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The influence of idiomatic salience during the comprehension of ambiguous idioms by patients with schizophrenia ☆

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ABSTRACT

This study investigates whether figurative comprehension in schizophrenia is influenced by the salience of idiomatic meaning, and whether it is affected by clinical and demographic factors and IQ. Twenty-seven schizophrenic patients and 25 healthy participants performed a semantic relatedness judgement task which required the comprehension of idioms with two plausible meanings (literal and figurative). The study also used literal expressions. The figurative meaning of the idioms was less salient (ILS), more salient (IFS), or equally salient (IES) compared to the literal meaning. The results showed "a salience effect" (i.e., all participants understood the salient meanings better than the less salient meanings). There was also a "figurativeness effect" (i.e., healthy individuals understood the figurative meaning of IES better than the literal meaning but not schizophrenic patients). In patients, their thought disorder influenced the figurative comprehension of IFS. The verbal IQ influenced the figurative comprehension of ILS. The thought disorder, the verbal IQ, and the educational level influenced the figurative comprehension of IES. The patients' clinically evaluated concretism was associated with a reduced figurative comprehension of IFS and IES evaluated at a cognitive level. The results are discussed in relation to cognitive mechanisms which underscore figurative comprehension in schizophrenia.

1. Introduction

Language and communication abnormalities, regarded as cardinal symptoms of schizophrenia (Bleuler, 1911), are often illustrated by patients' difficulty in interpreting the figurative forms of a language (for a review, Thomas and Daum, 2006). Evidence of impaired figurative language comprehension was provided using different forms of figurative language in a large variety of tasks: an oral interpretation of proverbs (Carpenter and Chapman, 1982; Harrow et al., 1974; Shimkunas et al., 1967; Sponheim et al., 2003; Kiang et al., 2007), metaphors and idioms (Tavano et al., 2008) during standardized clinical interviews; comprehension of proverbs (Barth and Küfferle, 2001; Brüne and Bodenstein, 2005) or of ambiguous idioms (Iakimova et al., 2006; Schettino et al., 2010) with multiple choice tasks; and irony or/and metaphor comprehension in the context of short stories (Langdon et al., 2002; Mo et al., 2008), idioms (Titone et al., 2002; Strandburg et al., 1997) and comprehension of proverbs with semantic tasks (Spitzer, 1997).

Several studies have explored which clinical factors and cognitive impairments influence figurative comprehension in schizophrenic patients. It was shown that the bizarre and idiosyncratic interpretation of proverbs was associated with the severity of the schizophrenic patients' thought disorder (Sponheim et al., 2003), but less abstract and highly concrete interpretations were associated with several cognitive deficits related to attentional processes (Sponheim et al., 2003), executive functioning (Sponheim et al., 2003; Kiang et al., 2007), planning (Sponheim et al., 2003), working memory (Kiang et al., 2007), verbal memory (Sponheim et al., 2003), and general IQ (Sponheim et al., 2003). The comprehension of irony (Langdon et al., 2002), proverbs (Brüne and Bodenstein, 2005), and metaphors in the context of short stories (Mo et al., 2008) was associated with the theory of mind deficit in schizophrenia, but the comprehension of familiar metaphors and idioms was associated with linguistic dysfunctions, such as impaired syntax (Tavano et al., 2008). Langdon et al. (2002) suggested that metaphor and irony impairments in schizophrenia are related to different aspects of the psychopathology

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and may be underscored by different cognitive dysfunctions. These authors suggested that poor comprehension of metaphors, which was associated with negative symptoms, may be related to semantic memory dysfunctions, while impaired irony comprehension, which was associated with positive symptoms, may be related to the theory of mind deficits.

One common characteristic of these heterogeneous forms of figurative language is that most of them can also be interpreted literally. Titone et al. (2002) demonstrated that literality has a negative impact on schizophrenic patients' ability to understand figurative language. By using a semantic priming paradigm, the authors examined the comprehension of two types of idioms: literally plausible and literally implausible. They demonstrated that schizophrenic patients were only able to actively generate a figurative meaning when no other interpretation of the idiom was possible. However, patients showed impaired activation of the figurative meaning when both figurative and literal meanings were plausible. Titone et al. (2002) suggested that schizophrenic patients' difficulties in accessing the figurative meaning when the literal one was also plausible may be explained by working memory limitations and/or a deficit of controlled processing. Schettino et al. (2010) studied the comprehension of ambiguous and unambiguous idioms in schizophrenic patients and healthy individuals by the means of a sentence-to-picture-matching task. The authors showed that schizophrenic patients were impaired in both types of idiomatic sentences but their performance was particularly poor in the case of ambiguous (literally plausible) idioms. In this study executive dysfunctions, which were considered to impair the literal meaning suppression/inhibition, were strong predictors of schizophrenic patients' performance on idiom comprehension.

However, one important characteristic of literally plausible figurative forms is that the plausibility of the literal interpretation may vary in function with its salience (familiarity, conventionality, and frequency of use). The salience of the idiomatic meaning crucially influences the cognitive and the brain processes involved in figurative comprehension (Giora et al., 2000; Giora, 2007; Mashal et al., 2005, 2008; Mashal and Faust, 2008; Laurent et al., 2006).

According to the Graded Salience Hypothesis (Giora, 1997, 2003), when the meaning is salient it is automatically activated from the semantic memory (before the less salient meaning). In this sense, this activation does not require the intervention of controlled processes. In contrast, when the figurative meaning is not salient, the comprehension involves the inhibition/suppression of the firstly accessed salient meaning, so more extra inferential processes, and a strong contextual support.

The focus on meaning salience may provide a fruitful cue to the understanding of the neurocognitive processes, underlying impaired figurative comprehension in patients with schizophrenia. Its relation to the clinical dimensions of the disorder can also be clarified. On its basis, we may suggest that potential difficulties in figurative comprehension in patients with schizophrenia would be particularly marked when the figurative meaning is not salient (for example, in irony, poetic metaphors, and in some idioms and proverbs). This result would be due to a deficit in controlled processes, such as a deficit of executive inhibitory mechanisms (Titone et al., 2000; Schettino et al., 2010), context processing (Chapman et al., 1976; Cohen and Servan-Schreiber, 1992), and other extra-linguistic mechanisms, such as the theory of mind comprehension (Brüne and Bodenstein, 2005; Mo et al., 2008). In contrast, the comprehension of figurative meaning may be relatively preserved when the figurative meaning is salient (for example, in literally implausible idioms, Titone et al., 2002, and in familiar metaphors, Iakimova et al., 2006). This facility is due to the fact that salient meaning is directly retrieved from semantic memory. Thought disorder may particularly influence the comprehension of figurative meaning when it is salient, given the well-established relationships between thought disorders and functional impairments in semantic memory (Goldberg et al., 1998; Kuperberg, 2008). In contrast, positive and negative symptoms may influence the comprehension of figurative meaning, in particular when it is not salient, consistently with the correlations found between irony or metaphor comprehension and both positive and negative symptoms in patients with schizophrenia (Langdon et al., 2002).

Therefore, the first aim of the current study was to explore whether schizophrenic patients are sensible to the meaning salience or to the literality/figurativeness of the idioms. Patients had to understand idioms with two meanings, one figurative and one literal. The second aim was to evaluate the impact of clinical and demographical factors and verbal IQ on the comprehension of meaning salience and figurativeness of idioms in schizophrenic patients.

These issues were addressed using a semantic decision task involving the comprehension of French ambiguous idioms with high literal (e.g., “to open the umbrella”) or figurative (e.g., “to lose the compass”) salience and of idioms with equal figurative and literal salience (e.g., “to swallow the pill”) (for examples, see the Appendix). Subjects had to judge whether a target word was semantically related to the preceding idiom. As the idiomatic target was related to either the *global* literal or the *global* figurative meaning, the results (percentage of accuracy and reaction time) are expected to reflect the extent to which both (or one of the two) idiomatic meanings were activated and maintained after the idiomatic offset. If the schizophrenic patients can understand the salient aspects of the idiomatic meaning, they will more quickly and accurately judge the relationship between an idiom and a target word related to its salient meaning compared with its less salient meaning. When idioms have two equally salient meanings, all participants are expected to identify them with equal accuracy and rapidity. Alternatively, if patients are more likely to interpret the literal plausibility of the idioms, they will more rapidly and accurately identify the word targets related to their literal meaning compared with those related to their figurative meaning. The question of whether verbal IQ, demographical factors (age, education, and length of illness), and clinical symptoms (positive, negative, and thought disorder) influence the comprehension of idioms with two meanings will be explored using analyses of correlations between these factors, and the participants' ability to understand the figurative and literal meanings of the idioms.

2. Method

2.1. Participants

Twenty-seven patients, whose symptoms met the DSM IV criteria for schizophrenia (APA, 1996), took part in the study. All were outpatients from the psychiatric unit of Versailles Hospital (Centre Hospitalier de Versailles, Le Chesnay, France). The diagnosis of schizophrenia was confirmed by a short semi-structured interview (M.I.N.I., French version, Lecrubier et al., 1997). All patients received stable doses of medication (mean chlorpromazine equivalent per day: 329 mg, S.D. = 460 mg). Clinical symptoms were evaluated using the Positive and Negative Syndrome Scale (PANSS) (Kay et al., 1987), the Scale for Thought, Language and Communication Disorders (TLC, Andreasen, 1979, French Translation, Bazin et al., 2002), and The Schizophrenia Communication Disorder scale (SCD, Bazin et al., 2005). The SCD assesses specific communication difficulties in patients with schizophrenia during a semi-structured conversational interview. It is one of the first theoretically-derived tools to assess communication difficulties in schizophrenic patients, and is based upon cognitive neuropsychological models of disorganised speech in schizophrenia (Hardy-Bayle et al., 2003).

Twenty five healthy participants were recruited from the local community through a newspaper advertisement. These participants were evaluated with the M.I.N.I. to assure that they had no past or present psychiatric disorders. Healthy participants were paid 30.50 Euros (~37 US dollars) for participating. The demographic and clinical data of the participants are presented in Table 1. All participants were native French speakers aged between 20 and 54. They had no history of neurological impairments, epilepsy, alcoholism, or regular drug use, and they had not undergone electroconvulsive therapy during the 6 preceding months. Healthy participants were matched on age and vocabulary skills (assessed with the Binois and Pichot vocabulary scale, Binois, 1947) with the patients with schizophrenia, but, in general, patients were less educated than healthy volunteers (see Table 1). All participants were informed of the study procedures and gave written informed consent.