

Schizophrenia: The Immediacy Mechanism

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ABSTRACT

This paper reviews Immediacy Theory which posits a mechanism making schizophrenic behavior preponderantly controlled by stimuli immediate in the patient's environment. It reviewed all studies of schizophrenia in the 2003 year of the *Journal of Abnormal Psychology*. Of those 12 studies, nine were found to confirm that mechanism and three not to be relevant.

Key words: Schizophrenia, Immediacy hypothesis, behavioral mechanism, context, conditioning.

RESUMEN

Esquizofrenia: el mecanismo de la inmediatez. El presente trabajo revisa la Teoría de la Inmediatez que propone un mecanismo que hace que la conducta esquizofrénica esté controlada principalmente por estímulos inmediatos en el ambiente del paciente. Se revisan todos los estudios sobre esquizofrenia del año 2003 publicados en la *Journal of Abnormal Psychology*. De los 12 trabajos, nueve confirmaron ese mecanismo y tres no fueron relevantes.

Palabras clave: esquizofrenia, hipótesis de la inmediatez, mecanismo conductual, contexto, condicionamiento.

The complexity of schizophrenia and its often-dramatic quality, which has to some degree promoted it as the epitome of psychosis, has inspired awe but not the necessary simplicity of explanation required. Little argument exists today with the genetic component. Gottesman (1991) expresses the genetic relationship well (p. 217): "At the present stage of our knowledge, it is more accurate to call schizophrenia a heavily genetically influenced disorder rather than a genetically determined disorder, to avoid any hereditarian implication of inevitability." All agree that there must be something there of a biochemical or physiological nature to explain a part of schizophrenia. At the same time, we have to cope with the many and varied manifestations of the behaviors that we ascribe to schizophrenia. Like the electronics of the computer, the biology of the schizophrenic patient (no more than that of the normal person) is responsible for complexity that is based on relatively simple devices like neurons in the patient and electronic on/off switches in the computer. We will make a similar argument for behavioral complexity, namely that schizophrenic behavior is, to a large degree, the result of the

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interaction of the person and his or her environment, a current environment as well as one of the past. It is the product of that interaction that produces the complexity that faces us when we meet a schizophrenic patient.

The burden of this paper is to explain that complexity by beginning with a simple principle underlying it and introducing the complexity by showing how the simple mechanism interacts with learning. Salzinger (1984) proposed the Immediacy Hypothesis as the mechanism that underlies schizophrenia. After explaining that mechanism and demonstrating how it can produce schizophrenic symptoms, that is, behaviors, we will survey all of the articles on schizophrenia in the *Journal of Abnormal Psychology* of 2003. Using the approach taken in Salzinger (1984), we will then systematically apply the immediacy mechanism to the experiments described in all the articles surveyed in order to determine the extent to which the data corroborate the theory.

THE IMMEDIACY MECHANISM

Behavior is controlled by stimuli, that is, stimuli that provide the occasion for response and those that serve as consequences. Examples of stimuli that occasion responses are a greeting from an old friend, an odor that resembles gas, a series of numbers on a bill, a thought reminding you to make a call about a meeting. In operant conditioning language these events are referred to as discriminative stimuli. Responding to such stimuli often results in consequences (reinforcers). Thus responding to your friend might result in a smile or a conversation, responding to the odor might allow you to turn off an offending gas stove or warning someone of escaping gas with the ultimate result that some mishap is avoided. Responding to the numbers on a bill might remind you to provide your charge card to a waiter and receive his thanks in turn; and finally, your thought (response-produced stimulus) might result in your calling in time to get to speak to someone who is about to throw some business your way. Indeed, the importance of stimuli is best illustrated when your environment is devoid of them, as in the old experiments on sensory deprivation, when subjects tend to manufacture the stimuli, as in hallucinations.

Behavior is controlled by stimuli in another way as well, namely through the mechanism of classical conditioning. Thus, if the odor mentioned above is powerful enough, it might well elicit an unconditional response of nausea or vomiting. Furthermore, if the odor is present whenever you come near the gas stove, the latter might elicit the gas sensation even when no gas is escaping from the stove -the conditional stimulus. The old friend's greeting might well elicit a positive emotional response involving your autonomic nervous system; the numbers on the bill might elicit anger by their size and your thought might serve to elicit sweating because neglecting to reach the person in question might put your business in jeopardy. These stimulus functions make up part of the classical conditioning paradigm in which stimuli elicit responses that have been conditioned or which simply serve as eliciting stimuli without the necessity of any conditioning having to take place, as when a lion comes charging at you with open jaws.

This oversimplified version of stimulus control is described here to remind the

reader of the various functions that stimuli have, not to describe the many ways in which operant and classical conditioning operate. An important point here is to call the reader's attention to the fact that not all events function as stimuli for our behavior. Some do not successfully impinge on our senses. Thus, a child with a hearing loss cannot respond to sound stimuli; indeed, people of normal hearing do not respond to the high pitch tones that dogs can hear. If you are color blind, your behavior will not come to be controlled by colors; if someone speaks to you in English and you do not speak that language, you will not, indeed cannot, respond to what a person is saying to you in the same way as those who can speak English. The point here is that only some stimuli (and admittedly there are many) can ever control your behavior or even impinge on you in any way. Before speaking about how this affects our understanding of schizophrenia, we must consider still another point about stimuli. They are involved in conditioning, that is, in change of behavior over time and with repeated stimulus presentation whether in the form of CS-US relations or in the operant relation of discriminative stimulus, response and consequence. What does that imply? That we cannot be conditioned to all stimuli, only to those that impinge on us and thus we are likely to learn to behave in ways that reflect our interaction with a subset of stimuli in our environment. Because we respond only to a subset of stimuli, our conditioning is also restricted to them. Thus, if we are blind, not only can we not see the dark clouds of an oncoming storm, we cannot learn to seek shelter when large dark clouds appear on the horizon. What we can learn under these conditions is to pay more attention to aspects of storms such as the distinctive sound they make.

The immediacy mechanism makes use of this reasoning in the following manner. We posit that schizophrenic patients have a tendency to respond preponderantly to stimuli that are in their immediate environment. In terms of their symptomatic picture, this results in their responding to stimuli out of context, giving rise to the possibility of misunderstanding and eventually paranoid thinking. Thus, if someone says he is going to "kill you the next time you make a pun like that" at a party where people are joking, everyone knows that this is not to be taken literally. Responding to the word, "kill" out of that context on the other hand, that is, interpreting it or responding to it in isolation might lead one to believe that someone does intend to kill you (as might happen with a schizophrenic patient who has delusions). Under more precise conditions, Chapman, Chapman and Miller (1964) showed that schizophrenic patients respond to words' most frequent meaning rather than the meaning delineated by the context in which they are embedded.

The evidence (Gould, 1949) that schizophrenic patients tend to engage in subvocal speech, although not easily observable, when they are hallucinating shows, according to Immediacy Theory, that such patients tend to respond to their own talking out of context and therefore as if somebody else had said what they themselves were saying sotto voce. This leads to the possibility that what we call hallucinations may simply reflect the patients' own verbal behavior unrecognized as such by the patients.

Schizophrenic patients exhibit peculiar verbal behavior -at the extreme consisting of word salad, that is, of strings of verbal behavior which make no sense to the hearer. We have found this to reflect the patients' tendency to respond to those response-

produced verbal stimuli that were most immediate as they talked. In other words, such patients tend to string together words which relate to other words that are very close, rather than to those that may be critically related but far away, in a sentence or previous sentences. Let us look at an example: "I said it was mine but I couldn't make it up the mine shaft." The word "mine" stimulated two entirely different meanings, something that could not have happened except if the person responded to the word "mine" in isolation -first as a pronoun and then as a noun. Salzinger et al (1964, 1966, 1980, 1984) did a series of studies that made clear the schizophrenic patient's tendency to respond to words in relative isolation by using the cloze procedure. That procedure consists of taking a sample of schizophrenic speech, deleting every nth word and having normal individuals guess those deleted words. The studies showed that the missing words of schizophrenic patients' speech were guessed correctly less often than that of normal individuals because schizophrenic patients had a tendency to speak in such a way that only neighboring words were related to one other. When normal subjects were asked to guess words that were excised in schizophrenic speech samples, providing more words surrounding the word to be guessed was not as helpful as it was when the same thing was done with normal speech (Salzinger, Portnoy, Pisoni, & Feldman, 1970). On the other hand, when a minimal number of words was used to cue the guess, schizophrenic and normal speech samples were equally predictable. Again, we had evidence for the tendency of schizophrenic patients to respond preponderantly to stimuli most immediate in their environment, in this case stimuli generated by the patients themselves.

Salzinger & Pisoni (1958, 1960) showed that one could condition schizophrenic patients as effectively as normal individuals on a continuous schedule of reinforcement, but when it came to extinction, the latter extinguished more slowly than the schizophrenic patients, showing that schizophrenic patients responded more quickly to the absence of reinforcers (the immediate stimuli present only during conditioning) than normal persons. Finally, (additional studies showing the immediacy effect are to be found in Salzinger, 1984). Later, Leibman and Salzinger (1998) were able to show that one can affect immediate stimuli therapeutically to ameliorate the symptomatology in schizophrenic patients.

Before reviewing studies in the *Journal of Abnormal Psychology*, let us look at another theory of schizophrenia, namely the latent inhibition failure as a source of the disorder. Researchers examining latent inhibition have found that psychotic individuals, unlike normal individuals who cannot condition when the CS is presented to them several times before conditioning, respond as if the CS pre-exposure had not occurred and rapidly condition. This so-called latent inhibition failure in schizophrenia has been linked to many symptoms including disorganized thinking, delusion formation and a variety of negative symptoms (Álvarez, de la Casa, & Sánchez, 2003; Lubow & Gurwitz, 1995).

The immediacy mechanism provides an explanation for latent inhibition failure in schizophrenia. That mechanism (schizophrenic patients tend to respond preponderantly to stimuli most immediate in their experience) would negate previous presentations of the CS's because only the immediate stimuli would have an effect, thus making it less

likely that they will show latent inhibition. Patients may be more prone to form deviant associations to immediate stimuli because they fail to benefit from the latent inhibitory mechanisms that would otherwise prevent their learning of these immediate abnormal associations. The resulting behavior appears irrational because it is evoked by immediate discriminative stimuli and is often strengthened by idiosyncratic and non-adaptive reinforcement contingencies.

Classical conditioning theories concerning the cause of psychotic symptoms have also been advanced (Ellson, 1941; Hefferline, Bruno, & Camp, 1974). Ellson (1941), for example, speculated that hallucinations are the result of sensory conditioning. After repeated pairings of a tone (the unconditional stimulus; UCS) with a light (conditional stimulus; CS), Ellson (1941) found that subjects heard, that is, "hallucinated" the tone when the light CS was presented alone. Kot and Serper (2002) applied the sensory conditioning procedure to hallucinating and nonhallucinating schizophrenic inpatients. Consistent with the immediacy hypothesis hallucinating patients quickly acquired and maintained their sensory conditional hallucinations and were resistant to extinction when presented with the CS. These findings suggested that hallucinators had a heightened susceptibility to form sensory conditional associations.

To summarize, the Immediacy mechanism posited here was that schizophrenic patients tend to respond preponderantly to stimuli which are immediate in their spatial and temporal environment. Now, using that definition we will survey all the articles dealing with schizophrenia in the year 2003 in the *Journal of Abnormal Psychology* to determine the extent to which that mechanism can be fruitfully applied to the results of those studies.

Let us begin by looking at a study of memory of schizophrenic and normal subjects. Huron, Danion, Rizzo, Killofer, & Damiens (2003) studied what they called subjective aspects of memory associated with pictures vs. words. Both schizophrenic patients and normals showed a superiority of memory for pictures than for words but the patients did so less than normal individuals. The investigators separated the recognition responses into "remember" vs. "know" vs. "guess" responses. "Remember" responses were supposed to reflect the subject's recalling not only, the stimulus word or picture, but also something in addition, such as an image or event in their life. "Know" responses reflected only familiarity with the stimuli and did not differ between schizophrenic and normal subjects. The third kind of recognition response consisted of guessing, namely a feeling that they had seen the stimulus before. That also led to no differences between schizophrenic and normal persons. The authors concluded that one has to separate the kind of recall response one is measuring when comparing groups, with so-called subjective aspects (the kind of recall involved) being included. From the point of view of the Immediacy mechanism, this demonstrates that immediate stimuli including those that are response generated, as when they relate them to their own lives, will produce better recall; since schizophrenic patients generate predominantly immediate response-produced stimuli to the pictures, they are not as helpful (rich) in recall as the more remote stimuli generated by normal persons.

A study of great relevance was that done by Barch, Carter, MacDonald, Braver, and Cohen (2003). Beginning with a theory that states that schizophrenic patients suffer

from a “context-processing” disturbance, these authors do a rather detailed analysis of both schizophrenic and other psychotic functioning, including a comparison of behavior with and without medication. Using the Continuous Performance Test (CPT), these investigators set up the following experiment: Subjects were required to respond to stimulus X only when preceded by stimulus A. Thus, the authors were able to record errors of missing a response to the correct stimulus X when following A, or responding incorrectly to the stimulus Y when following A, responding incorrectly to the stimulus X when following B and finally responding incorrectly to Y when following the stimulus B. The error rate was smallest for AX as long as the delay between A and X was short (that is, one second); nevertheless the error rate was twice as large for schizophrenic patients as for normal controls for the short delay and three times as large as the normal controls for the AX at long (that is, 5 seconds) delays. Finally, although schizophrenic patients did not differ from other psychotic patients at short delay; they did differ from the other psychotic patients at long delays of 5 seconds. All of these results would be predicted by the Immediacy theory, as they were by context theory. In summary, schizophrenic patients tended to respond to the most immediate stimulus the X, irrespective of what preceded it; thus they were not helped by the warning stimulus A as much as were the normal controls, nor were they stopped from responding as much as were the normals when the X was preceded by a B (not to respond). Although psychotic patients other than schizophrenic patients made as many errors for the AX condition, they made fewer BX errors than the schizophrenic patients. Finally, schizophrenic patients (like the other psychotic patients) increased the number of errors for the AX condition when the delay was longer, once again verifying the Immediacy Theory.

Had this particular experiment been done using the term “stimulus” rather than “context” it could have been done to test Immediacy Theory. We submit that explaining behavior in terms of stimuli is more effective since the concept “stimulus” is more basic and more generalizable. To give but a couple of findings about schizophrenia that can be explained in terms of the immediacy of stimuli rather than contextual effects, let us look at the rapid extinction effect in schizophrenia (Salzinger & Pisoni, 1958; 1960), referred to above and the effect of an anchor stimulus on weight judgment (Salzinger, 1957). The latter found that schizophrenic patients tended to shift their judgments more than normals when given the instruction to withstand the anchor weight effect, showing that the immediate anchor stimulus obliterated the effect of the verbal instruction for schizophrenic patients. These findings cannot be explained by context, whereas they can in terms of the immediacy effect of stimuli.

Let us look at the next paper. MacDonald and Carter (2003) define context processing as an executive function involved in voluntary, complex actions such as overcoming automatic responses. The present study tested the hypothesis that context-processing deficits in patients with schizophrenia are associated with impairment in the left dorsolateral prefrontal cortex (DLPFC). Using event-related functional magnetic resonance imaging (fMRI), schizophrenic patients performed an A-X CPT task in which a learned, automatic response had to be suppressed. In this task (cf. Barch et al, 2003 above), subjects respond to the target (X) when it is preceded by the discriminative stimulus (A) and not to any other stimulus (i.e., B, Y). In controls, left DLPFC activity

increased when preparing to overcome an automatic response, whereas patients with schizophrenia showed no differential activation. In controls, activity in DLPFC was greater when a controlled response is called for, consistent with the need to represent and maintain context information. In patients with schizophrenia, DLPFC activity was found to be weaker than in controls when a controlled response was needed. Consistent with the immediacy hypothesis, and with the Barch et al. (2003) study above, schizophrenic subjects made significantly more errors of commission (responding to the X when it was preceded by another stimulus -B-) than controls. In other words, the preceding stimulus A or B did not matter because they were not immediate enough. Also consistent with the immediacy hypothesis, the authors found the difference between patients and controls was not significant for the non-target A-Y condition.

Docherty, Cohen, Nienow, Dinzeo, and Dangelmaier (2003) examined the speech of schizophrenic patients and controls to determine once again what differences one can discover, and whether or not those differences reflect trait or state conditions. Studies of schizophrenic speech, of course, constituted some of the early inspirations of the Immediacy theory (Salzinger et al. above). The latter studies showed that schizophrenic patients tended to respond to immediately preceding words rather than more remote ones in the speech that they generated. Docherty, et al.'s (2003) findings were that referential speech disturbances were trait-like and therefore indicators of vulnerability as well as of the illness. Let us look at the various reference failures. They include vague reference (speech so vague one cannot tell what the patient is referring to), confused reference (sentence doesn't allow one to tell which person or thing the patient is referring to), missing-information reference (again, the patient speaks in such a way that the listener does not understand what is being discussed, in this case, because the matter was never mentioned before), ambiguous-word-meaning reference (the word's context does not make clear which meaning of a word is to be understood), wrong-word reference (the word seems to be wrong in the context in which it is used), and finally structural unclarity (grammatical structure is such as to defy meaning). These are all instances in which the speech appears to confuse the listener because he or she expects words to refer to preceding words. However, particular words are determined not so much by anything as abstract as an attempt to communicate but by the speaker's proximal words rather than by some more remotely related referent. Thus, Immediacy Theory would predict referential communication disturbances in schizophrenia because words relate directly to proximal response-produced stimulus control.

A paper by Barrowclough, Tarrier, Humphreys, Ward, Gregg, and Andrews (2003) dealt with self-esteem which is not, on the face of it, directly relevant to testing the Immediacy theory. Nevertheless, it does seem that responding to immediate stimuli that are negative in nature coming from relatives criticizing the patient might well more easily impinge on such patients because they are more likely to respond to such negative evaluation, out of context, generalizing a criticism of one aspect of their behavior to all of it, thus resulting in greater likelihood of low self esteem.

Gold, Wilk, McMahon, Buchanan, and Luck (2003) studied schizophrenic working memory for visual features and conjunctions of various visual features. Basically, subjects were required to identify a change in a stimulus array after a brief exposure. The

question posed was whether the difference between schizophrenic subjects and normal controls could be attributed to storage capacity of information or whether it relates to what they called attentional deficits. The fact that schizophrenic patients already performed worse for set sizes of two stimuli to be compared than the normal controls led the investigators to conclude that the problem could not be attributed to a storage deficit but rather to a deficit in sustained and selective attention. In terms of immediacy, schizophrenic subjects showed difficulty in responding to stimuli by attending (not sustained performance with respect to a given stimulus) to the most immediate rather than to the most relevant stimulus.

Byrne, Clafferty, Cosway, Grant, Hodges, Whalley, Lawrie, Owens, and Johnstone (2003) administered a neuropsychological battery of tests, including executive function (Stroop color and word test, verbal fluency, etc.), perceptual motor speed, mental control/encoding, verbal ability and language, learning and memory and attention, to a sample of high risk subjects for schizophrenia (having close relatives with schizophrenia) and a comparable sample of normal controls. Their results showed a neuropsychological deficit in such high risk subjects and led them to conclude that this deficit reflects vulnerability rather than a prodromal state as some investigators have maintained. Interesting as these results are, they do not help us to support or negate the Immediacy Mechanism since they show a general difference in functioning as shown by these tests. The complex functions being tested such as those in the WAIS or learning tasks include stimulus control but because they include many other functions, one cannot say much about that in particular. On the other hand, this study does comment on the fact that they did not find a difference on the continuous performance test between high risk subjects and controls (a finding not discussed in this paper but in another one by this group of investigators -Cosway, Byrne, Clafferty, Hodges, Grant, Morris, et al (2002) which reflects attentional capacity and leads them to conclude that sustained attention is not a genetic marker for schizophrenia as others have maintained. Nevertheless, this is contradicted by the finding of a deficit in sustained attention, as we have shown above in Gold, Wilk, McMahon, Buchanan, and Luck (2003).

Brenner, Wilt, Lysaker, Koyman, and O'Donnell (2003) employed visual perception tasks of form and motion. They found that schizophrenic patients demonstrated a deficit for both types of stimulation when compared to a normal control group. Like some of the other studies above, this one showed that schizophrenic subjects were more likely to show a problem in response to shorter periods of stimulation, demonstrating once more that preponderantly responding to immediate stimuli puts schizophrenic patients at a disadvantage. These investigators also showed that psychometrically matching these visual tasks did not eliminate their findings.

Resnick, Bond, and Muesser (2003) evaluated the relationship between trauma and posttraumatic-stress-disorder (PTSD) severity and schizophrenic symptoms. They found that 13% of their sample of patients with schizophrenia experienced PTSD. Within the total sample, PTSD symptoms were not correlated with schizophrenia-specific symptoms, but the authors found that trauma and stress-related events occur frequently enough that the authors recommend these symptoms be routinely assessed in schizophrenic patients. In other words, schizophrenic patients, like normal people, respond adversely

to trauma. This study neither supports nor negates the immediacy hypothesis.

The next study in the *Journal of Abnormal Psychology* by Lenzenweger, Jensen, and Rubin (2003) examines the utility of a statistical model based on an expectation-maximization (EM) algorithm to distinguish between “genuine” and false-positive schizotypes derived from scores on the Chapman Perceptual Aberration Scale. This was a statistical analysis of potential schizotypy and as such is not relevant to the immediacy hypothesis discussion.

Narr, Green, Capetillo-Cunliffe, Toga, and Zaidel (2003) studied the presence of disturbed functional lateralization and altered callosal connectivity in schizophrenia by utilizing a lateralized lexical decision paradigm. The lexical decision task in this study presented word targets or pronounceable nonword targets and distracters tachistoscopically to subjects' left and right visual hemifields simultaneously. In each trial, only one of the lexical stimuli presented to each hemifield is underlined. Subjects must decide whether the underlined target is a word or a nonword.

In normals, the lateralized lexical decision paradigm typically produces a right visual field advantage (RVFA), (b) an advantage for word decisions compared with nonword decisions, and (c) a wordness by visual field interaction, in which the advantage for processing words relative to nonwords is greater in the right visual field (RVF) than in the left visual field (LVF). The authors found schizophrenic patients not to differ from controls in left-hemisphere superiority for lexical processing and right-hemisphere superiority for error monitoring.

Consistent with the immediacy hypothesis, the results showed that only schizophrenic patients' performance improved when the lexical status of target and distracter stimuli presented to each hemifield were the same. That is, schizophrenic patients showed increased accuracy of performance in their lexical decision making, relative to normal controls, when the target and distracter stimuli, presented to opposite visual fields, were of the same lexical category (i.e., word–word or nonword–nonword) compared with when they were of opposite categories (i.e., word–nonword). This lexicality priming effect is consistent with the immediacy hypothesis. Facilitated lexicality priming may reflect a difficulty in suppressing irrelevant information in the opposing visual field and may be related to deficits in ability to filter out the most immediate stimuli presented resulting in abnormally increased response accuracy. This is similar to past theories which posit that facilitated priming performance may be due to deficits in control of attention to distracter stimuli (Barch *et al.*, 1999).

Kerns and Berenbaum (2003) examined two aspects of schizophrenic executive function deficits (context processing and interference resolution) and related these deficits to thought disorder. The authors suggested that impaired context processing and interference resolution might disrupt the ability to represent and maintain speech topics and goals. They employed the N-back task which involves viewing a series of letters on a computer screen. Each letter appeared for 1.5 s, with an interstimulus interval of 3.5 s (with no intertrial interval). Subjects decided whether every letter they saw was the same or different from the letter that appeared two letters previously. The task requires that subjects remember the identity and position of previous letters in order to know how to respond to the current target. To measure interference resolution, participants first

viewed a target set of letters. Then they were presented with a probe item and had to decide whether or not the probe was in the target set. On interference trials, probe items were not in the current target set, but they would have appeared in the target set on the preceding trial. Thus, on interference trials, probes are associated with conflicting information. Results showed that schizophrenic individuals performed poorly on these tasks, responding as they did to immediate stimuli of preceding probes. Performance also correlated with the severity of subjects' thought disorder. Deficits in schizophrenia might disrupt the ability to retrieve and select ideas and words in speech. The authors suggested that impaired context processing might disrupt the ability to represent and maintain speech topics and goals. Impaired interference resolution was suggested to disrupt the ability to retrieve and select ideas and words in speech.

Stated in Immediacy Theory language, thought disorder may result from "excessive control" by immediate stimuli (Salzinger, 1984) on current performance. Salzinger (Salzinger, Portnoy, & Feldman, 1964, 1966, 1980; Salzinger, 1984; 1993) investigated this same idea using the cloze procedure. The maintenance of goal-relevant information during speech was found to be compromised because the larger amount of context did not help the speaker keep on target. Past research has shown that subjects become less comprehensible, the longer they speak (Salzinger, Portnoy, & Feldman 1966) and the more the conversation has become open ended (Leudar, Thomas, & Johnson, 1994; Harvey & Serper, 1990). Both the immediacy hypothesis and the current research findings suggest that thought disorder will increase to the extent that speech becomes distal to the original context. Thought disorder disrupts the ability to maintain speech threads in favor of responding to the immediate sounds of the words rather than the more distal contextual meaning of the sentence strings. This process may impair the subject's ability to detect and correct speech and impair the speaker from knowing that he has gotten off track from the original context in which speech was initiated (i.e., interference resolution).

CONCLUSION

Of the 12 studies in the *Journal of Abnormal Psychology* of 2003 that dealt with schizophrenia three were not relevant to the Immediacy Hypothesis and the other nine corroborated it. This is in addition to the last review of the same journal of 1981 by Salzinger (1984). He found eleven studies dealing with schizophrenia with all of them being either irrelevant to the Immediacy Mechanism or found to be consonant with it. Considering all of the studies described in this paper as well as in other papers by Salzinger et al above, our conclusion is that the Immediacy mechanism warrants being applied to describe schizophrenia.

In 1984, Salzinger listed a number of research questions that one could ask about this mechanism. One of these questions was how long a time period is "immediate"? Barch et al's (2003) study discussed above serves to shed some light on this. They found that when the stimulus A in the AX procedure occurred 5 seconds before X, schizophrenic patients performed statistically significantly worse than when A occurred one second before X. Study of the number of words that cohere (Salzinger et al, 1970)

in schizophrenic speech suggested that somewhere between 8 and 16 words related to one another in schizophrenic speech, suggesting an immediacy period of between 16 and 30 seconds. It would be useful to follow this up in other domains.

Another question that was raised was partially answered by Leibman and Salzinger (1998). That study suggested that one can reduce delusions and hallucinations by getting patients to direct their attention to more remote stimuli rather than the immediate ones that produce the symptoms. Another question asked about how much of the behavior of the schizophrenic patient is controlled by the immediacy mechanism, that is, does it apply more to speech or social behavior, and less to nonsocial behavior or is all behavior by schizophrenic patients equally affected? Studies reviewed here and elsewhere indicate that much can be learned by using the Immediacy mechanism as a starting off point.

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