

The comprehension of ambiguous idioms in aphasic patients

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Abstract

The ability to understand ambiguous idioms was assessed in 15 aphasic patients with preserved comprehension at a single word level. A string-to-word matching task was used. Patients were requested to choose one among four alternatives: a word associated with the figurative meaning of the idiom string; a word semantically associate with the last constituent of the idiom string; and two unrelated words. The results showed that patients' performance was impaired with respect to a group of matched controls, with patients showing a frontal and/or temporal lesion being the most impaired. A significant number of semantically associate errors were produced, suggesting an impairment of inhibition mechanisms and/or of recognition/activation of the idiomatic meaning.

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1. Introduction

Idioms are among the most common forms of figurative language (Gibbs, 1999). The meaning of idioms is highly conventional in that their meaning generally cannot be predicted from the meaning of their constituent parts. Notwithstanding, the syntactic as well as many of the semantic features characterizing their constituents are still preserved. For instance, one cannot slowly “kick the bucket”, neither idiomatically nor literally, since “to kick” cannot be used to refer to a slow action (Hamblin & Gibbs, 1999).

Idioms do not form a unitary class and rather vary along a number of syntactic and semantic dimensions (Nunberg, Sag, & Wasow, 1994; Cacciari & Glucksberg, 1995). First, idioms vary as to their semantic transparency, namely in the extent to which the motivation for their structure can be recovered. Idioms can involve figuration (although there are idioms not involving

figuration at all, such as “by dint of”) and can be originally metaphorical (e.g., “take the bull by the horns”), even if speakers may not perceive the figure originally involved (Nunberg et al., 1994). When an idiom is semantically opaque, the speaker needs to know the stipulated meaning that cannot be derived neither from the image evoked nor from the constituent word meanings. Second, idioms vary as to their decomposability, namely in the extent to which the idiomatic interpretation can be mapped onto single constituents (Gibbs, Nayak, & Cutting, 1989). Third, idioms vary in the extent to which they can be syntactically transformed still retaining their idiomatic meaning (Gibbs & Gonzales, 1985). Finally, some idioms do not have any well-formed literal counterpart while others instead have it and are “ambiguous” (e.g., “break the ice”).

Early theories of idiom comprehension assumed a literal meaning priority and a search for a figurative interpretation only when the literal one was defective. For example, Bobrow and Bell (1973) proposed the *Idiom List hypothesis* according to which idioms were fixed expressions whose meaning was sought in an idiom list whenever the literal reading of the string made no sense in context. Differently, the most influential *Lexical Representation hypothesis* posited that idioms behaved as long, morphologically complex words stored in the mental lexicon together with the other lexical units (Swinney & Cutler, 1979).

Abbreviations: LBD, left brain-damage; rTMS, repetitive transcranial stimulation

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Linguistic processing of the string and retrieval of the idiomatic meaning was supposed to proceed in parallel with the second faster than the first. Gibbs (1984) proposed a more extreme version of this hypothesis arguing that people did not engage in any linguistic analysis at all and could entirely bypass the literal meaning directly accessing the figurative interpretation of the idiom string. A last different model was proposed by Cacciari and Tabossi (1988), the *Configuration hypothesis*, according to which idioms are configurations of words that undergo a linguistic analysis until enough information had accumulated to prompt the recognition of the idiomatic nature of the string and the subsequent activation of the related figurative meaning.

All these hypotheses are based on language unimpaired participants and assume that, in order to understand an idiom, lexical integrity is required. However, this is precisely what cannot be taken for granted with aphasic patients whose lexical-semantic and/or a syntactic impairments have shown to limit figurative language comprehension (Papagno, Tabossi, Colombo, & Zampetti, 2004). However, a widely accepted view in the neuropsychological literature assumes that damage to the right hemisphere, but not to the left one, has major consequences on the processing of figurative language in general, and of idiomatic expressions in particular (e.g., Van Lancker & Kempler, 1987). Recent evidence questioned this view (e.g., Tompkins, Boada, & McGarry, 1992) showing that idiomatic meaning comprehension is impaired in left-hemisphere damaged patients (Papagno & Genoni, 2004) and in healthy people as well, when the activity of their left hemisphere is selectively disrupted by repetitive transcranial magnetic stimulation (rTMS) (Oliveri, Romero, & Papagno, 2004). The proponents of the right hemisphere hypothesis also posited that idioms were processed like unitary, non-syntactically analysed strings, an assumption contradicted by evidence that language-unimpaired speakers syntactically parsed the idiom string even after its idiomatic meaning was already retrieved (Peterson, Burgess, Dell, & Eberhard, 2001).

More specifically, the results collected so far on aphasic patients show that they have a strong bias toward the literal interpretation of the idiom string even when the idiom only has a non-literal interpretation (Papagno et al., 2004). However, this result might at least in part depend on the testing modality that has proved to be extremely relevant in neuropsychological studies, even more than in studies on language-unimpaired participants (Tompkins et al., 1992). The two tasks more often used in idiom studies with patients, the string-to-picture matching task and the oral definition task (but see Hillert, 2004), are both problematic. The string-to-picture matching task can underestimate idiom comprehension, because the picture representing the literal interpretation (often a bizarre image, especially when the idiom string has not a literal meaning) can strongly interfere with the correct response, similarly to what happens in the Stroop effect (MacLeod, 1991; Stroop, 1935). This has proved to be the case for patients with probable Alzheimer's disease (AD) (Papagno, Lucchelli, Muggia, & Rizzo, 2003), whose idiom comprehension skills were tested using a sentence-to-picture matching task. The 15 AD patients involved in this study were asked to select the picture corresponding to the figurative meaning of the idiom string between two alternatives, respec-

tively, representing the figurative and the literal interpretation. Idiom comprehension was very poor with respect to a group of matched controls and was correlated with the performance on tasks assessing executive abilities. When the idiom test was repeated using an unrelated picture, instead of the one depicting the literal meaning of the idiom string, the patients' performance significantly improved suggesting that the picture representing the literal interpretation strongly interfered with idiomatic meaning retrieval.

The second task employed in many idiom comprehension studies, the oral definition task, has important limitations as well: a deficit in speech output, as found in non-fluent aphasic left brain-damaged (LBD) patients, can in fact lead to an underestimation of their ability to understand idioms since they might be unable to provide a verbal explanation of an idiomatic meaning they actually know.

Therefore, the aim of this study was to investigate idiomatic meaning comprehension in aphasic patients, without a semantic deficit at a word level, employing a task that might overcome the limitations just outlined. Hence, to avoid the "interference" of the literal interpretation and any verbal fluency effect, we used a string-to-word matching task (see below). We employed idiomatic expressions that have both a figurative and a literal interpretation (i.e., ambiguous idioms) as experimental material. Since these idioms have not yet been tested in aphasic patients, the results of the present study might extend what we currently know on idiomatic processing, allowing a more fine-grained assessment of idiomatic meaning comprehension impairment in aphasia. The figurative interpretation of familiar idiom strings, as those employed in this study, is usually more frequent than the literal one. Consequently, the idiomatic interpretation is almost always the dominant one, and the literal the subordinate one (Cronk, 1990). In any case, the participants were advised that the idiom string was meant idiomatically even though it also had a literal interpretation. Given the heterogeneity of idiomatic expressions in terms of syntactic structure, literal ambiguity, semantic transparency, and so forth (see Nenonen, Niemi, & Laine, 2002), we cannot exclude that different processing mechanisms might be involved in processing different types of idioms.

If the right hemisphere hypothesis is correct, then we should expect aphasic patients to comprehend idiomatic expressions as control participants do. A normal performance in aphasic patients with normal word comprehension skills also would support the view that idioms are just long words, as proposed by the *Lexical Representation hypothesis*. On the contrary, if idiom processing indeed requires morpho-syntactic and lexical-semantic processing (Cacciari & Tabossi, 1988; Peterson et al., 2001), then we should expect aphasic patients to be impaired in understanding idiomatic expressions as previously shown for idioms without a literal meaning (Papagno et al., 2004), and for verb phrase idioms (Nenonen et al., 2002).

In sum, the aim of this study was to assess ambiguous idiom comprehension in aphasic patients characterised by a good comprehension at a word level. An impairment in idiom comprehension, but not in word comprehension, would further question the *Lexical Representation hypothesis*.

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