during the term of the experiment). Thus, there was a total of (7) x (2) x (3) x (3), or 126 observations for the analysis of monologues.

Second, seven patients with a single therapist produced two hours of dialogue for each of three drugs and each of three sessions. Thus, there are a total of (7) x (2) x (3) x (3) or 126 observations for the analysis of dialogues.

For greater clarity the analysis of results has been divided into three distinct phases. The first phase examines patient pauses in pre and post drug monologues. The second phase examines both therapist and patient pauses in dialogues. Finally, the third phase includes a comparison of the patient monologues and dialogues.

Phase 1--Patient Pre and Post Drug Monologues

Pre-drug monologues

A subjects (6) by drugs (2) by session (2) Anova was performed to examine the effects of subjects, drugs and session in the pre drug monologues (Table 1).

Subjects main effect was significant ($F=36.80$, $df=6/24$, $p < .001$).

Hence, with respect to pause probabilities, subjects apparently behave quite differently from one another. Prior experience clearly dictated the partitioning of subjects as a main effect and the above results clearly confirm this.

The lack of significance for drug main effects supports the success of the blind design; subjects were not anticipating drug conditions.

Post-drug monologues

A subjects (6) by drugs (2) by session (2) Anova was performed to examine the effects of subjects, drugs and session in post drug monologues (Table 2).

Subjects main effect was significant ($F=13.34$, df-6/24, $p<.001$). Despite the addition of drugs subjects continued to behave quite differently from one another.

Drug main effect was also significant ($F=3.214$, df-2/24, $p<.10$). The results of the planned comparisons indicated that LSD whether compared to dextroamphetamine or placebo, was significant at the $p<.01$ level. Dextroamphetamine when compared to placebo was not significantly different. As is evident later on, placebo and dextroamphetamine move in similar directions.

Pre-drug monologues compared to post-drug monologues

A pre-drug and post-drug monologue comparison (Table 3) served two purposes. First, it indicated a degree of reliability from one sample to another later in time despite the addition of a drug condition. Second, it establishes the basis for examining the change in social context i.e., to dialogue. Thus, changes demonstrated for subjects when measured in different social contexts should support the significance of social context as a variable.

A Spearman rank difference correlation was computed on the transitional pause probabilities of patients, for the pre and post drug monologues (Siegel, 1956). The coefficient of .964 was significant at the $p < .01$ level. Relative to one another, patients are consistent in their pausing from pre-drug monologues to post-drug monologues. Mean pause probabilities for post monologues are slightly greater than pre monologues. This may be a fatigue effect (Jaffe, et al., 1972).

For a greater clarity Table 3 provides the means and standard deviations of patient pause probabilities in monologues.

Phase II--Patient and Therapist Dialogues

ANOVA designs were used to examine separately patient and therapist dialogue pause probabilities. The results of these analyses are presented in Tables 4 and 5, respectively. A Spearman rank difference coefficient was computed for patient and therapist pause probabilities (Siegel, 1956).

Patient pause probabilities in dialogues

A subjects (6) by drugs (2) by session (2) by hour (2) ANOVA was performed to examine the effect of subjects, drugs, session and hour in patient dialogues (Table 4).

Subjects main effect was significant ($F=16.33$, $df=6/24$, $p < .001$). It is evident, with respect to pause probabilities, that subjects, whether speaking in monologues or dialogues, behave quite differently from one another.

Drug main effect was significant ($F=11.83$, $df=2/24$, $p < .001$). This finding establishes the proposition that drugs do influence social interactions. Specifically, that drugs can be assessed using speech patterns as indices.

Session main effects were significant ($F=6.16$, $df=2/24$, $p < .01$). The

means for the second, fourth, and sixth sessions were .8857, .8934, and .8744, respectively. These pause probabilities suggest an inverted U function with pause probabilities first increasing, then decreasing over time. The lack of interaction effects makes this finding interesting, but not critical for the present effort. It appears to be some kind of therapy effect, but future research designed to examine this effect will have to be done.

Since hour main effects were not significant, hours 1 and 2 were combined. This allowed a more reasonable single best estimate for future calculations.

Therapist pause probabilities in dialogues

A subjects (6) by drugs (2) by session (2) by hours (2) ANOVA was performed to examine the effects of subjects, drugs, session and hour on therapist dialogues (Table 5).

Subjects main effect was significant ($F=9.09$, $df=6/24$, $p<.001$).

Hour main effects were significant ($F=5.508$, $df=1/24$, $p<.05$). The mean pause probabilities for hours 1 and 2 were .8866 and .9017, respectively. This indicates that the therapist was pausing longer in hour 2 than hour 1. Fatigue or therapeutic approach might be two of the factors which caused these effects. Lack of interaction effects suggested that though interesting, the results were not critical for the present design. To facilitate further computations the hours were combined by average to give a single best estimate.

Patient and therapist dialogue pause probabilities compared

With Hours 1 and 2 combined (Table 6), a Spearman rank difference correlation was calculated for patient and therapist transitional pause probabilities. The obtained coefficient was significant at the $p<.05$

level. This high positive relationship shows that inter-speaker influence facilitated similar pause behavior (Table 6). This finding is consistent with prior research on inter-speaker influence which demonstrated convergences of dyadic speaker speech patterns (Lennard & Bernstein, 1960; Jaffe & Feldstein, 1970).

Phase III--Patient Monologues and Dialogues Compared

A Spearman rank difference correlation was computed for patient post-drug monologues and dialogues. The obtained coefficient of .321 was not significant. This lack of a significant relationship between monologue and dialogue patient transitional pause probabilities, especially in light of the already established significant positive relationship between pre- and post-drug monologues, strongly suggests the power of social context to modify transitional pause probabilities.

Comparisons between monologues and dialogues are severely complicated by the radically different means and variances of the distributions. In addition, since the scores of monologues and dialogues have been shown to be normally distributed it was decided to transform all transitional pause probabilities into Z scores (Jaffe & Feldstein, 1970). These normalized scores made comparisons for all conditions feasible. Patient transitional pause probabilities were transformed into Z scores for both monologues and dialogues. Each patient was used separately to generate his own normalized scores. Table 7 presents the results of these transformations.

Patient monologues

An examination of Table 7 indicates that LSD increases mean transitional pause probabilities, while dextroamphetamine decreases mean transitional pause probabilities. The respective average Z scores for

LSD, placebo, and dextroamphetamine are: .3332, -.0804, and -.2525.

Patient dialogues

The respective average Z or normalized scores from Table 7 for LSD, placebo and dextroamphetamine are: .0533, .3968, and -.4481.

It is apparent that dextroamphetamine decreases mean pause probabilities while in the placebo condition mean transitional pause probabilities increase. LSD acts as a slight increaser of mean pause probabilities.

Patient monologues and dialogues after subtraction of placebo

In order to fully assess the vicissitudes of LSD and dextroamphetamine with respect to monologues and dialogues, the placebo Z scores were subtracted from the LSD and dextroamphetamine Z scores of each patient. The results of this computation are expressed in Table 8.

It is apparent that in monologues LSD acts as a pause increaser while in dialogues it acts as a pause decreaser. Dextroamphetamine acts as a pause decreaser in monologues and this is even more exaggerated in dialogues.

TABLE 1

Analysis of Variance for Pre Monologue
Transitional Pause Probabilities

Source	Sum of Squares	df	Mean Squares	F	p
ss	0.68012	6	0.11335	36.80	<0.001
Drug	0.00149	2	0.00074	.24	
Session	0.00961	2	0.00481	1.56	
Ss x Drug	0.04889	12	0.00407	1.32	
Ss x Session	0.06703	12	0.00559	1.81	
Drug x Session	0.00598	4	0.00149	.48	
Residual	0.07384	24	0.00308		
Total	0.88696	62			

TABLE 2

Analysis of Variance for Post Monologue
Transitional Pause Probabilities

Source	Sum of Squares	df	Mean Squares	F	p
Ss	0.59390	6	0.09898	13.34	<0.001
Drug	0.04771	2	0.02385	3.214	
Session	0.01312	2	0.00656	.88	
Ss x Drug	0.11238	12	0.00937	1.26	
Ss x Session	0.08804	12	0.00734	.99	
Drug x Session	0.02145	4	0.00536	.72	
Residual	0.17818	24	0.00742		
Total	1.05479	62			

TABLE 3

Means and Standard Deviations of Transitional Pause Probabilities For Pre and Post Monologues

	Pre		Post	
Patient	$\bar{X}$	S	$\bar{X}$	S
1	.4744	.0684	.5267	.1412
2	.7922	.0644	.8533	.1258
3	.5933	.0505	.6567	.0469
4	.6433	.0622	.7478	.0608
5	.6456	.0835	.6944	.0654
6	.7778	.0471	.7789	.0415
7	.7311	.0376	.7644	.0621
Total $\bar{X}$	.6654	.1196	.7174	.1304

TABLE 4

Analysis of Variance for Patient Transitional Pause Probabilities in Dialogues

Source	Sum of Squares	df	Mean Squares	F	p
Ss	0.06268	6	0.01045	16.33	<0.001
Drug	0.01515	2	0.00757	11.83	<0.001
Session	0.00788	2	0.00394	6.16	<0.01
Hour	0.00161	1	0.00161	2.516	
Ss x Drug	0.01057	12	0.00088	1.375	
Ss x Session	0.01093	12	0.00091	1.422	
Ss x Hour	0.00383	6	0.00064	1.000	
Drug x Session	0.00692	4	0.00173	2.703	
Drug x Hour	0.00140	2	0.00070	1.09	
Session x Hour	0.00015	2	0.00008	.125	
Ss x Drug x Session	0.02909	24	0.00121	1.891	
Ss x Drug x Hour	0.01020	12	0.00085	1.328	
Ss x Session x Hour	0.00584	12	0.00049	.77	
Drug x Session x Hour	0.00410	4	0.00103	1.61	
Residual	0.01545	24	0.00064		
Total	0.18581	125			

TABLE 5

Analysis of Variance for Therapist Transitional Pause Probabilities in Dialogues

Source	Sum of Squares	df	Mean Squares	F	p
Ss	0.07202	6	0.01200	9.09	<0.001
Drug	0.00694	2	0.00347	2.629	
Session	0.00820	2	0.00410	3.106	
Hour	0.00727	1	0.00727	5.508	<0.05
Ss x Drug	0.02003	12	0.00167	1.265	
Ss x Session	0.01258	12	0.00105	.795	
Ss x Hour	0.00782	6	0.00130	.985	
Drug x Session	0.00634	4	0.00159	1.205	
Drug x Hour	0.00063	2	0.00032	.242	
Session x Hour	0.00612	2	0.00306	2.318	
Ss x Drug x Session	0.04236	24	0.00177	1.341	
Ss x Drug x Hour	0.01930	12	0.00161	1.220	
Ss x Session x Hour	0.02752	12	0.00229	1.735	
Drug x Session x Hour	0.00398	4	0.00099	.75	
Residual	0.03164	24	0.00132		
Total	0.27276	125			

TABLE 6

Patient-Therapist Comparisons of Means and Standard Deviations of Transitional Pause Probabilities in Dialogue

First and Second Hour Combined

	Patient		Therapist	
1	.8802	.0250	.8995	.0279
2	.9171	.1721	.9179	.0217
3	.8932	.0308	.9474	.0340
4	.8946	.0375	.9207	.0378
5	.8771	.0185	.8610	.0328
6	.8914	.0453	.8974	.0350
7	.8385	.0285	.8561	.0696
Total	.8846	.0381	.8941	.0463

TABLE 7

Normalized Scores for Each Subject
For Each Drug Condition

	Mono			Dialog		
Ss	L	P	D	L	P	D
1	+.9207	-.8265	-.0947	+.2080	+.2447	-.4487
2	+.4507	+.2917	-.7417	+.0186	-.0041	-.0139
3	-.0718	-.4264	+.4968	+.3626	+.1997	-.5601
4	-.1831	+.1458	+.0362	-.1253	+.3711	-.2431
5	+.1876	-.1876	-.3731	-.5459	+.9324	-.3937
6	+.6158	-.0253	-.5909	+.4264	+4323	-.8565
7	+.4122	+.0902	-.5003	+.0290	+.6018	-.6205
$\bar{Z}$	+.3332	-.0804	-.2525	+.0533	+.3968	-.4481

TABLE 8

Normalized Scores for Each S After Subtracting Placebo

	Monologues		Dialogues	
	L	D	L	D
1	+1.75	+ .73	- .04	- .69
2	+ .16	-1.03	+ .02	- .01
3	+ .35	+ .92	+ .16	- .76
4	- .33	- .11	- .50	- .61
5	.00	- .56	-1.48	-1.33
6	+ .64	- .57	- .01	-1.29
7	+ .32	- .59	- .57	-1.22
$\bar{X}$	+ .41	- .17	- .35	- .84

CHAPTER IV

DISCUSSION

Major Findings

The general query raised by the present research was: What part, if any, does social system or context play on the effects of drugs on humans? This query raises not only research, but theoretical questions as well. With regard to the specific research questions raised, the following hypotheses were examined:

First, with respect to drug effects as measured by pause probabilities, there will be differences between monologues and dialogues. Let us look briefly at the evidence substantiating this hypothesis. It is apparent that drug effects change dramatically when the social context changes. For example, the normalized score for LSD pause probabilities in post-drug monologues was .33 while in dialogues it was .05 (See Table 7). It is not simply that pause probabilities are "bound" to change from monologue to dialogue, because relative to a placebo the change is even more dramatic. E.g., the normalized score for LSD after subtracting the placebo score was .41 in post-drug monologues while it was -.35 in dialogues (See Table 8). Clearly the first hypothesis is confirmed.

Second, LSD as a transitional pause increaser in monologues should be attenuated in respective dialogues, while dextroamphetamine as a pause decreaser in monologues should be intensified in respective

dialogues. With regard to this hypothesis an examination of Table 7 provides the following information. The normalized score for LSD in post-drug monologues is .3332. However, in the dialogue condition LSD is greatly attenuated, the normalized score being .0533. Examination of the dextroamphetamine normalized scores of -.2525 and -.4481 for post-drug monologues and dialogues, respectively, confirms that the pause decreasing status of dextroamphetamine is intensified in dialogues.

Third, with respect to placebo, both LSD and dextroamphetamine should decrease mean transitional pause probabilities. This last hypothesis is substantiated through a combined use of both normalized scores and placebo comparison. Table 8 presented all the normalized scores for both monologues and dialogues, and LSD and dextroamphetamine, after subtracting the placebo normalized scores. A look at these figures shows that LSD with a score of .41 clearly and dramatically shifts direction in dialogues to a -.35. While dextroamphetamine, a clear pause decreaser in monologues, remains substantially a pause decreaser in dialogues.

Since these hypotheses were stated in order of increasing predictive power, confirmation of the last hypothesis in effect confirms the former two.

It was predicted that changes in social situation i.e., monologues and dialogues would change the effects of drugs on speech. Since it was demonstrated that with respect to a placebo the effects of LSD in monologues were reversed in dialogues, the hypothesis was confirmed. In other words, if subjects take LSD and engage in monologues, transitional pause probabilities will increase. If these same subjects participate in psychotherapeutic dialogues, where a principle demand characteristic is to talk, LSD acts to decrease transitional pause probabilities.

Minor Findings

A number of additional findings are noteworthy.

Individual differences

Individual differences are strongly evident. The excellent work of Barr et al. (1971) on the interaction of LSD and personality, presented dramatic evidence showing individual idiosyncratic reactions to LSD as well as distinctive individual differences among subjects. Regarding individual differences the present study found the following:

Within a specific social context i.e., monologues, whether drugs are present or not, individuals clearly and consistently behave differently relative to one another. A significant Spearman coefficient between pre-drug and post-drug monologues confirmed this.

Although drugs and social context, two apparently powerful variables, were manipulated, they did not appreciably attenuate the relative differences among subjects. Subjects continued to act idiosyncratically. The significant subject differences found in pre-drug and post-drug monologues as well as dialogues confirms this.

Drug effects

Drug effects were clearly present in both monologues and dialogues. This finding supports Waskow's (1967) assertion that speech parameters can be used as indices of drug action.

System properties

The significant subject effects found in the therapist dialogue analysis demonstrates that it is possible to delineate a number of significant parameters. This finding suggests that system properties must be identified in order to predict a participant's behavior. In

short, for dyads it is the immediate pause behavior of participant A, rather than the previous monologue pause behavior of participant B that is important in predicting participant B's pause behavior.

Critical Observations

The following critical observations can be divided into methodological and theoretical.

Methodological

First, there is no way of establishing equivalences of drug dosages between two drugs as different as LSD and dextroamphetamine. Hence, comparisons between them are relative and can be made only with particular regard to the dosage specified for each.

Second, dosages for both LSD and dextroamphetamine were at best only moderate in strength, if the dosages were higher a fairer test of the power of social context would have been permitted. In answer to this it is not the point of the present thesis that large doses could not obviate social context effects, to wit, fatal doses. Rather, the purpose was to demonstrate that social context can be not only theoretically, but methodologically relevant in drug research. In addition, since drug doses are generally moderate in quantity, this research may be more reflective of actual drug practice than if very high doses were administered.

A third possible criticism is that the variables chosen for social context, i.e., monologues and dialogues, are somewhat constricted, and hence irrelevant. To this, one can only say that the complexities of social psychological research simply dictate lucid design models which, nevertheless, must accept the possibility of irrelevancy. Future research will have to deal with this issue.

Fourth, the use of the same participant for all dialogues, i.e., the therapist, makes the findings suspect on the bounds of idiosyncracy or technically not generalizeable. Although this too is a valid observation, one can claim that first approaches often lack the polish of years of follow-up research with relevant technical innovations.

Theoretical

Theoretical weaknesses stem mainly from the possibility that the hypotheses are of a "straw man" character. Though articles recently published by Mischel (1973) and Bowers (1973) indicate a new trend in this area, at present classical trait models of personality with both implicit and explicit axioms denying or relegating the importance of social context are still in vogue.

Further Theoretical Considerations

It was a general intent of the present thesis to bring into focus certain drug research models. This necessitated a discussion of theoretical conceptualizations of personality trait theory, specifically, the concept of personality as a relatively closed system, or "portable reality." The utilization of the present methodology i.e., drug research, presents a rather nice framework for examining this issue. It is not accidental that theoretical positions grounded on weak logical supports begin to break down when applied in empirical designs. This is especially true if these theories are used as explanations of data gathered in situations somewhat removed from their explanatory networks. In brief, shortcomings of classical trait theories of personality are sometimes clearer when they are applied to relatively remote areas of research, to wit, drug research.

It is the present author's contention that the logical and empirical

dichotomization of "personality" and "social" variables (sometimes intra-psychic and inter-psychic) is serving to place a good deal of psychological research in an unnecessary and frustratingly burdensome conceptual yoke. There is no logically compelling basis for this dichotomy, but the difficulty of finding a suitable framework for reconciliation is formidable. It is possible that the answer has already been outlined, at least in part, by Mead (1934), (Lennard and Bernstein, 1969; Lennard et al., 1971), as mentioned above.

Two recent articles have addressed themselves to this very point (Mischel, 1973; Bowers, 1973). Mischel (1973) distinguished environmental conditions, person variables, and phenomenological impact as perspectives which could be taken depending on one's research interest. He concludes, "Ultimately, conceptualizations of the field of personality will have to be large enough to encompass the phenomena seen from all three perspectives (Mischel, 1973, p. 279)." Bowers (1973), on the other hand, criticizes the tendency to focus on situation as the sole description of human activity. He posits the following prescriptive statement which he calls interactionalist or biocognitive. "More specifically interactionism argues that situations are as much a function of the person as the person's behavior is a function of the situation (Bowers, 1973, p. 327)."

In conclusion, the speech of individuals under the influence of drugs was recorded in monologues and therapeutic dialogues. It was hypothesized that if significant and predictable changes could be demonstrated as a function of the change in social context, then the importance of social context has been shown. It was demonstrated e.g., that LSD in monologues increased mean transitional pause times, but in dialogues this effect was reversed.

Hence, social context was empirically shown to be a critical influence, and therefore, classical trait theories of personality which predict consistency across social contexts seem questionable. It was suggested that social variables be redefined as integral to all behavior and that any reformulation of the social-personality framework take account of this.

In brief, it was demonstrated that social context can be a critical variable in the explication of drug effects and that a careful delineation of the parameters of particular social contexts may allow us to predict with greater precision particular behaviors.

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