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Journal of Pragmatics 31 (1999) 1601–1618

journal of PRAGMATICS

www.elsevier.nl/locate/pragma

On understanding familiar and less-familiar figurative language☆

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Abstract

Findings of three experiments are consistent with the graded salience hypothesis (Giora, 1997), according to which salient meanings should be processed initially before less salient meanings are activated. A meaning of a word or an expression is considered salient if it can be retrieved directly from the mental lexicon. According to the graded salience hypothesis, processing familiar metaphors (which have at least two salient interpretations – the literal and the metaphoric) should involve activation of both their metaphoric and literal meanings, regardless of the type of context in which they are embedded. Processing less familiar metaphors (which have only one salient meaning – the literal) should activate the literal meaning in both types of contexts; however, in the literally biased context, it should be the only one activated. Processing familiar idioms in a context biased towards the idiomatic meaning should evoke their figurative meaning almost exclusively, because their figurative meaning is much more salient than their literal meaning. However, processing less familiar idioms in an idiomatic context should activate both their literal and idiomatic meanings, because both meanings enjoy similar salience status. In a literally biased context, familiar idioms should evoke their more salient idiomatic meaning to a greater extent than less familiar idioms. A word fragment completion test was used to measure the amount of activation of literal and figurative meanings in both literally and figuratively biased contexts. Subjects were presented with 'target sentences' (metaphors or idioms) at the end of either figuratively or literally biased contexts. They were asked to complete fragmented words (such as t_b_e) with the first word that came to mind. The target words were related to either the figurative or the literal meaning of the target sentence, so that activation of the

☆ This research was supported by grants from Tel Aviv University Basic Research Fund and The Israel Science Foundation to the first author. We would like to thank research assistant Shirli Kahanovich for comments and help in running Experiment 1, and the students of Levinsky College, Bahani Ofra, Ben-David Levkovits Madi, Dekel Zipora, Faglin Daliah, Jakobson Zohar, Levi-Ya'akobovits Limor, Zionit Iris for running Experiment 3 and the experiments mentioned in note 2. Thanks are also due to Mira Ariel, Richard P. Honeck, Bob Lubow, Yeshayahu Shen and Debrah Titone for their comments on an earlier version.

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PII: S0378-2166(99)00006-5

different meanings could be assessed. Findings reveal that, contrary to current beliefs, metaphor interpretation involves processing the literal meaning. They further reveal that metaphor and literal interpretations do not involve equivalent processes.

Keywords: Salience; Familiar; Metaphor; Idiom; Figurative language; Literal language

1. Introduction

In a previous study, Giora (1997) proposed that the direct/sequential-process debate on how meaning is processed can be reconciled if one considers the type of utterance one is dealing with. Reviewing and reanalyzing a number of studies on literal and figurative language, Giora showed that meaning salience determines the type of processing invoked. According to the graded salience hypothesis, highly salient meanings should be processed initially. Among other things, this means that alternative interpretations of similar salience should be processed in parallel, whereas less salient meanings should be evoked after more salient meanings have been activated.

According to Giora (1997), the consensual beliefs among contemporary psycholinguists and cognitive psychologists that literal and nonliteral language involve equivalent processes (e.g., Ortony et al., 1978; Glucksberg et al., 1982; Gildea and Glucksberg, 1983; Gibbs and Gerrig, 1989; Glucksberg, 1989; Keysar, 1989, 1994), and that processing nonliteral language does not necessitate processing the surface literal meaning first (e.g., Gibbs, 1980, 1984), hold only when salient (e.g., conventional, familiar, frequent etc.) figurative meanings are intended. For example, when highly conventional idioms are used idiomatically, their more salient, figurative meaning is processed directly, without first analyzing the surface literal meaning (Gibbs, 1980). Similarly, when alternative meanings are similarly salient, as is the case of the literal and metaphoric meanings of familiar metaphors, both meanings are processed initially (Blasko and Connine, 1993). In contrast, sequential processing, where (as assumed by the traditional theorists) the literal meaning is processed first (e.g., Grice, 1975; Searle, 1979), applies when language is used innovatively, as in the case of novel metaphors (Blasko and Connine, 1993), novel uses of highly conventional referring expressions (Gerrig, 1989; Gibbs, 1990), or literal uses of highly conventional idioms (Gibbs, 1980). The graded salience hypothesis, thus, enables the reconciliation of views that until now have been in conflict.

This study aims at testing the predictions of the graded salience hypothesis by examining salient and less salient figurative language. A linguistic expression is considered salient when its interpretation can be computed directly from the lexical meanings automatically associated with entries, before any extra inferences based on contextual assumptions have been derived (for a more detailed discussion of the notion of salience see Giora, 1997). According to this view, familiar metaphors have at least two salient interpretations: the literal and the metaphoric. Less familiar metaphors, however, have only one salient meaning – the literal.

According to the graded salience hypothesis, processing familiar metaphors should involve activation of both their metaphoric and literal meanings initially, regardless of contextual bias. Thus, processing a familiar metaphor such as *step on somebody's toes* should activate both its literal (e.g., foot) and figurative (e.g., offend) concepts in the context in which it is intended metaphorically, and in the context in which it is intended literally. Processing less familiar metaphors (e.g., 1b) should activate the literal meaning in both types of contexts. However, in the literally biased context (e.g., 2), it should be the only one activated:

(1) a: My husband is terribly annoyed by his new boss. Every day he comes home even more depressed than he had been the day before. Somehow, he cannot adjust himself to the new situation.
b: *Their bone density is not like ours.*
(2) Our granny had a fracture from just falling off a chair and was rushed to the hospital. I told my sister I never had fractions falling off a chair. She explained to me about elders. She said: *Their bone density is not like ours.*

2. On understanding familiar and less-familiar metaphors

According to the graded salience hypothesis, understanding familiar metaphors need not take longer than understanding their literal interpretation, because familiar metaphors are expected to activate both their literal and metaphorical meanings initially, regardless of contextual information. Note that the predictions of the graded salience hypothesis and the equivalence processing hypothesis regarding processing times of familiar metaphors may look the same. However, the hypothesis that the metaphoric meaning should be evoked in the both the metaphoric *and* the literally biasing contexts has never been specified nor tested before (see later). In contrast, less familiar or novel metaphors (e.g., 1) are expected to take longer to read than their literal equivalents (e.g., 2), because novel metaphors should be interpreted initially only literally, having only one salient meaning – the literal meaning.

Actually, T-test reliability analysis (two tailed, paired) revealed that the familiar metaphors used in this study to attest to the different processes involved in salient and less salient interpretations took no longer to read (1.9403 sec.) than their literal interpretations (1.8162, p=0.4688). In contrast, novel metaphors took comprehenders significantly longer to read (3.025 sec.) than their literal uses (2.199, $p< 0.005$, Giora et al., in preparation).

The experiments in this study were designed to test the graded salience hypothesis by using word fragment completion tests. In a word fragment completion test, subjects are asked to complete a fragmented word (e.g., t_b_e) with the first word they can think of. This test is considered an implicit memory test because it measures activation/retention indirectly by having subjects perform a task ostensibly unrelated to a prior phase in the experiment (Graf and Schacter, 1985). Retention is indicated when performance on studied items exceeds that on new items, a phenomenon commonly referred to as priming. The word fragment (and word stem) completion test is con-

sidered by some memory researchers as perceptual (data-driven) in nature, because it is greatly affected by manipulation of such study conditions as modality (visual or auditory; see Blaxton, 1989; Roediger and Blaxton, 1987) and symbolic form (word or picture; Weldon et al., 1989). Other researchers, however, think that this test is conceptually-driven, or at least sensitive to both perceptual and semantic variables. Supporters of this view indicate that cross-modal priming does occur in the word fragment completion test (Blaxton, 1989; Roediger and Blaxton, 1987; Rajaram and Roediger, 1993; Weldon, 1991), and that semantic processing affects performance in this task (Bassili et al., 1989; Challis and Brodbeck, 1992; Hirshman et al., 1990; Smith, 1991; Weldon, 1991). However, most studies in this area involved direct priming, in which subjects are directly exposed to the to-be-tested stimulus (e.g., presented with the word 'table' and later on tested on 't_b_e'). We, on the other hand, are interested in indirect (semantic) priming, in which the subject is exposed to a stimulus semantically related to the target (e.g., the word 'chair' and test-word 't_b_e'). Research in this area has shown that mere presentation of target-related words did not produce priming in a word fragment completion test (Mandler et al., 1986; Roediger and Challis, 1992). However, semantic processing during a study phase (like reading behavioral descriptions, reading short stories or poems, category clustering) did produce indirect priming (Bassili, 1989; Bassili and Smith, 1986; Mandler et al., 1990; Overson and Mandler, 1987; Richards and French, 1991; Whitney et al., 1992). In our study, we presented subjects with short stories, ending with the target sentence (a metaphor), and tested completion of words related to either the literal or the metaphoric meaning of the target sentence. Since this procedure promotes semantic processing, we expected to be able to detect indirect semantic priming, resulting in different patterns of activation, according to the biased context.

2.1. Experiment 1

Experiment 1 tests the hypotheses related to processing familiar and less familiar metaphors. Regarding familiar metaphors, it aims to show that both the literal and metaphorical meanings of familiar metaphors should be activated in both types of context: in the context biasing the interpretation towards the literal meaning, and in the context biasing it towards the metaphoric meaning. Regarding less familiar metaphors, it aims to show that upon processing less-familiar and unfamiliar metaphors, the literal meaning of the metaphor in the metaphorically biased context should be activated and retained, while the metaphoric meaning in the literally biased context should not.

2.1.1. Method

Design. A 3x2x2 factorial design was used, with metaphor type (familiar/less-familiar/unfamiliar), discourse type (metaphorical/literal), and word type (metaphorically/literally related) as within-subject factors.

Subjects. The subjects were 40 undergraduate students of Tel Aviv University and Levinsky College (32 females and 8 males), aged 22–49. They participated in the experiment as part of their class assignments.

Texts. Thirty-six Hebrew metaphors ('target sentences') were selected for the experiment. Nine were unfamiliar, 9 were less-familiar, and 18 were highly familiar metaphors. The division was determined by a pre-test, to be described later. For each target sentence, two texts, a couple of sentences long, were prepared. One comprised a metaphorically biased context, in which the last clause, the target sentence, had a metaphorical interpretation. The other comprised a literally biased context, in which the last clause, the target sentence, had a literal interpretation. An example of both types is presented below for the target sentence, *Only now did they wake up*:

(3) a. The Saturday night party went on for hours. Drinks were poured, and we danced all night. We were probably less than inconsiderate when, the next evening, we called on our friends who had been partying with us. When they opened the door we realized: *Only now did they wake up.*
(Literally biasing context)
b. A bloody war has been going on in central Europe for a few years. Thousands of innocent women, men and children got massacred, and no one budged or lifted a finger. At last, a decision was made to intervene in the fights. *Only now did they wake up.*
(Metaphorically biasing context)

Materials. Two different booklets were prepared. Each contained 36 texts: 18 literal and 18 metaphorical context versions for the 36 target sentences. Thus, for one booklet 18 target sentences were set in a literally biasing context, while the other 18 target sentences were set in a metaphorically biasing context, so that each subject read only one (either literal or metaphorical) type of each target sentence. The texts were ordered randomly within each booklet. They were each printed on a separate page. Two incomplete (fragmented) Hebrew test words were printed on the next page. One test word was related to the literal meaning, and the other to the metaphorical meaning of the target sentence (e.g., *act* [*osim*] – the metaphorically related test word; *rise* [*kamim*] – the literally related test word for the target sentence *Only now did they wake up* in 3).

Pretesting of materials. (a) Metaphors: Twenty-five undergraduates of the department of Poetics and Comparative Literature, Tel Aviv University, were presented the 36 metaphors, in random order. They were asked to rate each metaphor for familiarity on a 7 point scale (1 = unfamiliar, 7 = highly familiar). A mean rating was computed for each metaphor. Nine metaphors (mean between 1–3) were classified as unfamiliar, 9 (mean between 3–5) were classified as less familiar, and 18 (mean between 5–7) were classified as familiar. (b) Test words: To get base-line rates, the test words were tested for their salience out of context. Twenty undergraduates of Tel-Aviv University, who did not participate in the experiment, were presented with booklets containing pairs of the fragmented words, arranged in the same order as in the experimental booklets. The subjects were instructed to complete the fragmented words with the first words that came to mind.

Procedure. The participants were tested in groups. The booklets were distributed in random order. The subjects were instructed to read the text once, rapidly, but in a

way that would enable them to understand it. Then, they were to turn over the page. They were not allowed to go back to the text. They were instructed to complete two fragmented words with the first words that came to mind. They were also reassured that we were not concerned with correct spelling, and that in fact there was more than a single correct response. The session took approximately 30 minutes.

2.1.2. Results

Three metaphors were discarded from the analysis, because we realized that the original test words could be related to both the literal and the metaphoric meanings of the target sentences. Of the 33 remaining metaphors, 18 were familiar, 7 were less familiar, and 8 were unfamiliar.

Pretest baseline results. Subjects' responses to the fragmented words presented out of context were analyzed. Two judges (a researcher and a research assistant) individually evaluated the responses for their relatedness either to the metaphoric or the literal meaning of the target sentence. A response was classified as either metaphorically or literally related if it was either the intended word, or related to one of the contexts. Incomplete responses and responses unrelated to either context were classified as unrelated, and were not analyzed. The judges agreed on 95% of the cases. Disagreements were resolved after a discussion.

The number of correct (either metaphorically or literally-related) responses obtained for each fragmented word served as base-line rates. Those base-line rates were submitted to a 3x2 analysis of variance (ANOVA), with metaphor type (familiar/less-familiar/unfamiliar) as between-metaphors variable, and response type (metaphorical/literal) as within-metaphors variable. There were no significant main effects, nor a significant interaction (all $F<1$), indicating that the test words were similarly salient out of context. However, each base-line rate was subtracted from the number of correct responses obtained for each (fragmented) word in the experiment. Thus, the data we present henceforth represent the number of (correct) responses above base-line rates.

Test results. Subjects' responses to the fragmented words were analyzed as in the pretest above as either metaphorically or literally related (and, hence, as either compatible or incompatible with the context). The data were submitted to a 3x2x2 ANOVA, with metaphor type (familiar/less-familiar/unfamiliar) as between-metaphors variable, and context type (metaphorical/literal) and response compatibility (compatible/incompatible with context type) as within-metaphors variables. The means for familiar, less-familiar and unfamiliar metaphors are presented in Tables 1, 2 and 3, and illustrated in Fig. 1. The ANOVA revealed a significant main effect of compatibility, $F(1,30)=41.59$, $p<.001$, indicating that overall, more compatible than incompatible responses were obtained. There were no main effects of either metaphor type, $F(2,30)<1$, or context-type, $F(1,30)<1$. The only significant two-way interaction was of context type and compatibility, $F(1,30)=16.34$, $p<.001$. This interaction is illustrated in Fig. 2. While there is no difference between compatible and incompatible responses in the metaphoric context, there is a large difference in the literal context. Most importantly, there is a significant 3-way interaction of metaphor type x context type x compatibility, $F(2,30)=3.34$, $p<.05$. This interaction can be

demonstrated by comparing the top, mid, and bottom panels of Fig. 1. While familiar metaphors activated both the metaphoric and the literal meanings in both types of context, this is not true of less-familiar and unfamiliar metaphors. Less-familiar metaphors hardly activated the incompatible (metaphoric) meaning in the literally biased context. Similarly, unfamiliar metaphors, which, contrary to expectation, activated the metaphoric meaning in the literal context, nevertheless exhibited a different pattern of activation from that of familiar metaphors.

Table 1
Compatible and incompatible responses to target sentences in metaphorically and literally biased contexts: Classification of responses (SD in parentheses)

Familiar metaphors		
	metaphoric text	literal text
compatible response	7.33	8.33
	(2.89)	(3.45)
incompatible response	4.67	3.67
	(3.89)	(4.01)

Table 2
Compatible and incompatible responses to target sentences in metaphorically and literally biased contexts: Classification of responses (SD in parentheses)

Less-familiar metaphors		
	metaphoric text	literal text
compatible response	5.14	10.14
	(4.88)	(5.49)
incompatible response	7.29	0.86
	(3.64)	(1.57)

Table 3
Compatible and incompatible responses to target sentences in metaphorically and literally biased contexts: Classification of responses (SD in parentheses)

Unfamiliar metaphors		
	metaphoric text	literal text
compatible response	6.38	8.75
	(4.47)	(4.06)
incompatible response	6.75	3.63
	(3.24)	(3.46)

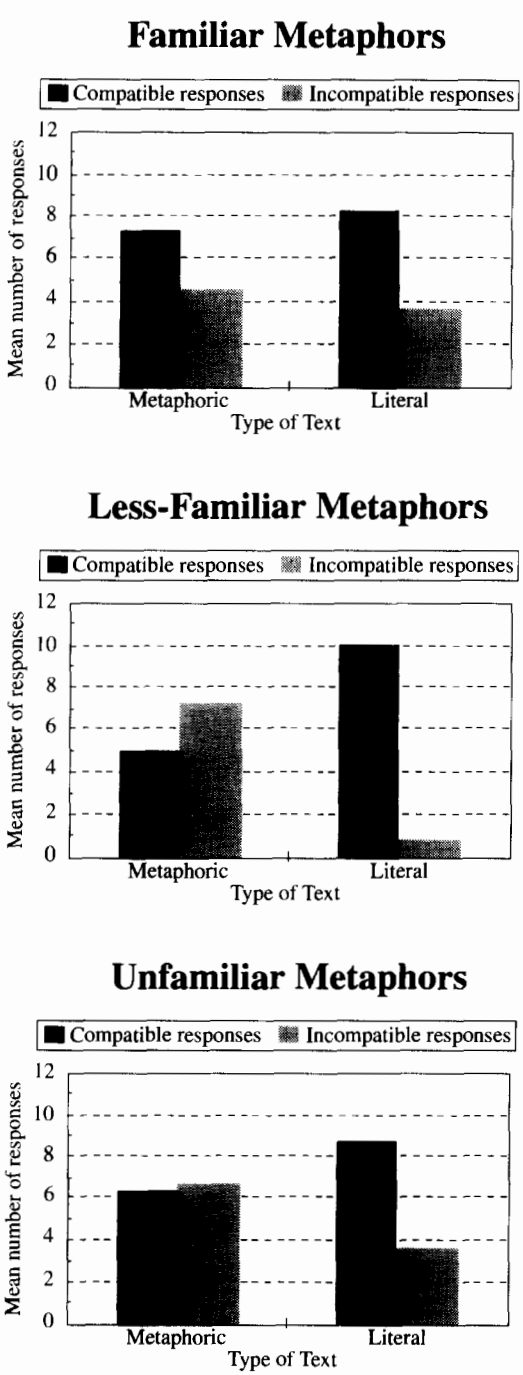

Fig. 1. Mean number of compatible and incompatible responses in metaphorically/literally biased texts, for familiar, less-familiar and unfamiliar Metaphors (experiment 1)

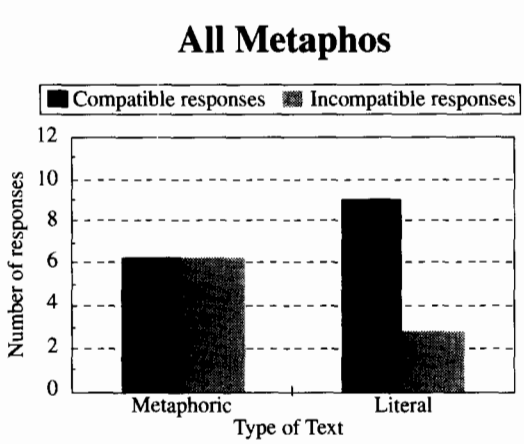

Fig. 2. Mean number of compatible and incompatible responses in metaphorically/literally biased texts, for all metaphors (experiment 1).

2.1.3. Discussion

As predicted by the graded salience hypothesis, our findings show that understanding familiar metaphors involves activation of both the literal and the metaphoric meaning in both types of contexts. These findings dispute the claim prevalent among contemporary linguists and psycholinguists that in processing metaphors we do not (have to) process the literal meaning at all (e.g., Gibbs, 1984, 1994). Furthermore, contrary to current views (e.g., Gibbs and Gerrig, 1989; Gildea and Glucksberg, 1983; Glucksberg et al., 1982; Glucksberg, 1989, Keysar, 1989, 1994; Sperber and Wilson, 1995 [1986]), these results also suggest that familiar metaphors and their literal uses are processed differently. Though they both activate literal and metaphorical meanings, the metaphorical meaning is retained to a lesser degree in the literally than in the metaphorically biased context. These findings are consistent with previous findings regarding literal ambiguity, which show that the meaning which is incompatible with the context gets suppressed (e.g., Swinney, 1979; Gernsbacher, 1990). Along these lines, we propose that the metaphorical meaning in the literally biased context, with which it is incompatible, either decays or gets suppressed. In contrast, the literal meaning in the metaphorically biased context is retained, because it is relevant.

In prior studies, equal reading times for metaphorical and literal utterances (Inhoff et al., 1984; Ortony et al., 1978) were taken to support the equivalence processing hypothesis. This finding does not necessarily attest to identical processes, however. Recall that, in fact, the familiar metaphors used in our study took no longer to read than their literal interpretations (see Giora et al., in preparation). Nevertheless, they exhibit a different pattern of retention of related meanings.

Only the responses to the set of eight unfamiliar metaphors are inconsistent with the graded salience hypothesis. We suspect that the ambiguity of some of the test-words partially explains these results. Unfortunately, in four of the five metaphors which, contrary to expectations, induced activation of their metaphorical meaning in the literally biased context, the metaphorically related test-words could have also been derived from the literal meaning of the target sentence. For instance, the target, 'pita bread without falafel', is also literally related to *main* – the metaphorically related test-word. In the fifth case, the metaphorically related test-word (*soul*) could have been activated by the literally related test-word (*skeleton*) through the collocation of 'body and soul'.

However, the findings concerning the set of less-familiar metaphors support our hypotheses. First, the more salient, literal meaning was more highly activated than the less-salient, metaphoric meaning in both types of context. The amount of retention of the literal meaning was comparatively high in both the metaphorically and the literally biased contexts. However, while in the metaphorically-biased context the metaphoric meaning was also activated, in the literally biased context the metaphoric meaning was hardly active. As predicted by the graded salience hypothesis, less-familiar metaphors differ from familiar metaphors in the amount of activation of the metaphoric meaning in the literally-biased context. Whereas the metaphoric meaning of familiar metaphors was activated in the literally-biased context, this was not true of less-familiar metaphors.

In sum, the findings of experiment 1 support the graded salience hypothesis, but disconfirm current beliefs. They show that, overall, the literal meaning of metaphors is not suppressed in metaphorically-biased contexts. They further suggest that metaphorical and literal interpretations involve different processes. Overall, the incompatible (metaphoric) meaning is less active in a literally-biased context than the incompatible (literal) meaning is in a metaphorically-biased context.

These findings could, however, be induced by the contexts which precede the target sentences rather than by the target sentences themselves. To rule out this possibility, experiment 2 was administered.

2.2. Experiment 2

Experiment 2 tests the possibility that it is the context rather than the target sentence that affects the pattern revealed by the results of experiment 1. Experiment 2 is, therefore, identical to experiment 1 in every respect apart from the fact that its materials comprise texts without target sentences, so that the effect of context on its own may be assessed.

2.2.1. Method

Design. A 3x2x2 factorial design was used, with metaphor type (familiar/less-familiar/unfamiliar), discourse type (metaphorical/literal), and word type (metaphorically/literally related) as within-subject factors.

Subjects. The subjects were 36 undergraduate students of Levinsky College (35 females and 1 male), aged 22–43. They participated in the experiment as part of their class assignments.

Texts. We used the texts and materials of experiment 1, omitting the last clause (the target sentence) from each text.

Procedure. As in experiment 1.

2.2.2. Results and discussion

The analysis data were the subjects' responses to the (same) test words (analyzed in experiment 1). As in experiment 1, two judges (a researcher and a research assistant) individually evaluated the words for their relatedness to either the metaphoric or the literal meaning of the (presumed) target sentences. The means for familiar, less-familiar and unfamiliar metaphors are presented in Tables 4, 5 and 6. The data were submitted to a 3x2x2 ANOVA, with metaphor type as between-metaphors variable (familiar/less-familiar/unfamiliar), and context type (metaphorical/literal) and response compatibility (compatible/incompatible with the context type) as within-metaphors variables. The ANOVA revealed a significant main effect for compatibility, $F(1,30)=10.23$, $p<.005$, but no other effects (all $F<1$).

Table 4
Compatible and incompatible responses to metaphorically and literally biased contexts without target sentences: Classification of responses (SD in parentheses)

Familiar metaphors		
	metaphoric text	literal text
compatible response	6.06	6.22
	(5.96)	(4.01)
incompatible response	4.28	2.72
	(4.35)	(2.74)

Table 5
Compatible and incompatible responses to metaphorically and literally biased contexts without target sentences: Classification of responses (SD in parentheses)

Less-familiar metaphors		
	metaphoric text	literal text
compatible response	3.57	4.86
	(2.07)	(4.38)
incompatible response	3.57	2.00
	(4.72)	(2.16)

Given these findings, we could now assess the effect of the target sentences on concepts' activation without the effect of the context. To do that, we subtracted the responses to each and every test word in experiment 2 from the same responses in experiment 1. The results replicate the results of experiment 1. The ANOVA reveals

Table 6
Compatible and incompatible responses to metaphorically and literally biased contexts without target sentences: Classification of responses (SD in parentheses)

Unfamiliar metaphors		
	metaphoric text	literal text
compatible response	5.25	4.75
	(3.06)	(2.96)
incompatible response	2.50	5.25
	(2.39)	(4.77)

that there was an almost significant main effect for compatibility, $F(1,30)=3.90$, $p=.057$, and no main effects of either metaphor type, $F(2,30)<1$, or context-type, $F(1,30)<1$. The only significant two-way interaction was of context type and compatibility, $F(1,30)=17.62$, $p<.001$. While there is no difference between compatible and incompatible responses in the metaphorically biased context, there is a large difference in the literally biased context. Most importantly, there is a significant 3-way interaction of metaphor type x context type x compatibility, $F(2,30)=3.70$, $p<.05$. This interaction replicates the pattern of experiment 1. The findings of experiment 2 thus rule out the possibility that the pattern revealed by the results of experiment 1 were affected by the context rather than by the target sentences.

3. Familiar versus less-familiar idiomatic language

According to the graded salience hypothesis, processing familiar idioms in a context biased towards the idiomatic meaning should evoke their figurative meaning almost exclusively, because their figurative meaning is much more entrenched, i.e., salient, than their literal meaning. In contrast, processing less-familiar idioms in an idiomatic context should activate both their literal and idiomatic meanings, because both meanings enjoy similar salience status. In a literally biased context, familiar idioms should evoke their more salient idiomatic meaning to a greater extent than less-familiar idioms.

3.1. Experiment 3

Experiment 3 aims at replicating our results with idioms, thereby increasing the construct and the external validity of our results. As in experiment 1, the graded salience hypothesis was tested by manipulating degree of familiarity. A small change in the procedure was made, however. To preclude the possibility that by asking participants to complete two fragmented words, as in experiments 1–2, we forced them to process meaning incompatible with the context, the participants of experiment 3 were asked to complete only one of the two incomplete words. This enabled us to examine only the responses that really came to mind first.

Experiment 3 tests the hypothesis that familiarity with idioms might affect the amount of activation of the literal and idiomatic meanings. For an idiom to be familiar, its idiomatic meaning must be retrievable from the mental lexicon. This means that in an idiomatically biased context, only the idiomatic meaning should be highly activated. However, in a literally biased context, both the idiomatic and literal meanings should be activated.

Unlike familiar idioms, the activation of the figurative meaning of less-familiar idioms in the idiomatic context should not differ drastically from the activation of the literal meaning. However, in the context biased towards the literal meaning, less-familiar idioms should be interpreted mainly literally.

3.1.1. Method

Design. A 2x2x2 factorial design with degree of familiarity (familiar/less-familiar), discourse type (idiomatic/literal), and word type (idiomatically/literally related) as within-subject factors.

Subjects. The participants were 60 primary school students, aged 12–13 (34 females and 26 males), from Bat-Yam, one of the satellite towns of Tel Aviv (high middle class neighborhood). They participated in the experiment as part of their class assignments.

Texts. Twenty-four Hebrew idioms (henceforth 'target sentences') were selected for the experiment. Twelve were familiar and 12 were less-familiar idioms. The division was determined by a pre-test, to be described later. Two texts, one-sentence long, were prepared for each target sentence. One comprised an idiomatically biased context, in which the last clause or phrase – the target – had an idiomatic interpretation (e.g., 4a, where *on one leg* means 'briefly'). The other comprised a literally-biased context, in which the last clause or phrase -- the target – had a literal interpretation (e.g., 4b):

(4) a. He told me the whole story *on one leg*.
b. In the zoo, I saw a stork standing *on one leg*.

Materials. The materials were arranged as in the previous experiments.

Pretesting of materials. (a) Idioms: The participants familiarized themselves with the idioms through their studies at school. For a year they were taught idioms systematically, in an alphabetical order. At the end of the year, their knowledge of the idioms was tested. On the basis of the results of the test, the idioms in the experiment were divided into familiar and less-familiar idioms. (b) Test words: As in experiment 1, the test words were tested for their salience out of context. Forty students who did not participate in the experiment, but who were of the same school and age group as the subjects of this experiment, were presented with the list of the fragmented words. They were instructed to complete the words as part of their class assignments. Words exceeding 20% activation were either replaced, or refragmented and retested.

Procedure. The procedure of the previous experiments was repeated, except for the instruction to the participants to complete just one word of the two incomplete words that were presented – the first that came to mind.

3.1.2. Results and discussion

3.1.2.1. Familiar idioms. The results, illustrated in Fig. 3, show that both the idiomatic and literal meanings of the target sentences were highly activated in both types of contexts. However, in accordance with our predictions, their pattern of activation differs. Analysis of only the related responses reveals that, as predicted, the literal meaning of the target sentence in the context biased towards the idiomatic meaning was activated to a lesser extent than the idiomatic meaning in the context biased towards the literal meaning.[1] The difference between the activation of the idiomatic and literal meanings in the idiomatically biased context was much greater than the difference between the activation of the literal and idiomatic meanings in the literally biased context. The phi correlation between the context type (idiomatic/literal) and the response compatibility (compatible/incompatible with context type) is 0.33. This correlation is significant (χ^2=140.01, df=1, p<.0001).

3.1.2.2. Less-familiar idioms. As predicted, less-familiar idioms elicited a different response pattern. The data are illustrated in Fig. 3. In the context biased towards the idiomatic meaning of the target sentence, the idiomatic and literal meanings of the target sentence were highly activated. However, in the context biased towards the literal meaning of the target sentence, the idiomatic meaning was hardly activated. Analysis of only the related responses reveals that the difference between the amount of activation of the literal and the metaphoric meanings in the literally biased context was much greater than the same difference exhibited by familiar idioms. With regard to the idiomatically biased context, there were less idiomatically-related responses than literally-related responses, in contrast to the ratio of responses elicited by familiar idioms. As found for less-familiar metaphors, the difference between the activation of the idiomatic and literal meanings in the idiomatically biased context was smaller, and in the opposite direction, than the difference between the activation of the literal and idiomatic meanings in the literally biased context. The phi correlation between the context type (idiomatic/literal) and the response compatibility (compatible/incompatible with the context type) is 0.40. This correlation is significant (χ^2=191.41, df=1, p<.0001).

In sum, the predictions of the graded salience hypothesis regarding comprehension of familiar and less-familiar idioms were confirmed. Comprehension of familiar idioms in the idiomatically biased context hardly activated the less salient literal meaning, while the more salient idiomatic meaning was highly activated. In contrast, when the less salient meaning was intended, as in the case of the literally biasing context, both the idiomatic and the literal meaning were activated (see also Gibbs, 1980). Likewise, comprehension of less-familiar idioms, in which the idiomatic meaning is no more salient than its literal interpretation, activated both the literal and the idiomatic meanings in the idiomatically biased context. However, in the literally biasing context, it was the more salient literal meaning that was highly activated, whereas the less salient idiomatic meaning was only marginally evoked.

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[1] The results reported here are calculated without subtraction of base-line rates.

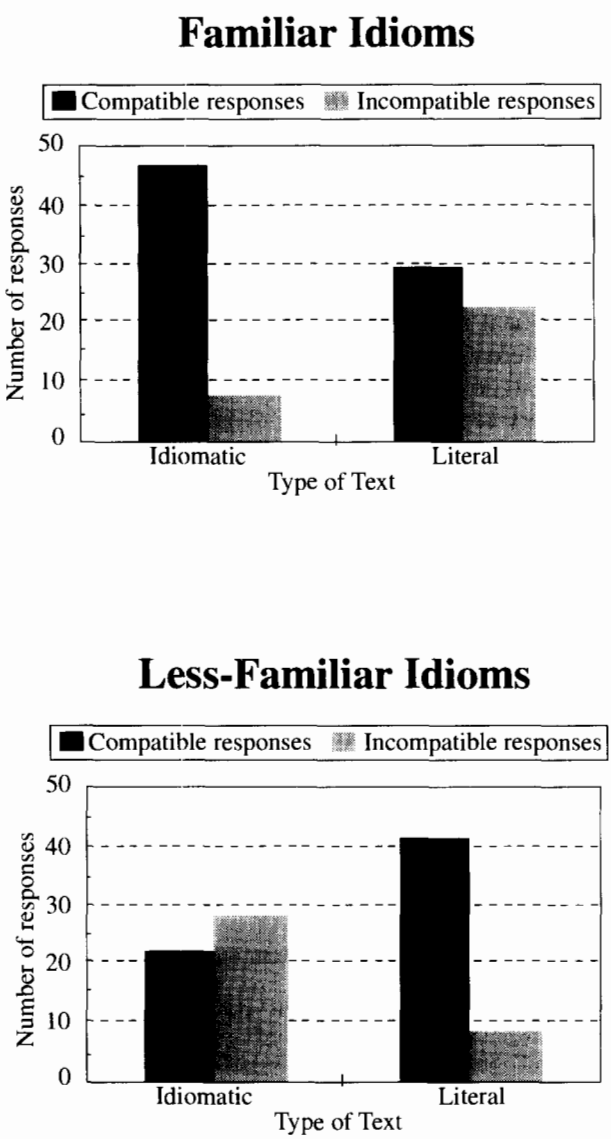

Fig. 3. Mean number of compatible and incompatible responses in idiomatically/literally biased texts, for familiar (top panel) and less-familiar idioms (bottom panel) in experiment 3

4. General discussion

We have shown that, as predicted by the graded salience hypothesis, (a) processing familiar metaphors involves activation of both their salient (literal and

metaphoric) meanings in both metaphorically and literally biased contexts (experiment 1);[2] (b) in processing less-familiar metaphors, only the salient (literal) meaning is highly activated in both types of contexts, whereas, in the literally biased context, it is almost the only one activated (experiment 1); (c) in processing familiar idioms, the (salient) idiomatic meaning is activated in both types of contexts; however, in the idiomatically biased context, its activation differs drastically from the activation of the less salient literal meaning (experiment 3); (d) in processing less-familiar idioms, the salient literal meaning is highly activated in both types of contexts, whereas, in the literally biased context, its activation differs drastically from the activation of the less salient idiomatic meaning (experiment 3). These results and the results regarding different reading times for familiar, less familiar and unfamiliar metaphors (Giora et al., in preparation) support the graded salience hypothesis. They attest to the superiority of salient meanings over context effects (experiment 2).

Our results also show that, contrary to current beliefs, (at least part of) the literal meaning of metaphors is always processed: Taken together, the findings concerning comprehension of familiar and less familiar metaphors show that metaphor comprehension involves processing (both the metaphoric and) the literal meaning (Fig. 2). Our results further suggest that understanding literal and figurative language involves different processes. Though the metaphoric and literal meanings of familiar metaphors may be salient, and hence equally activated, they may still be retained differently in the different types of contexts. Our findings show that deriving the metaphoric meaning (in the metaphorically biased context) involves retention of the literal meaning. Processing the literal meaning (in the literally biased context), we propose, involves suppression of the metaphoric meaning. [See Gernsbacher and Robertson (1999: 1619–1630)]

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[2] These results were replicated with two additional sets of metaphors and two different groups of subjects, this time primary school students. Results were the same as in Experiment 1. Details will be provided on request.

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