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Hemispheric involvement in native and non-native comprehension of conventional metaphors

Nira Mashal [a, b, *], Katy Borodkin [c, 1], Omer Maliniak [c], Miriam Faust [b, c]

[a] School of Education, Bar-Ilan University, Israel
[b] The Leslie and Susan Gonda (Goldschmied) Multidisciplinary Brain Research Center, Bar-Ilan University, Israel
[c] Department of Psychology, Bar-Ilan University, Israel

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ABSTRACT

The present study examined hemispheric processing of conventional metaphors in native (L1) and non-native (L2) language using the divided visual field technique. Participants included 25 native Hebrew speakers and 24 bilinguals who acquired English as L1 and Hebrew as L2. In Experiment 1, the two groups performed a semantic judgment task on conventional metaphors and literal Hebrew word pairs, and in Experiment 2, the processing of the expressions was compared between the two L1s. The results of the two experiments demonstrated a left hemisphere advantage for processing conventional metaphoric expressions in L1, but a right hemisphere advantage for processing the same kind of stimuli in L2. No such L1-L2 difference in hemispheric involvement was observed for literal word pairs. These results support the Fine-Coarse Semantic Coding Theory and the Graded Salience Hypothesis and suggest that the metaphoric meanings of conventional metaphors may appear less salient for a non-native speaker.

* Corresponding author. School of Education, Bar-Ilan University, Israel.
E-mail address: nmashal2@gmail.com (N. Mashal).
[1] Katy Borodkin is currently at Department of Speech-Language-Hearing Sciences, Lehman College, City University of New York, USA.

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1. Introduction

Figurative language and, especially, metaphoric language use is highly pervasive in everyday life. It is necessary for social communication and used in different dialogue environments. Whereas native language (L1) speakers use figurative language effortlessly, the difficulty it exerts on second language (L2) speakers is well-known (e.g., Kecskes, 2006). What makes it difficult to understand might be that a figurative meaning of an utterance is grounded in the socio-cultural experience of the native speakers, from which a particular highly accessible interpretation emerges. Due to the lack of (or limited) experience with the language and the culture, what is accessible for L1 speakers will not necessarily be accessible for L2 speakers (Kecskes, 2006). Consequently, the hemispheric processing of a figurative expression by L2 speaker may differ from that made by L1 speaker. Whereas the neural basis for processing figurative language by native language speakers was studied extensively, very little is known about the processing of figurative language in second language speakers. The aim of the present study is therefore to study the neural basis of bilingualism and to gain further insights into the processing of metaphoric expressions by L2 speakers.

According to the Fine-Coarse Semantic Coding Theory (FCSC Theory, Beeman, 1998; Jung-Beeman, 2005), the right hemisphere (RH) possesses a unique semantic coding characterized by high sensitivity to distant semantic relations. Based on evidence from studies showing that semantic priming effects of remotely related words are obtained in the RH but not in the left hemisphere (LH) (e.g., Chiarello, 2003), the FCSC Theory has suggested that semantic processing by the two cerebral hemispheres differs qualitatively. According to this theory, immediately after encountering a word, the LH focuses on a single dominant interpretation (fine semantic coding), whereas the RH loosely activates and maintains larger semantic fields containing more distant associates and more unconventional meanings (coarse semantic coding). Since the metaphorical meaning of a word is usually more semantically distant than its literal interpretation, the FCSC theory predicts RH semantic processes may be more apt for metaphor comprehension. Although there is a growing body of research examining the predictions of this theory for metaphoric language processing in native language (e.g., Faust & Mashal, 2007), it has been rarely tested in non-native language. In particular, Faust, Ben-Artzi, and Vardi (2012) found priming effect for weakly-related word pairs in Hebrew as L1 presented to the RH via the left visual field (LFV), using a relatively long time interval of 750 ms. However, no priming effect was observed for weakly-related word pairs in English as L2, pointing to a weaker coarse semantic coding for a non-native than native language.

Another psycholinguistic theory that addressed hemispheric lateralization in language processing is the Graded Salience Hypothesis (GSH, Giora, 2002, 2003). According to the GSH, salient meanings of words and utterances are the foremost meanings on our mind, i.e., they are coded in the mental lexicon and can easily be accessed. What is required for a meaning to be most salient is its conventionality, frequency, familiarity and/or prototypicality. Giora (1997, 2003) claims that the degree of meaning salience, rather than the literal or metaphorical meaning of an utterance, determines the time-course of meaning processing. According to the GSH, the order by which meanings are accessed and retrieved from the mental lexicon depends on the degree of meaning salience of the linguistic expression such that salient meanings are retrieved before less salient meanings regardless of context and their literality or non-literality. In other words, it is the salience-non-salience continuum rather than the literal-metaphoric distinction that determines how linguistic stimuli are processed. The GSH predicts a selective RH involvement in the processing of nonsalient meanings (such as novel metaphors in L1) and traditional LH involvement in the processing of salient meanings (such as conventional metaphors in L1).

The FCSC Theory and the GSH may have some important implications for studying the processing of metaphors and other aspects of figurative utterances in L2. For native speakers, a conventional metaphor possesses a highly salient metaphoric meaning and a less salient literal interpretation since native speakers have naturally encountered the expressions more often than L2 speakers. Thus, on encountering a highly conventional metaphor, the LH engages in a fine coding and strong activation of small semantic fields, related to the salient metaphoric meaning that will be immediately available for retrieval for L1 speakers. For L2 speakers, on the other hand, the metaphoric meaning of the highly conventional metaphors may be less salient, resulting in the engagement of coarse semantic coding of