

Enhanced semantic priming in thought-disordered schizophrenic patients using a word pronunciation task

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Abstract

Previous research on semantic priming in schizophrenia has produced contradictory findings. For the present study, it was intended to resolve some of the ambiguities in the literature. Using a semantic priming task with word pronunciation, evidence is provided that thought-disordered schizophrenic (TD) patients exhibit significantly increased semantic priming as compared to healthy and psychiatric controls. Results suggest that enhanced semantic priming is not confined to tasks that require lexical decision. Moreover, results indicate that TD schizophrenic patients suffer from a decay of hierarchical thinking, i.e. TD schizophrenics reveal a tendency to process the less meaningful rather than the dominant aspects of external information. Priming effects for the inferior meaning of homograph words (for example, ‘dance’ is an inferior, and ‘game’ is a superior associate of the word ‘ball’) were significantly greater compared to healthy controls and non-TD schizophrenics. Results were not moderated by sociodemographic background variables, psychomotor slowing and psychopathological symptoms other than thought disorder. © 2001 Elsevier Science B.V. All rights reserved.

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1. Introduction

Within the last decade, neurocognitive research has increasingly shifted away from simple *paper and pencil* tasks in favour of computerized tests allowing for more fine-grained analyses of essential cognitive parameters. Adopted from cognitive psychology, semantic priming tasks have been employed to shed light on the potential pathological pathways of schizophrenia. In priming experiments, two words

(referred to as *prime* and *probe*) are successively presented. Responses are reliably facilitated to a probe following a semantically related prime word compared to a probe that is unrelated to the prime (for example, *brother–sister* versus *hat–table*). This effect, called *semantic priming*, is attributed to a spread of activation initiated by the display of the prime word, which is thought to lower the activation threshold of related information (Neely, 1991). Semantic priming is usually assessed via two experimental designs: lexical decision (LD; the subject has to decide whether the probe string is a neologism or a real word) or word pronunciation (WP) techniques (the subject has to read the second word). Semantic

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priming tasks are considered correlates of the speed with which information runs through human semantic networks (Spitzer, 1997).

Semantic priming studies in schizophrenia research have produced contradictory results. Maher et al. (1987) and others (Kwapil et al., 1990; Spitzer, 1997; Weisbrod et al., 1998; Moritz et al., submitted for publication) have found that thought-disordered schizophrenics (TD) exhibit enhanced semantic priming compared to controls, which is hypothesized to reflect a disinhibition of automatic spreading activation. According to this account, compared to controls, associations spread faster and further in the semantic networks of thought-disordered schizophrenic patients, which, at the symptomatic level, may give rise to symptoms such as associative loosening and derailment. In contrast, other priming studies do not support the conclusions drawn by Maher et al. (1987). Several studies have found no evidence for enhanced semantic priming in thought-disordered schizophrenics (Chapin et al., 1989, 1992; Vinogradov et al., 1992; Ober et al., 1995, 1997; Barch et al., 1996). As has been thoroughly discussed elsewhere (Moritz et al., 1999), the failure to find enhanced semantic priming in schizophrenia may result from several methodological weaknesses in previous studies:

1. Several studies (Blum and Freides, 1995; Vinogradov et al., 1992; Ober et al., 1995, 1997; Barch et al., 1996) have used short prime presentation times (lower-equal 100 ms). However, there is strong evidence that schizophrenics have problems to process shortly displayed material (Cadenhead et al., 1997). Therefore, short prime display times preclude stable processing of the prime information and may lead to decreased priming effects, which does not necessarily reflect a defect in automatic processing but rather reflects perceptual problems.
2. Some studies that did not support Maher's and Spitzer's conclusions made no subdivision of patients according to the presence of formal thought disorder (Chapin et al., 1989, 1992; Vinogradov et al., 1992; Ober et al., 1995, 1997).
3. Several studies (for example, Aloia et al., 1998) did not employ short stimulus onset asynchronicities (SOAs, interval between prime and probe onset, SOAs below 500 ms are thought to tap automatic

processes). However, according to Maher et al. (1987), the core deficit of thought-disordered schizophrenics is inferred for the automatic processing mode, which can only be assessed by short SOAs.

Several researchers who did not find enhanced priming in (TD) schizophrenics emphasize that increased priming has only been revealed in LD tasks. It is argued that LD, unlike WP, tasks do not solely tap automatic processes (Barch et al., 1996) but, in addition, tap other controlled influences that may also operate at short SOAs (i.e. semantic matching). According to this line of thought, enhanced semantic priming in schizophrenics as assessed with LD-tasks is a test-specific effect and does not implicate increased spreading of activation. Although there is evidence that LD-tasks with short SOAs are indeed adequate for the measurement of pure automatic processing (Neely, 1991), an attempt is made in the present study to falsify the above antithesis.

It is hypothesized that enhanced semantic priming in TD patients can also be demonstrated in WP paradigms. This result would give further evidence that automatic spreading activation is enhanced in schizophrenics suffering from thought disorder and does not reflect a task-specific effect. Moreover, we tested the hypothesis that the associations generated by thought-disordered schizophrenics do not only spread faster and further but are also more oblique compared to controls. In the present study, a psychiatric control group is investigated to test whether these differences are specific to TD schizophrenics or whether they occur in other psychiatric patients, too.

2. Methods

2.1. Subjects

Forty-five schizophrenic patients [age: 31.6 (S.D.: 10.2); 30 women, 15 men; years of education: 11.1 (S.D.: 1.8), length of illness: 7.2 (S.D.: 8.2)] were investigated and split according to the presence of associative loosening. The presence or absence of associative loosening was rated by two trained clinicians who interviewed the patients for at least 40 min with the Positive and Negative and Disorganized

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