

Activation and Suppression of Context-Relevant and Context-Irrelevant Senses in the Processing of Nonliteral Language by L2 Learners

Anna Cieślicka
Adam Mickiewicz University

Abstract: *Recent psycholinguistic literature has witnessed an astounding boom of research into the processing of figurative language. Whereas the majority of the figurative language research has been carried out with monolingual language users, a substantially smaller number of studies have addressed the question of how second language learners cope with figurative expressions. The aim of the present paper is, therefore, to fill the research gap concerning figurative language processing by second language learners. More specifically, the paper focuses on the degree to which literal and metaphorical meanings of L2 idiomatic phrases become activated, and consequently either retained or suppressed in the course of their processing by L2 learners. To measure the amount of activation and suppression of literal and figurative meanings of idioms, a word fragment completion test was carried out with a group of advanced Polish learners of English. Results of the test are interpreted against the existing idiom comprehension models postulated in the psycholinguistic literature and implications for the L2 processing model are discussed.*

1. Introduction: An Overview of L1 Idiom Processing Models

Several different theories regarding the comprehension of idiomatic expressions by native language (L1) speakers have been proposed in the figurative language literature. Broadly speaking, theoretical accounts of idiom representation and processing can be divided into two major classes: *noncompositional* theories on the one hand and *compositional* ones on the other. The noncompositional theories, also referred to by Glucksberg (1993) as *direct-look up* models, share the assumption that idiom meanings are stipulated arbitrarily and understood by retrieving the meaning of an idiom as a whole, rather than by linguistic processing of their constituent parts. These models differ in the proposed temporal sequencing of accessing their literal and figurative meanings. Thus, whereas, the *idiom list hypothesis* (Bobrow & Bell 1973) assumes that figurative meanings can only become available after the obligatorily accessed literal meanings have been rejected as inappropriate, the *lexical representation hypothesis* (Swinney & Cutler 1979) proposes simultaneous computation of idioms' literal and figurative senses, and the *direct access model* (Gibbs 1980; 1985) claims that figurative meanings are accessed before literal ones, which can fail to be computed altogether, especially in cases when an expression is immediately recognized as idiomatic.

Contrary to the traditional, noncompositional view of idioms, compositional theories propose that idiomatic meanings are built both out of

literal meanings of idiom constituents and the specific figurative interpretation of these constituent word meanings in a given context. Major compositional theories proposed in the psycholinguistic literature are the *idiom decomposition model* (Gibbs & Nayak 1989; Gibbs; Nayak; & Cutting 1989), the *configuration model* (Cacciari & Tabossi 1988), and the *Phrase-Induced Polysemy model* (Glucksberg 1993; 2001). Nunberg (1978) tried to capture the compositional dimension of idiom variability by proposing a compositionality continuum along which idioms could be ordered. This issue has been taken up and further developed by Gibbs and his colleagues (Gibbs & Nayak 1989; Gibbs; Nayak; & Cutting 1989), who have experimentally verified the prediction that people can reliably assess the degree of compositionality of idioms.

Since the strict compositional versus noncompositional dichotomy over time turned out insufficient to accommodate data from psycholinguistic studies of idioms, a hybrid approach has emerged that combines aspects of both positions. Among the hybrid proposals for idiom processing, the most prominent have been Titone and Connine's (1999) *hybrid model of idiom representation and processing* and Giora's (1997, 1999, 2002, 2003) *graded salience hypothesis*. Titone and Connine's hybrid approach assumes that idioms behave both noncompositionally and compositionally and that, in accordance with the configuration model (cf. Cacciari & Tabossi 1988), the activation and retrieval of an idiom's figurative meaning is performed when a sufficient portion of the idiomatic string has been encountered, at the point known as 'the idiomatic key'. Retrieval of the idiom's figurative meaning is thus simultaneous with a literal analysis of the phrase, under which individual word meanings are activated and compositionally combined.

Rather than focusing on the distinction between literal and figurative meanings and investigating which of them enjoys priority over the other, Giora's (1997) graded salience hypothesis posits the priority of salient meanings, which she defines as the meanings which are coded in the lexicon and "enjoy prominence due to their conventionality, frequency, familiarity, or prototypicality" (Giora 2002:490). Salient meanings are always processed initially and accessed via a direct look-up in the mental lexicon immediately upon encounter of the language stimulus. Contextually incompatible meanings accessed initially on account of their salience may, subsequently, be either maintained or suppressed, depending on their contribution to the construction of the compatible meaning. The fate of contextually incompatible meanings is regulated by the so-called *retention hypothesis*, which supplements the graded salience hypothesis (Giora 2002). On the retention hypothesis, inappropriate meanings which are conducive to the compatible interpretation are retained, whereas meanings conflicting with the compatible meaning are discarded. Since literal meanings may contribute to the construction of figurative interpretations, in the figurative context, where the incompatible literal sense is supportive of the compatible figurative meaning, it may remain active even after the contextually appropriate figurative sense has been determined. In contrast, in the literally biasing context, where the contextually appropriate meaning is the literal one,

the incompatible figurative sense is usually irrelevant to the construction of the utterance meaning and hence becomes suppressed.

With respect to the processing of idioms, the graded salience hypothesis predicts that processing familiar idioms, whose idiomatic meanings are more salient than their literal meanings, will involve activating their figurative meanings in both figurative and literal biasing contexts. In the figurative biasing context, the idiomatic meaning should be evoked almost exclusively, because it is not only the more salient but also the intended meaning. In turn, in the literal biasing context, the idiomatic meaning will be activated initially, on account of its salience, but will subsequently give way to the contextually appropriate, less salient, literal interpretation. Processing less familiar idioms, on the other hand, is likely to evoke a different pattern of activation, since for these idioms the literal meaning is more salient than the idiomatic meaning. The notion of salience is likely to appear of particular relevance for modeling the comprehension of idioms by second language learners, even if the salience status of various senses of idiom constituents may be considerably different for native and second language users.

2. Idioms and Second Language Learners

The abundance of L1 idiom processing studies has been accompanied by a regrettable lack of comparable research into the representation and processing of idiomatic expressions by second language (L2) learners. Very little psycholinguistic research has been undertaken into the actual processing of idiomatic expressions by second language learners, and even less research has dealt with on-line aspects of L2 idiom comprehension. Few idiom scholars have attempted to present a theoretical account of L2 idiom learning. Among them, Glucksberg (2001) has emphasized cultural-specific knowledge involved in learning idioms. Such *oligosemic* idioms, whose meanings are deeply embedded in culture and which refer to social and cultural values, pose, according to Glucksberg, a particular problem for second language learners. To learn such idioms, learners must not only become bilingual but also bicultural, in the sense of immersing themselves in the target language culture.

Matlock and Heredia (2002) assume that non-experienced (beginner) second language learners must establish direct connections between literal and nonliteral meanings of figurative expressions. Following from this assumption, they envisage idiom comprehension at early stages of L2 learning as consisting of three stages. In the first stage, an L2 idiomatic expression is translated literally into L1. Next, the L2 learner accesses the literal meaning of the expression and attempts to make sense of it. Finally, in the third stage, the figurative meaning is accessed. Matlock and Heredia postulate that at more advanced stages of L2 learning the L2 speaker may process figurative expressions in the same manner as a native monolingual speaker, the view consistent with the more general hierarchical model of bilingual lexical

organization (cf. Kroll & Scholl 1992; Kroll 1993; Heredia 1997; Kroll & Tokowicz 2001).

Other proposals, however, appear less unanimous. Whereas some researchers have suggested that L2 learners comprehend idioms by direct retrieval of their figurative meanings (Nelson 1992), others have suggested that L2 learners first process idioms literally and only then access their figurative readings (Liontas 2002). Kesckes (2000; 2002) has noticed that prefabricated pragmatic units, which he labels *situation-bound utterances* are likely to be produced and comprehended quite differently by native speakers on the one hand and L2 learners on the other. Since, in accordance with Giora's (1997) hypothesis, figurative and literal language use are governed by a principle of salience, which results from the interaction between a person's linguistic and cognitive development, it is likely that what is salient for native language users may be less so for second/foreign language learners. Kecsckes (2000) goes on to suggest that, because of insufficient metaphorical competence in their second/foreign language and the essentially L1-based conceptual processing mechanism, L2 learners may be more likely to fall back on literal meanings of figurative pragmatic units in the course of their processing. A number of studies not directly concerned with on-line processing issues but rather with strategies of coping with L2 idioms have also emphasized the importance of literal meanings, either of L2 idiom components themselves or of their L1 translation equivalents (see, for example, Irujo 1986; Bortfeld 2002; Charteris-Black 2002).

Joint implications stemming from the review of L1 idiom processing literature and the L2 studies seem to converge on a number of issues. First of all, it appears necessary to acknowledge that both literal and figurative senses become simultaneously activated on-line in the course of idiom comprehension. Secondly, it is very likely that processing patterns demonstrated for native language speakers will diverge from those obtained for second language learners. Given the importance of literal meanings in the processing of L2 idioms reported in some L2 idiom studies and the fact that L2 learners customarily acquire literal meanings of second language vocabulary items long before they learn their figurative meanings in fixed phrases, it will be assumed here that it is literal meanings that enjoy a more salient status than figurative ones during on-line processing of idiomatic phrases by second language learners. The study reported in the remainder of this paper was designed to test this assumption.

3. The Study

The study tested the degree to which literal and figurative senses of L2 idioms become activated, and consequently either retained or suppressed, in the course of their processing by second language learners when these idioms are embedded in literal and figurative discourse. To measure the amount of

activation and suppression of literal and figurative meanings of idioms, a word fragment completion test was carried out with a group of advanced Polish learners of English. In a word fragment completion task, participants are presented with a fragmented word (such as *h-t*) and are asked to complete the word with the first word that comes to mind. The task has been employed extensively in the psycholinguistic literature as a measure of implicit memory test (see, for example, Srinivas & Roediger 1990; Smith 1991; Challis & Brodbeck 1992; Roediger; Weldon; Stadler; & Riegler 1992; Rajaram; Srinivas; & Roediger 1998; Schonpflug 2000), because it measures the amount of activation or retention of the previously processed stimulus by asking subjects to perform a task seemingly unrelated to a prior phase of the experiment. When subjects' performance on studied items surpasses that on newly encountered items, retention is documented, and it is ascribed to priming.

For the purpose of the idiom experiment described here, the variant of the word fragment completion task developed by Giora and Fein (1999) was employed. In this variant, idiomatic targets are embedded in literally and figuratively biased contexts, which favor either their literal or figurative interpretations. For each context, the idiomatic target sentence occurs at the end. Upon reading the short story context with the target idiom, participants are presented with two fragmented words (such as *c-a-r* and *t-b-e*) and are asked to complete one of the words with the first word that comes to mind. One of the fragmented words is related to the literal and the other to the figurative meaning of the target idiom, so analyzing participants' responses enables assessing the activation (and suppression) of different meanings in the course of idiom processing.

Recently Gibbs (2002) has criticized studies tapping the activation of literal and figurative senses of idiomatic expressions, suggesting that such studies confuse word vs. phrasal meaning with literal vs. figurative. This is so because the literal target in such studies is most often associated with the meaning of only one (usually last) word of the idiomatic expression, whereas the idiomatic target is related to the phrase's overall metaphoric meaning. As Gibbs (2002: 465) rightly observes, this confusion "makes it difficult to conclude anything about the time-course under which literal meanings of an entire sentence are activated compared to figurative meanings of these expressions".

Bearing these crucial observations in mind, a careful attempt will be made in this article to avoid drawing unwarranted conclusions from the results of the word fragment completion test described here. First of all, it is acknowledged that literal and idiomatic targets employed in the experiment do indeed reflect two different levels of meaning (i.e., word versus phrase). Hence, successful completion of literal targets will not be taken to imply that literal meaning of an entire idiom sequence has been activated, but merely that the word-level sense of one of idiom constituents must have been accessed. Secondly, no claim will be made as to whether the activation of one or the other kind of meaning is indicative of distinct linguistic processes. Thus the fact that the two types of meaning are labeled here as "literal" and "idiomatic" does not

entail the assumption that those meanings result from the operation of completely different language processing mechanisms. The only valid conclusion that can be drawn from the word fragment completion test is whether, following the comprehension of an idiomatic sequence, it is primarily word-level meaning related to the literal reading of one of the idiom's constituents or rather phrase-level meaning reflecting the idiom's metaphoric reading that will be activated to a larger extent. Predominance of what has been labeled as "literal target" completions will thus merely indicate that individual meanings of idiom constituent words have been activated more strongly than the metaphoric meaning of the overall phrase. On the other hand, predominance of "idiomatic target" completions will indicate that it is primarily the phrase-level, figurative meaning of the entire idiomatic expression, rather than literal senses of individual words, that remains more active once the idiom has been processed. It is with this understanding that the terms "literal" and "figurative" meanings will be used throughout this paper.

In addition, given the fact that the word fragment completion task essentially taps post-access stages of lexical processing, it should be emphasized at this point that the word fragment completion task can merely be taken as indicative of the degree of retention of idioms' various meanings. Since, however, retention can only be evidenced if it follows an earlier activation process, analyzing the data obtained in the word fragment completion task can indirectly speak to the varying activation patterns of various types of meanings of idiomatic phrases. Detecting on-line availability of different senses of figurative expressions would require a more sensitive on-line measure. It is with these terminological and methodological assumptions that the experiment reported in the subsequent sections is described and interpreted.

3.1. Research predictions

Research predictions formulated for L2 learners' performance on the word fragment completion task directly reflect the assumption of primacy of literal (word-level) over figurative (phrase-level) meaning and the resulting higher-salience status of literal meanings in the course of L2 idiom processing. This assumption draws on the importance of literal meanings in the processing of figurative language by second language learners demonstrated in a few L2 idiom studies (see review in the previous section) and is consistent with a more general L2 idiom comprehension model that I have proposed elsewhere (Cieślicka 2004). Given a higher salience status of literal over figurative meanings assumed here, the word fragment completion task should yield an overall greater number of literal than idiomatic responses. The higher salience of literal meanings will also imply that, even if the context-irrelevant senses become suppressed by the language processing mechanism, the literal meanings will remain more active in the incompatible idiomatic context than the idiomatic meanings in the incompatible literal context.

Given these considerations, the following scenario can be predicted for processing idioms embedded in the literal and idiomatic discourse: for idioms

embedded in the literal-biasing context, both literal meanings of idiom component words and the phrase-level figurative sense become initially fully and exhaustively accessed. Given the salience priority of literal over figurative senses, however, the activation of literal senses exceeds that of the figurative senses. This initial, context-independent access is followed by the subsequent integration of the contextually appropriate literal meaning and the suppression of context-irrelevant, idiomatic sense. Since the idiomatic meaning, on account of its lower salience status, has been initially activated more weakly than the literal senses of idiom constituent words, its subsequent suppression results in a very low activation level of the idiomatic meaning towards the end of idiom processing. Consequently, a post-perceptual task like word fragment completion should demonstrate the substantial activation of literal and negligent or nonexistent activation of idiomatic meanings for idioms embedded in the literal context.

In turn, for idioms embedded in the idiomatic-biasing context, processing predictions are different. Since the literal meaning is incompatible with context, it will become suppressed by the language processing mechanism. However, given the fact that literal meanings were initially more active than idiomatic meanings on account of their higher salience status, this suppression does not bring the activation level of literal meanings of idiom constituents down to zero. In addition, and following Giora and Fein (1999), since the literal meaning of idiom component words should not interfere with the idiomatic interpretation, because, as in metaphors, it might be instrumental in construction of the nonliteral meaning, it need not be suppressed. Instead, literal meanings of idiom constituents remain active even after the context-relevant phrase-level idiomatic meaning has been selected and integrated into the developing interpretation of the discourse. Consequently, the word fragment completion task should reveal substantial activation of contextually incompatible literal meanings, along with the activation of contextually compatible idiomatic meanings for idioms embedded in the idiomatic context. Taking both scenarios into account and translating their predictions into results of the word fragment completion task, we should expect considerably more incompatible (literal) responses in the idiomatic context than incompatible (idiomatic) responses in the literal context.

In sum, the present study is designed to test the following predictions: (1) Activation of literal meanings should be greater than activation of idiomatic meanings. Thus, the overall number of literal responses should exceed that of the idiomatic responses. (2) The number of incompatible (literal) responses obtained in the idiomatic context should be greater than the number of incompatible (idiomatic) responses obtained in the literal context.

4. Method

4.1. Participants

A total of forty 3rd year students of English Philology (20 female and 10 male, aged 22-24), all studying at the School of English, Adam Mickiewicz University, Poznań, Poland, agreed to participate in the experiment. They were all advanced learners of English, who had successfully passed their Practical English Examination administered at the end of Year 2 and were located between the advanced and proficiency levels of second language competence, as defined by the University of Cambridge Local Examinations Syndicate. The data were collected on four separate occasions at the time where regular classes for the groups were scheduled at the School of English. The experiment thus constituted part of the students' class assignments.

4.2. Design

A 2 x 2 factorial ANOVA was used, with context type (literal or idiomatic) and response type (literal or idiomatic fragment completion) as within-subject factors.

4.3. Materials: Idiom targets and contexts

Twenty-nine English idioms were selected for the word fragment completion task. Those idioms were all ambiguous, in that they could be interpreted either literally or figuratively (e.g., *skate on thin ice*). For each idiom, two short story contexts, consisting of a few sentences, were prepared. While one context was biased toward the figurative interpretation of the target idiom, the other was biased toward its literal reading. The target idiom was embedded in the sentence and occurred at the end of the story. Overall, 58 short story contexts were prepared, 29 of which were idiomatic contexts and 29 literal. Examples of target idiomatic sentences along with their idiomatic and literal contexts are presented in Appendix 1.

4.4. Materials: Test words

For each idiom target, two test words were prepared, one of which was related to the idiom's figurative meaning, whereas the other to the literal meaning of the last word of the idiom. The literal target words were drawn from Postman and Keppel's (1970) word association norms and further verified in an independent word association experiment with 20 native speakers of English, so they all represented words associated semantically to the literal meaning of the last word of the idiom.

In turn, idiomatically related targets were elicited from 10 native speakers of English and 10 fluent Polish speakers of English, who were presented with a list of idioms and asked to provide one word for each idiom which best captured its figurative meaning and which first came to mind. The most frequent response was selected for inclusion in the experimental materials. A complete list of the literally and idiomatically related target words accompanying each idiom is presented in Appendix 2. The target words were subsequently fragmented, i.e., every other letter following the first one was removed and replaced with a hyphen.

4.5. Experimental booklets

For the purpose of the experiment, booklets were prepared, consisting of short story contexts printed one on each page, and two fragmented literal and idiomatic targets printed on the following page. Each booklet contained 29 stories, one for each idiom, so that each participant saw the same idiom only once. Among the 29 stories, 14 (or 15) biased the literal meaning of the idiom, and the remaining 15 (or 14) biased the figurative meaning of the idiom. For example, for one booklet, 14 target idioms were set in the literal context and 15 target idioms were set in the idiomatic context. For another, 15 idioms were biased literally while 14 were biased figuratively. Thus, each participant read only one context for a given target idiom. The contexts were ordered randomly within each of the forty booklets prepared.

The fragmented words, one related to the literal and the other to the figurative meaning of the idiom, were printed on the page following each story context. Their layout on the page was varied, so that, for half the words, the literally related target was printed in the line above the figuratively related target, while for the other half, their position on the page was reversed (the literal target was printed below the figurative target).

4.6. Pretesting of materials

To get baseline rates for the fragmented words employed in the word fragment completion test, the words were tested for their salience out of context. Twenty-five students who did not participate in the experiment were presented with booklets containing pairs of the fragmented stimulus words. These words were arranged in the same order as in the experimental booklets. Participants were all 3rd year students studying at the School of English, Adam Mickiewicz University, Poznań, Poland. Nineteen of them were female and 6 male, and their age ranged from 22-24. They participated in the baseline study as part of their class assignment. The students were instructed to complete the fragmented words with the first words that came to mind. They were also encouraged to work quickly and not to go back to the words which they originally could not complete. The session took about 15 minutes.

4.7. Procedure

Participants were tested in four groups, which consisted, respectively, of 11, 8, 12, and 9 students. The task was administered during a regular class scheduled for each group. At the beginning of the test, the experimenter informed the students that they were about to participate in the test whose purpose was to probe their English language skills connected with reading comprehension and filling in gapped words. To familiarize participants with the nature of the word fragment completion task, the experimenter displayed three posters in turn, each of which contained two fragmented words. The students were asked to look at the two words printed on the poster and say which of the two they could

complete first. They were then told that they were going to do a similar task, consisting in completing only one of the two fragmented words with the first word that came to mind.

The experimental booklets were then distributed in random order, each of which was coded with a different number and letter combination (e.g., A2). The students were asked to work through the booklets quickly, page after page. They were told to read the short text once, rapidly, but in a way that would ensure they comprehend it and then to turn over the page, look at the two fragmented words and complete one of them, the first they could solve. In case they forgot and filled both the words accidentally, they were instructed to write “1” next to the word they completed first and “2” next to the word which they completed second. The participants were not allowed to go back to the text or to the words once they completed them. Each of the four sessions took from 20 to 25 minutes.

Once the participants completed the booklets and the booklets were collected from them, the experimenter distributed post-test questionnaires, coded identically for each subject as the code of the booklet he or she had just worked through. The questionnaire contained a list of the idiomatic expressions that participants had just encountered in the booklets. The students were asked to tick those idioms with which they were familiar prior to encountering them in the experimental booklets. They were also asked to put a question mark next to the idioms whose meanings they were not sure or which they did not know at all. The questionnaires were next collected and attached to the booklets for further analysis.

5. Results

Four idioms were discarded from the subsequent analysis because of the problems discovered in the contexts or target words. The target words for these four idioms were also discarded from the analysis of pretest baseline results.

5.1. Pretest baseline results

Participants’ responses to the fragmented words presented in isolation were analyzed and categorized as either idiomatically or literally related to the target idioms. The experimenter’s categorization was confirmed by two independent judges who individually evaluated the responses for their relatedness either to the idiomatic or literal meanings of the target idiomatic sentences. A response was classified as related to the idiomatic meaning of the target sentence if it was an intended word or a word bearing a clear idiomatic relation to the idiomatic meaning of the target sentence. In turn, a response was classified as literal if it was an intended word or a word bearing a clear relation to the literal meaning of one of the constituents of the idiomatic sentence. For example, the two fragmented words for the idiomatic sentence, *But when Joe started coming back home as late as two or three in the morning, his father had to put his foot down,* were *i-s-* (*insist*) and *s-o-* (*shoe*). If the two words were filled correctly, the

first response (*insist*) was classified as idiomatic and the second (*shoe*) as literal. If the fragmented word *s-o-* was completed as *stop*, then this response was categorized as idiomatic, since it is related to the figurative sense of the idiom *put one's foot down*. The overwhelming majority (99%) of the responses classified as literal and idiomatic were actually the intended words. Incomplete responses and responses unrelated to either context were classified as unrelated and were not entered into the subsequent data analysis. The Interrater agreement rate was 100%.

The idiomatically and literally-related responses obtained in the baseline condition were next compared for their salience out of context, to ensure that any differences in the completion of either literal or idiomatic targets manifested in the contextually-embedded word fragment completion test were due to the contextual bias rather than to the inherent properties of the test words themselves. The percentage of successfully completed idiomatic responses in the baseline condition was 11.8%; whereas the corresponding percentage of the completed literal responses was 9.65%. These results were submitted to a t-test which revealed that the number of correctly completed idiomatic responses did not differ significantly from the number of correctly completed literal responses ($t(24) = -1.16, p > 0.05$), indicating that the test words were similarly salient out of context.

5.2. Word fragment completion test results

From each booklet, responses provided to the idioms with which a given participant was unfamiliar, as determined from the post-test questionnaire, were eliminated from further analysis. Such responses accounted for 2.2% of the overall responses elicited for the 25 idioms in the word fragment completion booklets. Responses obtained for familiar idioms were subsequently categorized as either idiomatically or literally related to the stimulus idioms, as in the pretest described above. Categorization of the responses carried out by the experimenter was confirmed by an independent judge, whose agreement rate with the experimenter reached 100%.

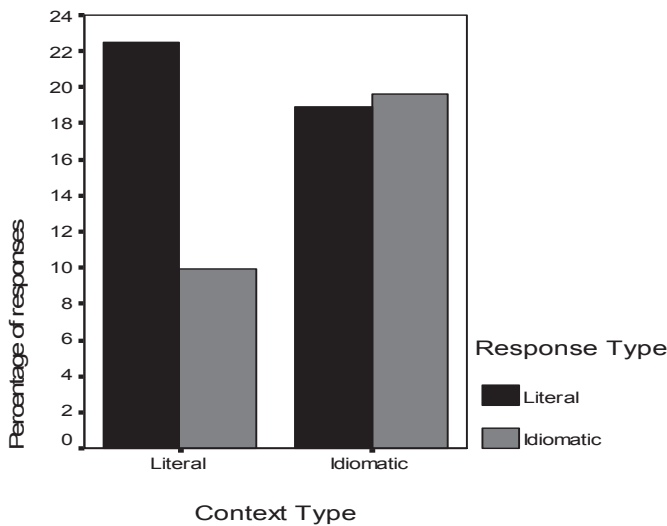
The data were subsequently converted to percentages and subjected to a 2 x 2 ANOVA with Context Type and Response Type as within-subject variables, to see if the obtained patterns confirmed the research predictions formulated earlier. The percentages of correct literal and idiomatic completions following literal and figurative discourse contexts are summarized in Table 1.

Table 1 Percentage of idiomatic and literal responses obtained in both context types

	Idiomatic Context	Literal Context	Total
Idiomatic Responses	19.6	9.9	29.5
Literal Responses	18.4	22.5%	40.9

The ANOVA revealed a significant two-way interaction between context type and response type, $F(1, 24) = 22.93, p < .0001$, indicating that, overall, the contextual manipulation was effective. There were no main effects of either context type, $F(1, 24) = 1.30, p > .05$, or response type, $F(1, 24) = 1.82, p > .05$. Although the overall number of literal completions (40.9%) did exceed the number of idiomatic completions (29.5%), in accordance with research prediction (1), the difference failed to reach statistical significance, as demonstrated in the ANOVA. The interaction between the type of context and the obtained word fragment completion responses is illustrated in Figure 1.

Figure 1 Literal and idiomatic completions elicited in a literal and figurative bias context



Literal context elicited significantly more literal (22.5%) than idiomatic (9.9%) word fragment completions ($t(24) = -4.66, p < .0001$), whereas idiomatic context resulted in a comparable percentage of literal (18.4%) and idiomatic (19.6%) completions ($t(24) = 1.06, p > .05$), suggesting that literal meanings were, overall, more highly activated, irrespective of contextual bias. Across context comparisons revealed that significantly more idiomatic completions followed an idiomatic (19.6%) than a literal (9.9%) biasing context ($t(24) = -4.05, p < .0001$), and that the percentage of literal completions (22.5%) following a literal bias context was not statistically different from the percentage of literal completions (18.4%) following a figurative bias context ($t(24) = 1.91, p > .05$).

These data speak to the relevance of the research prediction (2) claiming that incompatible literal meanings should be more active in the idiomatic context than incompatible idiomatic meanings in the literal context. As shown in Figure 1, literal meanings (represented by black bars) were retained more substantially

in the incompatible idiomatic context than idiomatic meanings (represented by grey bars) in the incompatible literal context. The percentage of the incompatible idiomatic responses (9.9%) completed in the literal context was significantly smaller than the percentage of the incompatible literal responses (18.4%) completed in the idiomatic context ($t(24) = -2.80, p < .05$). Thus, while literal meanings of idiom constituents appear to be active even in contexts biasing those idioms' figurative meanings, it seems that figurative meanings do not become equally strongly activated in contexts in which idioms are used literally. While figurative meanings may in such incompatible literal contexts become initially accessed automatically, their activation may be relatively weak and they seem to get quickly suppressed, as evidenced by participants' performance on the post-perceptual word fragment completion task.

6. General Discussion

All in all, results obtained in the word fragment completion task broadly support research predictions put forward in this study. Consistent with research prediction (1) and the literal salience priority postulated for L2 idiom processing, the percentage of correct literal completions turned out to exceed that of the idiomatic completions. In the absence of the main effect of response type shown in the ANOVA, however, it cannot be claimed that research prediction (1) was statistically confirmed. Nevertheless, the overall advantage of literal over idiomatic responses seems to indicate that, even for highly familiar L2 idiomatic expressions, whose figurative sense might have become well-established in the learners' mental dictionaries, literal meanings of such idioms' constituents may still enjoy a higher salience status in processing than the well-established idiomatic meanings. In accordance with research prediction (2), the percentage of incompatible (literal) responses obtained in the idiomatic short story contexts was found to be significantly greater than the percentage of incompatible (idiomatic) responses obtained in the literal contexts.

While the obtained results provide some support for research predictions formulated at the beginning of this paper, the off-line, post-perceptual nature of the word fragment completion task precludes unambiguous verification of all the monolingual idiom processing models proposed in the figurative language literature. The demonstrated retention of literal meanings of idiom component words in phrases used figuratively is incompatible with the direct access model (Gibbs 1980; 1986), under which literal senses of words making up familiar idiomatic expressions should not be activated at all. Likewise, the idiom list hypothesis (Bobrow & Bell 1973), which predicts that literal analysis must be rejected as inappropriate before the idiom's figurative meaning can be accessed, would fail in accommodating the obtained results. If the idiom list hypothesis were a correct account of L2 idiom processing then no activation of literal senses should be found for idioms biased figuratively. This is so because, in accordance with Bobrow and Bell's model, literal analysis should be rejected as

inappropriate and hence no longer accessible in the post-perceptual task like word fragment completion.

The third model developed within the noncompositional tradition, the simultaneous processing model (Swinney & Cutler 1979), cannot be unambiguously verified, given the nature of the data and the vagueness of the model's predictions. The model claims simultaneous computations of both the literal and figurative meanings of idioms, without however, specifying what the fate of the activated literal meanings is once the figurative meaning has been directly retrieved from the mental lexicon. Thus, the demonstrated activation of incompatible literal meanings in the figurative biasing context cannot be interpreted as either favoring or disproving the simultaneous processing model.

Turning now to the compositional accounts of idiom processing, it seems that the results obtained in the word fragment completion task for advanced L2 learners are broadly compatible with all the three models developed within the compositional strand. Thus, in accordance with Gibbs et al.'s (1989) idiom decomposition model, individual components of L2 idioms' meanings were demonstrated to actively participate in the construction of the idioms' overall figurative interpretations. With regard to the configuration model, specifically emphasizing the role of literal meanings in constructing idioms' figurative interpretations (Cacciari & Tabossi 1988; Cacciari & Glucksberg 1991; Titone & Connine 1994), the obtained data likewise broadly agree with the model, in that both literal and figurative senses of the target idioms were shown to be activated. The word fragment completion results are, however, inconsistent with the earlier version of the configuration hypothesis, which claimed termination of the literal processing of the idiomatic string upon retrieving its idiomatic meaning from the lexicon (see Cacciari & Tabossi 1988). Had literal analysis been terminated upon retrieving the idioms' figurative meanings, no incompatible literal responses should have been elicited in the word fragment completion task from advanced L2 learners. The demonstrated activation of literal meanings of figuratively biased idioms is, however, compatible with the modified version of the configuration hypothesis, developed by Titone and Connine (1994). On this view, literal meanings of idiom components remain activated even after the idiom's figurative meaning has been retrieved from the lexicon, provided they are potentially useful to a higher-level representation of the phrase's meaning, as when the literal interpretation of the idiom is plausible. If, however, the idiomatic phrase is literally implausible, literal meanings are suppressed, as they are of no relevance for further processing. Since the L2 idiom targets employed in the word fragment completion task were all literally plausible, the obtained activation of literal meanings is consistent with Titone and Connine's claims. Verifying whether the comparable activation would not obtain for literally implausible idioms, however, is impossible with the stimulus materials employed in the experiment.

Turning now to Glucksberg's (1993; 2001) Phrase-Induced Polysemy model of idiom processing, its most relevant assumption from the point of view of our data is the claim that all idiomatic expressions, regardless of their

compositionality, are automatically analyzed literally. This claim is consistent with the results obtained on the word fragment completion task. However, Glucksberg's model, similarly to Swinney and Cutler's (1979) proposal, leaves unaddressed the issue of what happens to the activated literal meanings once the idiom's overall figurative meaning has been retrieved from the lexicon. Thus, the observed activation of incompatible literal senses in contexts biasing the figurative reading of L2 idioms cannot really be interpreted against Glucksberg's proposal.

With regard to hybrid approaches put forward for L1 idiom processing, the data obtained for L2 learners in the word fragment completion experiment can again be cautiously viewed as broadly compatible with some of the general tenets of these models. Verification of the remaining postulates of the hybrid models would call for a more sensitive, on-line measure. Beginning with Titone and Connine's (1999) hybrid proposal, it assumes, as has been mentioned in the introduction to this paper, that idioms behave both noncompositionally and compositionally. While conventional, highly overlearned idiom phrases are processed by retrieving their idiomatic meaning directly from the lexicon, prior to the literal analysis of the entire phrase, with compositional idioms, retrieval of their figurative meanings is simultaneous with a literal analysis of their individual components. Since verifying the hybrid model's postulate concerning processing differences between conventional and compositional idioms would require an on-line task, results obtained on the word fragment test cannot be interpreted against this proposal.

As far as the second hybrid account of idioms is concerned, namely, Giora's (1997) graded salience hypothesis, the L2 learners' performance documented in the word fragment completion experiment confirms Giora's postulate that salient meanings enjoy processing priority. In accordance with the retention hypothesis, contextually inappropriate literal meanings, which are conducive to the construction of figurative interpretations, are retained. This hypothesis has been clearly confirmed by the word fragment completion data, which demonstrated a substantial activation of contextually inappropriate literal meanings of idiom component words embedded in figuratively biasing contexts.

With respect to the processing of L1 idioms, the graded salience hypothesis predicts that, for familiar expressions, figurative senses are more salient than their literal meanings; the view quite opposite to the one adopted here, which postulates literal priority for all kinds of L2 idioms, be they familiar or unfamiliar. One consequence of Giora's assumption concerning familiar idioms is that processing such idioms in the figurative biasing context will evoke their salient idiomatic meanings almost exclusively, with very little simultaneous activation of the less salient and contextually incompatible literal meanings. Hence, by the end of the phrase, hardly any activation of the literal meaning should be obtained, the prediction quite contrary to the word fragment completion results obtained for our L2 learners, which demonstrated robust activation of literal meanings in the figurative contexts. As the L2 target idioms analyzed in the word fragment completion experiment were familiar to the

learners, verifying further predictions of Giora's model, concerning processing differences between familiar and less familiar idioms, is not possible.

It appears from the foregoing that, whereas some predictions of the models postulated for L1 idiom processing seem to hold for the processing of idioms by second language learners, others fail in accounting for the observed data. To further investigate the issue of the activation of various types of idiom meanings, as well as to develop a comprehensive model capable of accounting for second language idiom processing, more sensitive on-line research should be conducted, which could help unravel the mysteries of idioms in second language learning.

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Appendix 1: Examples of idioms used in the word fragment completion task, along with their literal and idiomatic-biasing contexts.

Idiom	Literal Context	Idiomatic Context
TAKE THE BULL BY THE	<i>A farmer showing his herd to a friend complained about</i>	<i>Peter told his friend: "I don't have the qualifications. I'm</i>

HORNS	<p><i>one bull: "This is the most stubborn bull I have ever had. When we go back from the pasture at the end of the day, all the cows and bulls go obediently to the barn, but he just stops at the gate and refuses to get inside. The friend advised: "You have to take the bull by the horns!"</i></p>	<p><i>probably too young. But I know I can do the job better than anyone. Do you think I should apply or am I wasting my time? "His friend answered: "If you don't take risks, life passes you by. You have to take the bull by the horns!"</i></p>
HAVE/GET COLD FEET	<p><i>I missed the bus and I was standing at the bus stop for over an hour to catch another one. It was freezing cold and I wasn't dressed up warmly enough. I didn't have my winter boots, so very soon I got cold feet.</i></p>	<p><i>"The poor girl was left standing there at the altar! Why didn't you come? Your parents and your future parents-in-law were shocked!"</i></p> <p><i>"I thought about it and decided I just wasn't ready to get married. At the last minute, I got cold feet."</i></p>
LET THE CAT OUT OF THE BAG	<p><i>On the way back home from the shopping mall, Susan found a little kitten. She put the kitten into her grocery bag to carry it home and feed it, as it looked feeble and hungry. When she was inside her apartment, Susan gently let the cat out of the bag.</i></p>	<p><i>Susan arranged a surprise party for her husband's birthday. Only a couple of friends who got invited to the party knew about it. One of them worked with Susan's husband in the same office. Just a few hours before the party he accidentally brought the topic in front of Susan's husband. He spoiled the whole surprise by letting the cat out of the bag.</i></p>
KICK THE BUCKET	<p><i>They were arguing, as usual, over who should clean the apartment. Sue was accusing her husband that he never did his share of work. Furious, she dipped the mop in the bucket and splashed water all over her husband's new jacket. He started shouting at her and calling her names and finally kicked the bucket towards her.</i></p>	<p><i>"The guy was a shooting star! And he looked so young and strong that the news of his unexpected heart attack took everybody by surprise!"</i></p> <p><i>"That's true! Nobody expected that a thirty-year-old bodybuilder would kick the bucket!"</i></p>
PULL SB'S LEG	<p><i>... Tony was taken to hospital. The doctors examined him and X-rayed his legs, as they suspected that Tony had broken his knee. During the examination,</i></p>	<p><i>"Tony thinks I've got no taste in clothes. He says I'm ten years out of date and I look old-fashioned."</i></p> <p><i>"Don't take him too seriously."</i></p>

PULL YOUR SOCKS UP	<i>the doctor told Tony: "Tell me when you feel pain, as I touch your knee. Now I am going to pull your leg."</i>	<i>He's only pulling your leg!"</i>
	<i>The central heating in our house broke down and we spent the night shaking with cold. We cuddled together and covered ourselves with blankets, but we still felt cold. Mother told us to put on warm turtleneck sweaters and to pull our socks up.</i>	<i>The history teacher was very disappointed with one of his students' work. The student kept missing classes and never submitted any homework assignment on time. The teacher asked his student to come to his office and said: "You're going to fail this course unless you pull your socks up".</i>

Appendix 2 : Idioms used in the word fragment completion experiment, along with the idiomatically and literally related words fragmented in the booklets.

IDIOM	IDIOMATIC TARGET	LITERAL TARGET
<i>take the bull by the horns</i>	CONTROL	ANTLERS
<i>bury the hatchet</i>	FORGIVE	AXE
<i>have/get cold feet</i>	NERVOUS	TOES
<i>tie the knot</i>	MARRY	ROPE
<i>let the cat out of the bag</i>	TELL	PLASTIC
<i>below the belt</i>	UNFAIR	PANTS
<i>wear the pants</i>	BOSS	TROUSERS
<i>kick the bucket</i>	DIE	BASKET
<i>a piece of cake</i>	EASY	DESSERT
<i>cover up one's tracks</i>	HIDE	TRAIN
<i>lose one's grip</i>	FAIL	TIGHT
<i>play with fire</i>	RISK	LIGHT
<i>paint the town</i>	PARTY	CITY
<i>save one's skin</i>	RESCUE	SMOOTH
<i>seal the fate</i>	DOOM	FORTUNE
<i>shut one's trap</i>	SILENT	DOOR
<i>steal the show</i>	ATTENTION	PARTY
<i>take a back seat</i>	DELEGATE	CHAIR
<i>throw sb to the wolves</i>	BETRAY	FOREST
<i>turn back the clock</i>	REVERSE	TIME
<i>waste one's breath</i>	SPEAK	AIR
<i>put one's foot down</i>	INSIST	SHOE
<i>have your hands full</i>	BUSY	EMPTY
<i>lift a finger</i>	HELP	HAND
<i>burn the candle at both ends</i>	TIRED	BEGINNINGS
<i>rock the boat</i>	UPSET	SEA
<i>skate on thin ice</i>	TROUBLE	COLD
<i>pull sb's leg</i>	JOKE	ARM
<i>pull your socks up</i>	IMPROVE	DOWN