ELSEVIER

Journal of Pragmatics 31 (1999) 1559–1578

journal of PRAGMATICS

www.elsevier.nl/locate/pragma

Swimming against the current: Do idioms reflect conceptual structure?☆

Boaz Keysar[a,*], Bridget Martin Bly[b]

[a] *Department of Psychology, The University of Chicago, 5848 South University Avenue, Chicago, IL 60637, USA*

[b] *Department of Psychology, Stanford University, Stanford, CA 94305, USA*

Abstract

Recent work inspired by cognitive linguistics suggests that some idioms make sense (i.e., their meanings seem transparent) because they are motivated by conceptual structures that exist independently of language. We claim that idioms cannot, in principle, be used to argue for the existence of such conceptual structures. To support this argument we demonstrate that people's intuitions about idiom transparency vary as a function of what they believe to be the meaning of the idiom. Thus, when people learn an idiom's meaning, they attempt to map elements of that meaning onto the linguistic constituents of the idiom. This mapping makes the stipulated meaning seem transparent, while it obscures the possibility that the idiom conceivably could mean something else. For example, people who learn that the statement 'The goose hangs high' bodes well have a difficult time conceiving of a negative reading, while those who learn that it expresses impending doom cannot easily conceive of a positive reading. In this way, our knowledge of the meaning of the idiom constrain the way we 'motivate' the idiom. Instead of reflecting conceptual structures, then, we suggest that intuitions about idiom transparency reflect the mind's interpretive strategies. © 1999 Elsevier Science B.V. All rights reserved.

Keywords: Idiom comprehension; Idiom transparency; Conceptual metaphor; Conceptual structure

☆ This research was partially supported by a PHS grant 2S07RR07029-26 to the University of Chicago. We are indebted to Raymond Gibbs for productive discussions of the issues and Bryan Duff, Linda Ginzel, William Horton and Marina Peterson for reading and commenting on earlier drafts. We also benefited from discussions with Sam Glucksberg and Howard Nusbaum.

* Corresponding author. Fax: +1 773 834 0873; E-mail: boaz@ccp.uchicago.edu

0378-2166/99/$ – see front matter © 1999 Elsevier Science B.V. All rights reserved.
PII: S0378-2166(99)00004-1

1. Introduction

When a speaker wants to keep her distance from someone, she keeps him *at arm's length*, because she knows that a distance as long as her arm is very long. Idiomatic expressions such as *to keep someone at arm's length* have recently regained the attention of philosophers, psychologists, and linguists who are interested in the relationship between language and thought. Though idiomatic expressions were once considered to be 'frozen' or arbitrary, they may provide insights into the human conceptual system. One can now ask questions such as why is the length of an arm conceptualized as 'very long'? How do we understand the meanings of such expressions? The recognition that idiomatic expressions make intuitive sense and are not 'arbitrary' opens up the possibility that idioms may offer a window onto speakers' conceptual structure. We will evaluate this possibility and argue that using idioms to make inferences about conceptual motivation is problematic. Instead of serving as a linguistic window onto conceptual structure, idiomatic expressions may *mirror* the content put into them. And just like mirrors, they might be mistaken for windows.

2. Brief history of the resurrection of idioms

The most frequent example given in linguistics and psychology textbooks of an idiom is *kick the bucket* (e.g., Akmajian et al., 1987: 261; Clark and Clark, 1977: 446). This choice reflects the way idioms have been traditionally conceived: frozen forms whose meanings are represented in the mental lexicon as one word. Indeed, many linguistics textbooks refer to the mental representation of an idiom as essentially equivalent to that of a single word. In this view, an idiom is an expression whose meaning is not a compositional function of its elements or words (e.g., Cruse, 1986; Katz, 1973). It is indeed hard to see how the composition of 'kick' and 'bucket' could mean 'to die'. Consistent with this notion, psycholinguists have demonstrated that the idiomatic meaning of an idiom is understood before or, at least, not after its literal meaning (Swinney and Cutler, 1979; Gibbs, 1980; Ortony et al., 1978). Such idioms are interesting to syntacticians because non-compositionality does not entail syntactic frozenness. For example, *he kicked the bucket yesterday* retains the meaning of the idiom even though the verb is in the past tense. Exploring the constraints on such syntactic modifications, idioms have been used to argue either for (e.g., Chomsky, 1980; Culicover, 1976; Keyser and Postal, 1976) or against (Brame, 1978; Bresnan, 1981) the existence of syntactic transformations. But on both sides of the argument, the prevailing assumption has been that the relationship between the expression and its meaning is arbitrary.

However, not all idioms are as opaque as *kick the bucket*. Focusing on idioms that are more transparent than *kick the bucket*, several researchers have argued against the traditional non-compositionality assumption and have suggested that the meanings of many idioms are partly a function of the component words (cf. Cacciari and Tabossi, 1993). Wasow et al. (1983: 109) claim that "the pieces of an idiom typically have identifiable meanings which combine to produce the meaning of the whole". This intuitive notion can be illustrated by mapping the parts of the meaning

'to exert influence by means of connections' onto the part of the idiom *to pull strings*. The action of exerting influence corresponds to the action of pulling, and the connections are the strings. Wasow et al. (1983) suggest that, because the elements play a role in the expression's meaning, they can be modified accordingly, as in *he pulled some family strings*. Cacciari and Glucksberg (1991; see also Glucksberg, 1991) develop this notion further and argue that mapping between an expression and its meaning, in conjunction with communicative principles, constrains both semantic and discourse productivity. For example in the idiom *spill the beans*, 'beans' correspond to 'secrets'. This allows an easy interpretation of the semantically productive variant *he didn't spill a single bean*, namely 'he didn't reveal even one secret' (Cacciari and Glucksberg, 1991: 227). McGlone et al. (1994) show that idiom variants are understood as rapidly as their literal counterparts. Discourse productivity of idioms demonstrates even greater flexibility, as illustrated by an interviewee on the radio who was describing how he had been besieged by recurring troubles and commented that it was like 'one straw after another'.

The extent to which an idiom's elements are mappable onto its meaning is also related to the idiom's syntactic flexibility. Gibbs and his colleagues (Gibbs and Gonzales, 1985; Gibbs and Nayak, 1989) map idioms' 'flexibility' by modifying Fraser's (1970) frozenness hierarchy (see also Cutler, 1982; Reagan, 1987). They show that the more an idiom is semantically decomposable, the more likely it is to be syntactically flexible.

Taken together, these studies challenge the traditional conception of idioms. If there is partial mapping between the component words of many idioms and elements of their meaning – a mapping that allows the idioms to be lexically flexible as well as productive in discourse – then the elements of idioms do play a role in their meanings. This approach argues for the mapping between an idiom and its meaning. It does not, however, explain why an idiom is mapped to a *particular* meaning. The mapping provides constraints, but they are very loose ones. For example, *beans* in *spill the beans* maps onto 'secrets' in the meaning of the idiom. This mapping allows one to break down the idiom and use it productively. Apart from such general constraints, the mapping does not seem particularly conceptual: 'beans' has no specific conceptual relationship to 'secrets'.

Gibbs and his colleagues, however, argue that the interpretation of idioms *is* conceptually motivated (see a review in Gibbs, 1994). Nayak and Gibbs (1990) show that emotion-related idioms are understood in accord with the conceptual prototype of their respective emotion (see also Kövecses, 1986). For example, they demonstrate that people judge idioms that refer to the same stage of an anger-related event as more similar than idioms that refer to two different stages. Thus, the expression *put a cog in your wheel* was judged as more similar to *steal your thunder* than to *get hot and bothered*. Similarly, they show that such conceptual relationships determine the contextual appropriateness of idioms (but see Kreuz and Graesser's, 1991, criticism; and Gibbs and Nayak's, 1991, reply.) Gibbs (1992a) and Gibbs and O'Brien (1990) also argue that the mapping between an idiom and its meaning is motivated by pre-existing metaphorical connections between concepts (Lakoff and Johnson, 1980a,b). For instance, Gibbs and O'Brien assume the kind of conceptual mapping that Lakoff and Johnson hypothesize

and show that the images associated with certain idioms are constrained by such mappings. According to Lakoff and Johnson, MIND is conceptualized as a CONTAINER, and IDEAS are understood as PHYSICAL ENTITIES. Gibbs and O'Brien show that people's images for *spill the beans* are consistent with this notion of conceptual mapping.

Psycholinguistic research on idioms attempts to explain how people understand and use idioms. This is an interesting, important, and relatively new question. The reason it is new is that the traditional approach did not need to ask it. The traditional theories *assumed* that the relationship between idioms and their meanings is arbitrary and non-compositional (e.g., Katz, 1973; Heringer, 1976). Once partial compositionality became a theoretical possibility, the focus of idiom research shifted to attempts to explain this compositionality. Accounting for idiom compositionality, however, still left open the question of understanding the underlying conceptual structure. For example, Cacciari and Glucksberg (1991) are non-committal with respect to any particular pre-existing conceptual representation, whereas Gibbs and his colleagues assume a metaphorical mapping as an underlying conceptual structure. While each of these approaches relies on different assumptions, neither uses idioms to support a particular theory of conceptual organization. Our focus is different; instead of explaining idioms' compositionality, we focus on what idioms might tell us about the way our conceptual system is organized. We start by considering attempts to use idioms as evidence for the existence of certain conceptual structures.

3. What can idioms reveal about the mind?

Some idioms may not reveal much about the mind. Opaque idioms, such as the celebrated *kick the bucket,* do not allow insights into the workings of the mind. We therefore restrict our discussion to idioms that are relatively transparent. We will refer to an idiom as 'transparent' if its meaning makes intuitive sense to the native speaker – that is, if the native speaker feels that there is a motivated relationship between the expression and its meaning. We argue that while idioms that make sense cannot, in principle, reveal much about independently existing conceptual structures, they might be useful tools to investigate the mind's strategies of making sense of seemingly arbitrary constructions.

We start with the second claim by using an example where idioms are presented as evidence. To illustrate our point, we briefly describe the claim that the conceptual system involves systematic metaphorical mapping between concepts (e.g., Lakoff and Johnson, 1980a,b; Lakoff, 1987). Our claim is not that the conceptual metaphor view per se is wrong; although we use this approach as an example, we make a general argument about *any* theory that attempts to use idioms as a window onto conceptual systems.

3.1. The conceptual metaphor approach

Lakoff and Johnson (1980a,b) argue that the human conceptual system is 'fundamentally metaphorical in character' (1980a: 195). They hypothesize that most con-

cepts are understood via mappings onto a small set of basic concepts which are grounded in experience. For example, the concept SPACE is fundamental to human experience and is therefore basic to our conceptual system. As a result, they suggest, many concepts are understood by mapping onto various aspects of SPACE. For example, many different concepts are understood in terms of the vertical axis of space, UP and DOWN: MORE is understood as UP, CONTROL IS UP, GOOD IS UP, RATIONAL IS UP (Lakoff and Johnson, 1980a: 196). Lakoff and Johnson argue that this hypothetical metaphorical mapping is reflected directly in the way people use language. They illustrate this point with a variety of conventionalized expressions that seem to be motivated by the proposed conceptual mapping. When we say *my income rose last year* or *you made a high number of mistakes* we are invoking the MORE IS UP mapping. Similarly, the understanding of utterances such as *I am on top of the situation* and *he fell from power* is motivated by CONTROL IS UP. Not only can one basic concept define many different concepts, but the same concept can be understood in different terms due to mapping onto different concepts. Lakoff and Johnson illustrate how ideas can be defined as PEOPLE, PLANTS, PRODUCTS, COMMODITIES, RESOURCES, MONEY, CUTTING INSTRUMENTS, and FOOD. Such mappings may be reflected in the way we talk about ideas: *cognitive psychology is still in its infancy* (PEOPLE); *that idea died on the vine* (PLANTS); *let me put in my two cents* (MONEY); (1980a: 198–199). This view has been extended to explain poetic language (Lakoff and Turner, 1989; Turner, 1987), as well as the structure and coherence of poetic texts (Hiraga and Radwanska-Williams, 1996).

The conceptual metaphor approach has been criticized in various ways (see Murphy, 1996). Some question the role that conceptual metaphor plays in reasoning and understanding. Quinn (1991) argues that while conceptual metaphors provide convenient means of expression, they do not constitute means of thinking. Instead, she suggests that cultural models are more fundamental reasoning tools. Keysar and Glucksberg (1993) argue that although many metaphorical expressions appear to instantiate a conceptual mapping, this mapping does not contribute to the expression's meaning. For example, the metaphor *our marriage is nothing but a filing cabinet* seems to be an instantiation of LOVE IS A CONTAINER. Yet, this mapping is irrelevant to the actual meaning, which is an expression of the lack of spontaneity or emotional involvement in the marriage (see also Gibbs, 1992b; Glucksberg et al., 1992, 1993; McGlone, 1996).

Jackendoff and Aaron (1991) and Ortony (1988) raise several methodological issues. Jackendoff and Aaron argue that it is not clear how one determines the appropriate level of instantiation of the mapping. They ask, why is the mapping LIFE IS A FIRE invoked and not a more specific schema, such as LIFE IS A FLAME, or a more general one such as, LIFE IS SOMETHING THAT GIVES OFF HEAT (1991: 324)? Ortony argues, among other things, that there is no principled way of determining the completeness of the list of conceptual mappings (1988: 99). Ortony also points out that some mappings are 'reversed' because they seem to give meaning to basic concepts with less basic concepts. For example, ANGER is clearly more basic than INSANITY, yet some expressions seem to rely on the mapping ANGER IS INSANE BEHAVIOR.

Such critical analysis raises a general problem for the conceptual metaphor view that is directly relevant to our focus. What constitutes evidence for the existence of

a certain metaphorical mapping? The answer to this question is incomplete if it considers only supporting evidence. While positive examples are compelling, they do not have the status of evidence if they are not accompanied by principles that define what would constitute counter-evidence (Popper, 1959). In principle, the source of positive evidence must be capable of being a source of negative evidence. By analogy, consider the traditional use of grammaticality judgments in linguistics. One may cite a grammatical sentence that illustrates the existence of a hypothetical syntactic construct. Yet the force of the evidence is the in-principle possibility of providing instances that are non-grammatical to disprove the hypothesis. Can examples of idiomatic utterances serve in an analogous role to that of non-grammatical expressions? We do not know the answer to this question, but we would like to highlight the problem with an illustration.

Lakoff and Johnson (1980b) propose the following conceptual mapping: RATIONAL IS UP; EMOTIONAL IS DOWN. To provide evidence for this mapping, they give examples such as *The discussion fell to the emotional level, but I raised it back to the rational plane* (1980b: 17). Yet consider the slogan of the Museum of Science and Industry in Chicago: *We've got fun down to a science.* Though the museum had to bring fun *down* to a science, it probably does not conceive of science as below the 'high-plain' rational level. This example does not suggest that the concept of RATIONALITY is not mapped onto that of UP. Instead, proponents of the conceptual metaphor view would probably suggest that the museum's slogan is understood via a different kind of mapping altogether. This example sharpens the problem because it illustrates the lack of criteria for negative evidence.

This analysis brings us back to idioms. We argue that while it might be possible to outline criteria for negative evidence for many linguistic expressions, this is impossible with idioms. We will suggest that idioms cannot provide negative instances for a particular mapping; for this reason, idioms cannot provide compelling positive evidence either.

3.1.1. Idioms as positive evidence

Lakoff (1987) suggests that idioms that 'make sense' are motivated by two things: an image and a relevant conceptual mapping. According to Lakoff, the motivating elements make the connection between the idiomatic expression and its meaning sensible. Consider the idiom *keep someone at arm's length* (1987: 447–449). First, for most people, this idiom is motivated by an elaborate image of a person extending an arm forward, with an open palm, in a chest-high position. Secondly, two conceptual metaphors "provide the link between the idiom and its meaning": INTIMACY IS PHYSICAL CLOSENESS and SOCIAL (OR PSYCHOLOGICAL) HARM IS PHYSICAL HARM (1987: 448). The important claim for our purposes is that idioms that make sense reflect *independently existing* conceptual mappings: "What it means for an idiom to 'be natural' or to 'make sense' is that there are independently existing elements of the conceptual system that link the idiom to its meaning" (1987: 449).

The same kind of analysis can explain how, in principle, the same expression could have a different meaning. To the extent that there exists a set of conceptual structures that would link the expression with a different meaning, the idiom would

make sense. For example, *spill the beans* makes sense because it is motivated by THE MIND IS A CONTAINER and IDEAS ARE ENTITIES. But this idiom could have other meanings and still make sense. For example, *spill the beans* could mean 'to release someone from captivity'. This hypothetical idiom would have made sense, but the link between the expression and its new meaning could no longer be established by the same conceptual mappings, IDEAS ARE ENTITIES. This is not a problem for the conceptual metaphor view. The fact that the idiom makes sense presumably suggests the existence of a different set of conceptual metaphors that motivate its meaning. The example raises an interesting question because it suggests that 'reveal a secret' and 'release someone from captivity', which are highly related, are motivated by a different set of conceptual structures. However, this is beyond the scope of this paper, and we will not pursue this potential paradox further. The point that is relevant here is that the conceptual metaphor view does not require a one-to-one correspondence between expressions and motivating conceptual structures. Consequently, the same expression could, in principle, provide evidence for the existence of a variety of conceptual mappings. Positive evidence, then, can be provided by the link between what idioms mean as well as by what they *could* mean and still make sense.

3.1.2. Potential negative evidence

According to the conceptual metaphor view, idioms make sense because of independently existing conceptual structures. By the same token, when an idiom *does not* make sense, one must be able to infer that no conceptual structures exist to motivate the idiom. In addition to asking 'what could an idiom mean?' one should also ask 'what could an idiom *not* mean?'. In other words, the reason for an idiom's transparency ('making sense') should be tightly related to the reason for an idiom's opaqueness ('not making sense'). Transparency suggests the existence of independent structures while non-transparency suggests the lack of such structures. *Spill the beans* transparently means 'to reveal a secret' yet could mean 'release someone from captivity' and still be transparent. What could it *not* mean transparently?

Each opaque meaning an idiom has must testify to the lack of motivating conceptual links. For example, *spill the beans* could have meant 'to keep a secret'. Yet had it meant that, it would have been opaque to most native English speakers. The fact that 'keeping a secret' does not make sense may suggest that our conceptual system does not have the appropriate mapping to motivate it. This seems to us to be an appropriate inference from the conceptual metaphor view. To the extent that idioms can indicate both the existence and the lack of such conceptual structures, they seem to be good candidates to provide evidence for the existence of independent conceptual structures, and appear to be a window to the native speaker's conceptual system. To the extent that either one of these links is missing, idioms are inappropriate as evidence.

4. Idioms as windows: Do they reveal conceptual structure?

We argue that idioms cannot provide evidence for conceptual structures because they cannot provide negative evidence. We suggest that the fact that an idiom such

as *spill the beans* cannot transparently mean 'keep a secret' does not indicate the lack of structures. Instead, it reflects the kind of strategies that are employed in the search for meaning. Similarly, the transparency of the idiom's real meaning is a function of the same reflection: Transparency illustrates how we cast meaning into relatively non-compositional constructions. We will elaborate on this claim in the last section of this paper. Here, we attempt to explain why idioms cannot provide viable evidence for conceptual mapping.

Consider the idiom *swim against the current*. Had it meant 'do something with ease and no opposition' it would have been opaque. Similarly, had *keep someone at arm's length* meant 'ensure a very close and intimate relationship' it would have made little sense to native English speakers. The reason for this, we claim, is that we already know what the idioms actually mean in English. The reason is not a lack of conceptual structures to motivate it. This analysis predicts that had these expressions not been common idioms in the language, they could have transparently meant 'do something with ease and no opposition' and 'ensure a very close and intimate relationship', respectively. If this is true, then lack of transparency cannot testify to the lack of independently existing structures, nor can transparency testify to their existence.

But *could* those idioms mean the opposite of what they actually mean and not lose their transparency? Could *swim against the current* conceivably mean 'do something with ease and no opposition' and still be transparent? This is a strongly counter-intuitive possibility. Native English speakers have a strong intuition that any expression (idiomatic or not) of the form 'to (action) against X' inherently implies difficulty and opposition. Numerous idioms of this form support this intuition, e.g., *go against the grain*, *run against the clock*, *hope against all hope*, *bang one's head against a wall*, *against the odds*. These idioms all describe actions that are carried out in the face of opposition. As a result, native speakers have the intuition that had these idioms meant the opposite, they would not have been transparent. In spite of this intuition, we claim that idioms could have transparently meant the opposite of what they mean – if they did not have their current idiomatic meaning.

How can we support our claim empirically? The direct approach is to instruct native speakers to forget the meaning of certain idioms, and then to test whether the opposite meanings of these idioms suddenly became more transparent. Obviously, this would not work, because people cannot forget such knowledge, or any knowledge, upon demand. There are several possible indirect approaches. For example, one could test native speakers who do not know the meanings of idioms such as *spill the beans*. Unfortunately, native speakers who are unfamiliar with *spill the beans* may not know beans about English, and their intuitions may not reflect those of a more typical native speaker. Another option is to conduct a cross-linguistic study. For example, one could attempt to translate *keep someone at arm's length* into a language that does not have the same idiom, say, Hebrew, and see whether the possible meaning 'ensure a very close and intimate relationship' is transparent (see Coulmas', 1981, discussion). This approach might encounter difficulties with word choice in the translation, but the most serious problem is that the results might not bear directly on the issue. Even if one discovers that the opposite meaning is indeed trans-

parent, it may simply suggest that the conceptual system underlying Hebrew has structures to motivate this meaning. Indeed, Hebrew idioms reflect shorter arms than English. For instance, while *arm's length* means 'distant' in English, when something is 'at hand's reach' (*beheseg yad*) in Hebrew, it is close by.

To avoid these methodological problems, we chose a different route. We used English idioms that are no longer familiar to native speakers. Previous researchers have used relatively uncommon idioms (e.g., Schweigert, 1986), but most have used recognizable idioms. In our study (Keysar and Bly, 1995), we used idioms that were not recognizable to college students. The following study describes how we used such idioms to test the hypothesis that the relative transparency of an idiom's real or opposite meaning is primarily a function of what we believe the actual meaning of the idiom to be.

5. A study of unfamiliar English idioms

In the old days, when someone *found an elephant in the moon* he or she was making an illusory discovery. Though this idiom is unfamiliar to most native speakers of English, it makes sense to them. Those who see elephants in the moon are clearly hallucinating. Similarly, when people demonstrate high acclaim, it makes sense to say that they *applaud to the echo*, suggesting that they applaud so energetically as to produce echoes. We used such idioms to investigate whether the meaning which is the opposite of the real meaning of the idiom could also make sense. The study had two parts. First, we selected a set of idioms that are unfamiliar to college students and tested their ability to recognize the meaning of the idioms. Then we directly tested our hypothesis that once people believe that an idiom means P, they are less likely to see that –P would also make sense. For example, we predicted that once people learn that *applaud to the echo* means 'to demonstrate high acclaim', they will see that meaning as more transparent than the potential meaning 'to criticize or ridicule'. Similarly, if they learn that the meaning is 'to criticize or ridicule' then the opposite meaning (in this case the true meaning) would become less transparent. Our suggestion is that the same should hold for idioms that are in current use: Had we been able to undo people's knowledge about the actual meaning of *keep someone at arm's length*, and had we taught them that the idiom means 'ensure a very close and intimate relationship', then they would have seen the latter as transparent and the opposite, the real meaning, as less transparent.

5.1. Part 1: Selection of idioms

We collected twenty idioms that are not in common use and that seemed relatively transparent. We found them in idiom dictionaries such as *The Oxford dictionary of current idiomatic English* and *NTC's American idioms dictionary*, and in several Victorian novels. For example, *applaud to the echo* comes from Dickens' (1967) *The old curiosity shop*:

"All this Mr. Codlin did with the air of a man who had made up his mind for the worst and was quite resigned; his eye slowly wandering about during the briskest repartee to observe the effect upon the audience, and particularly the impression made upon the landlord and landlady, which might be productive of very important results in connexion with the supper.

Upon this head, however, he had no cause for any anxiety, for the whole performance was applauded to the echo, and voluntary contributions were showered in with a liberality which testified yet more strongly to the general delight." (1967: 126)

The goal of Part 1 was primarily to identify highly unfamiliar idioms. In addition, we were interested in the extent to which people could recognize the real meanings of the idioms. To achieve this, we listed all twenty idioms, each with a familiarity scale ranging from 1 (completely unfamiliar) to 7 (completely familiar) and asked 109 college students to indicate the extent of their familiarity with each idiom. Then we asked subjects to decide which of two possible meanings they believed to be the actual meaning of each idiom. For example, the idiom *to play the bird with the long neck* appeared with the following alternative meanings:

(1) to hide with one's head in the sand; to avoid encounters
(2) to be out looking for someone or something

In this particular case, the real meaning of the idiom is (2).

For each item, we averaged the familiarity ratings and calculated the percentage of correct identifications of the real meaning of the idiom. Overall, the idioms were not very familiar to people. The mean familiarity ratings ranged from 1.4 to 4.3 with a mean of 2.3. The mean percent correct was 51%, implying that, people were at chance overall when they attempted to identify the real meanings. The accuracy across the different idioms varied substantially. It ranged from 82% correct identification of the meaning of *have someone dead to rights* to only 15% for *lay out in lavender*. Interestingly, subjects' reported familiarity with an idiom did not reflect knowledge of the idiom's meaning, indicated by the fact that the mean familiarity score did not significantly correlate with accuracy (r=.19, n.s.). In general, then, reported familiarity with an idiom did not predict accuracy. For example, *have someone dead to rights* and *to whistle for it* had similar familiarity ratings (2.4 and 2.5, respectively). Yet, while the majority of subjects recognized the correct meaning of the first, a small minority identified the correct meaning of the second (82% and 16%, respectively). The real meaning of some idioms that seemed relatively familiar were not recognized by many subjects. For instance, *to go by the board* was rated as relatively familiar (3.0), but only 40% recognized its correct meaning.

Another indication that subjects were 'in the dark' comes from a comparison of the percentage of subjects who were actually correct when they indicated that they were very familiar with an idiom (7 on a scale of 1 to 7) and those who indicated that they were completely unfamiliar with it (1). These percentages of correct identification (given 7 or 1 on the familiarity scale) correlated substantially, r=.7, p< .001; this means that when accuracy was high for subjects who were very familiar with an idiom (7), it was also high for those completely unfamiliar with it (1). For instance, 46% of subjects who were completely unfamiliar (1) with *to go by the board* cor-

rectly identified the real meaning. Yet those who indicated high familiarity (7) were not more accurate; they correctly identified it in only 37% of the cases. It could be that subjects' sense of familiarity was partially determined by a vague memory of other idioms that look similar. In general, whatever was driving familiarity ratings, it was not knowledge of the idioms' meanings.

We eliminated four idioms, taking into account both familiarity and accuracy. For example, we eliminated *in the balance* because it had an average familiarity rating of 4.3 (out of 7) and 75% of the subjects recognized its meaning. In addition, given that the study took place during a presidential election year in the US, we eliminated *to take the stump*, even though it was surprisingly unfamiliar to subjects (1.97 out of 7). This left us with 15 idioms as items for the main study. Some of the idioms that were not eliminated are probably known to people over thirty years old but were unfamiliar to the college population which we studied. For example, the idiom *to warm one's britches*, meaning 'to punish', may be familiar to many readers, and was somewhat familiar to our subjects (3.8). Yet, our subjects were exactly at chance (50%) when they indicated whether it meant 'to punish' or 'to praise'. After we eliminated the five idioms, the remaining 15 idioms had a mean accuracy of 47%.

5.2. *Part 2: An idiom's transparency depends on its purported meaning*

The goal of this part of the study was to demonstrate that a particular meaning may make more sense when it is considered the 'true' meaning of an idiom. We did this in two phases: a learning phase and a test phase. In the learning phase, subjects were led to believe either that an idiom had a specific meaning or that it had the opposite meaning. In the test phase, they attempted to predict how an uninformed other would understand the idiom. If an idiom's meaning makes more sense once it is considered its 'true' meaning, then subjects should be more likely to predict that an uninformed other would believe that the idiom means what they themselves believe it to mean.

5.2.1. *First phase: Learning the meaning*

Three context stories that were biased toward a particular meaning were developed to convey the 'meaning' of each idiom. Subjects read the idiom embedded in a biasing context and indicated what it meant by choosing the appropriate meaning from a list of three possible meanings: the true meaning, its opposite, and an unrelated meaning. We added the last meaning condition to increase credibility and variety. Each subject saw all 15 idioms, each in only one of three context conditions, corresponding to each of the three meanings. Given that the unrelated condition was designed for purposes other than the focus of this study, we will only discuss the two central conditions.

Here is an example of one idiom *the goose hangs high* as it appeared in each of the two biasing contexts.

The two farmers walked side by side. It had been a good summer: clear skies for planting, abundant rain for the young plants, but not too much. They would each

> begin taking in their crops in a few days and it looked like the harvest would be the best on record. There was not a storm cloud in sight that would delay the harvest, and there were plenty of men and machines to do the work. They walked silently but contentedly – not great talkers, but good friends. At the place where their paths diverged, John turned to Olaf and said, simply, 'Looks good this year, eh?' And Olaf simply replied, 'Aye, John, *the goose hangs high*'. 'Well, goodnight'. 'Goodnight'. And they parted.

After they read the scenario, subjects indicated if the idiom meant that things are looking good, that things are not looking good, or that something is very loud. In contrast, those subjects who learned the opposite meaning answered the same question with the same set of alternatives, but read the following scenario instead:

> The two farmers walked side by side. It had been a disastrous summer: first heavy rains so the crops couldn't be planted on time, and then a fierce heat that had withered the seedlings and stunted the corn. They would each begin taking in what remained of their crops in a few days and it looked as if the harvest would be the worst one on record. There was not a thing now that could be done, that much was clear: the weather had already all but ruined them. They walked along, silent. They were not great talkers, even in the best of times. At the place where their paths diverged, John turned to Olaf and said, simply, 'Well, not much we can do now, eh?' And Olaf simply replied, 'Aye, John, *the goose hangs high*'. 'Well, goodnight'. 'Goodnight'. And they parted.

5.2.2. Second phase: Testing transparency

We hypothesized that to the extent that subjects learned one meaning as the 'correct' meaning, they would think that uninformed listeners would be more likely to attribute this meaning to the idiom. To test this, subjects read about a person using the idiom in conversation, but in a context that did not reveal its meaning. They were asked to predict the meaning that an overhearer would assign to the idiom. All subjects received the same set of test scenarios regardless of the biasing scenario they read in the first phase. For example, the test scenario for *the goose hangs high* was:

> You've been composing a new piece of music for four months now. Your friend asks you how the song is coming along. You answer, 'The goose hangs high'. Sitting not three feet away is a stranger. What would this stranger most likely think the phrase 'the goose hangs high' means?

As in the first phase, they indicated their choice by choosing one of the three meanings.

Subjects' predictions about others' interpretations were in fact consistent with what they believed to be the meaning of the idioms. Consider, for example, the results of *the goose hangs high*. Sixty-two percent of the subjects predicted that the stranger would think that the idiom's meaning was the same one that they learned in the first phase. In contrast, only 38% predicted that the stranger would understand

the idiom to have a different meaning. This is exactly the pattern of results one would expect if believing that an idiom means P makes P a more sensible and –P a less sensible meaning.

Overall, the goose hung high for us. Twelve of the fifteen idioms (80%) showed a pattern of results in the same direction as *the goose hangs high*. Only 20% of the idioms yielded the opposite pattern. Hence, subjects saw the meaning they learned as more sensible than the opposite meaning, and thus predicted that an uninformed person would perceive it to be more sensible as well.

Recall the original goal of the study. We argued that idioms could mean the opposite of what they actually do and still be transparent. *Keep someone at arm's length* could have transparently meant 'ensure a very close and intimate relationship', had we not known its actual meaning. We demonstrated this for unfamiliar idioms and would like to claim that the result generalizes to common idioms. Even an idiom such as *spill the beans* could have meant the opposite of what it actually means and still be transparent. Contrary to the native speaker's intuition, then, *spill the beans* could have sensibly meant 'to keep a secret', provided that it had not meant 'to reveal a secret' to start with. Therefore, our intuitions of transparency may not directly reflect conceptual constraints. If this is true, then idioms are inappropriate indicators of conceptual mapping. Idioms may not reveal independently existing conceptual structures that motivate the connection between the expression and its meaning. The reason for this is that when a meaning *does not make sense* it *does not* indicate the lack of motivating conceptual structures.

To appreciate the problem that these results pose for any approach that infers conceptual structures from idioms, consider the other side of the coin. Our results suggest that had *spilled the beans* meant 'to keep a secret' then not only would it have made sense, but 'reveal a secret' would not have made sense. This would happen precisely in the same way and for the same reason that the meaning 'to keep a secret' does not make sense to us now. This is a problem for theories that postulate motivating conceptual structures, because the discovery of underlying conceptual structures seems to depend on knowing the meaning of the idiom. This raises the possibility that meanings may suggest conceptual structures that do not exist independently, but rather are the *result* of knowing the meaning. They only *seem* to have independent existence because we do not recognize the effect of knowing the meaning of the idiom.

5.2.3. A potential problem with unfamiliar idioms

One might argue that a study with unfamiliar idioms does not generalize to common idioms. The literature on 'language death' (e.g., Schmidt, 1985) suggests that changes in the conceptual system of native speakers of a language result in the death of certain expressions. It is possible that the disappearance of conceptual structures resulted in the elimination of the idioms that we used. It could be, then, that our unfamiliar idioms yielded the expected result *because* the conceptual structures that motivated them no longer exist. In contrast to such unmotivated expressions, common transparent idioms that are motivated by conceptual mappings, may not have shown the same pattern of results. Therefore, in accord with intuition, different from

unfamiliar idioms, *spill the beans* would have been opaque had it meant 'to keep a secret'.

There are two complementary reasons to reject such a criticism. First, the fact that the idiom *the goose hangs high* died in the past does not mean it cannot be motivated by GOOD IS UP in the present. If GOOD IS UP motivates 'higher expectations', it should do the same for *the goose hangs high*. The second reason is that if one *assumes* that our unfamiliar idioms are not motivated by conceptual structures, then the study poses a different problem because these unfamiliar idioms *were* transparent to our subjects. The real meanings of these idioms did make sense to our subjects when they thought that they were their actual meanings. If conceptual structures do not play a role in the understanding of unfamiliar idioms, then this study demonstrates that idioms may be perfectly transparent once one learns their meaning, even without motivating conceptual structures. This suggests that some idioms in common use are of this sort – expressions that are transparent but are not motivated by systematic conceptual mapping. They are transparent only because people already know the meaning and are able to construct a 'story' to make sense of them. To see that this is possible, simply imagine that we introduce one of our unfamiliar idioms into the language. It would make perfect sense to native English speakers that *to eat someone's salt* means 'to share someone's food and drink'. This idiom would be accepted as transparent. This is a problem because there is no principled way to distinguish between such apparently motivated idioms and those that are truly conceptually motivated. In that case, *spill the beans* may be one of these pseudo-motivated idioms.

6. Idioms as mirrors

We have argued that idioms are not windows through which one may observe conceptual structures that exist independently of the linguistic expressions. Instead, consider the possibility that idioms function more like mirrors. They reflect structures that are projected onto them by the native speaker. Because we know what an idiom means, we may be predisposed to look for, and find, a particular structure in the idiom. In some cases we may even impose a structure on an idiom in order to make sense of it. To achieve this we have a variety of strategies at our disposal, strategies which we could use in an ad hoc fashion on a case-by-case basis. Because of the nature of our interpretive system, once we make sense of an idiom in one way it may be difficult to conceive of alternative ways to understand it. This very consequence of the process of making sense of idioms may enhance the apparent transparency of the actual meaning and may lead us to believe that the meaning reflects an inherent conceptual structure. In this sense, idioms may reveal the operations and consequences of the mind's strategies of making sense of seemingly arbitrary constructions (see Clark, 1983).

6.1. Strategies without knowledge of the meaning

Native speakers have a variety of strategies at their disposal to make sense of idioms. For example, as with some metaphorical constructions, people may consider

whether the literal interpretation of an expression could stand as a special case for a more general principle (Cacciari and Glucksberg, 1991; Keysar and Glucksberg, 1993). A crew that deserts a sinking ship is an instance of *giving up the ship*. In order to discover the range of such strategies, it may be best to avoid the constraining effect of knowing the meaning of the idiom. To explore this issue, one of us (BK), in collaboration with Cristina Cacciari and Sachi Kumon asked people to interpret unfamiliar idioms. We presented unfamiliar idioms without their meanings and people attempted to construct their meanings. People's interpretations and explanations indicated that they were using a small set of strategies.

Cacciari (1993) expanded that study and described a set of strategies that emerged. One such strategy was to search for a similar, known idiom. For instance, when subjects attempted to interpret *to go by the board*, they often recalled the idiom *to go by the book*. This link led them to interpret the idiom as meaning 'to do things according to plan' – as planned on the drawing board. The idiom's true meaning is 'to get lost or ruined', which is the result of getting washed off the board of a ship. Irrespective of accuracy, the interpretive path that subjects took may be revealing about the strategies available to them. Another such strategy was to focus on the semantics of one word in the idiom that may give one the general idea of what the idiom conveys. For example, *to leave a clean pair of heels* means 'to run away and disappear'. Some of our subjects focused on the word *clean*, which led them to a general notion of tidiness, doing a job properly, or being somewhat innocent. These strategies and others may be at people's disposal when they attempt to make sense of unfamiliar idiomatic expressions.

6.2. *The constraining effect of knowledge of the meaning*

In the main study described in this paper, we presented people with unfamiliar idioms and their meanings. Knowing the meaning most likely restricted people's sense making strategies to those that are relevant in making a connection between the idiom and its purported meaning. We would like to argue that the same holds for commonly used idioms; because people know what these expressions mean, they can only see the potential relevance of a small set of strategies. Had people not known the meaning, or had they believed that an idiom had a different meaning, they might have noticed the relevance of a different subset of strategies. The product of this constrained process is 'reflected' back from the idiom and appears to reveal inherent underlying structure. One way to realize that the reflected structure is a function of knowing the meaning is to consider the change in reflection that results from a change in the meaning. We will address this by illustrating how knowledge of the idiom's meaning affects the status of the idiom's 'elements'.

The more easily people can map pieces of form onto pieces of meaning, the more confident they are that the expression makes sense. Yet, the very breakdown into components is dependent on the meaning of the idiom. In this sense, the components may make sense of the idiom, by connecting the expression to its meaning; at the same time the very nature of the components may depend on what they attempt to clarify. We will illustrate this in three ways: We will show that the very interpreta-

tion of the components depends on the meaning, as well as the identification of the components (i.e., parsing of the idiom) and the weights assigned to each element.

6.3. Interpreting the elements

The elements of *spill the beans* are easy to detect. 'Spill' corresponds to the action of revealing and 'beans' stands for the exposed secrets (e.g., Wasow et al., 1983). We suggest that it is hard to conceive of the idiom as meaning the opposite because we already have this mapping. It does not seem to make sense to say that *spill the beans* could mean 'to keep secrets'. To make sense of this potential interpretation, we might attempt the same kind of mapping. 'Secret' might map again onto 'beans', because it is the object and perhaps because 'beans' is already so strongly associated with 'secrets' in this context. But this would not allow us to complete the mapping because 'keep' and 'spill' hardly correspond. However, the opposite meaning could make sense with a different mapping altogether. Suppose that beans stand not for the secrets, but for distractors, camouflage or pseudo-secrets. By spilling the beans, or the distractors, one manages to keep the real secrets. With this reinterpretation, one could see how spilling the beans could mean 'keeping a secret'. We hypothesize that had this idiom not been in common use, and had we 'informed' people that it means 'to keep a secret', people would have naturally arrived at such an interpretation of the elements that would have allowed them to make sense of it. In this sense, the very interpretation of the elements depends to a large extent on knowledge of its meaning.

6.4. Identification of the elements

We demonstrated how the same elements may receive different interpretations. While 'beans' is the object and 'spill' the action in both cases, they represent different things depending on the meaning of the idiom. Knowing the meaning of an idiom may not only lead to a specific interpretation of the elements; it may even induce people to identify different sub-parts of the idiom as its functional elements. In other words, it may induce differential parsing. Consider an unfamiliar idiom that we used in our study. *To play the bird with the long neck* means 'to be out looking for someone or something'. It makes sense because one can imagine the bird stretching its neck curiously, which suggests an analogy with someone who is looking for something. In this case, 'the bird' is an independent element which may stand for a person, and 'the long neck' is an independent element that may stand for the activity of looking all around. The opposite meaning of this idiom can also make sense. One can see that the idiom could have meant 'to avoid encounters', if *the bird with the long neck* had evoked an ostrich, suggesting an animal that avoids things by hiding its head in the sand. Here, the idiom not only has a different meaning, but it is parsed differently. 'The bird' and 'the long neck' are no longer two elements that contribute to the meaning of the idiom. Instead, "the bird with the long neck" as a whole stands for ostrich. The fact that the neck is long as opposed to short is not important for the meaning of the idiom; it is only a pointer to a particular bird.

6.5. Differential focus

In addition to its effect on identification and interpretation of an idiom's elements, knowledge of 'the' meaning of an idiom could determine the weight or importance of the idiom's components. The meaning of an idiom can increase an element's importance by making it a focal element. When *applaud to the echo* is thought to mean what it really means, 'to demonstrate high acclaim', the focal element is 'applaud'. In order to make sense of the idiom, we focus on whatever is most semantically related to the meaning. In this case, applauding is what we often do when we wish to demonstrate high acclaim. In contrast, had the idiom meant 'to criticize or ridicule', the focal element would be 'echo', which connotes vacuity and emptiness. When one focuses on one of the elements, the remaining components become less important. This is in part why the same elements can support two opposite interpretations. For example, while 'applaud' is central in conveying the idea of 'high acclaim' when the idiom has its actual meaning, taking 'applaud' out of focus allows the idiom to have the opposite meaning. Similarly, when "echo" is out of focus with the real meaning, the idea of 'emptiness' is not part of the meaning.

We said that differential focusing of elements is only a partial reason for why 'echo' and 'applaud' make sense in two opposite interpretations. This idiom also illustrates the combined effect of focusing and reinterpretation of elements. When one criticizes or ridicules by applauding to the echo, 'echo' is interpreted negatively. When one demonstrates high acclaim, one applauds vigorously, so as to produce an echo. In this case the presence of the echo is not negative but the result of a positive action. 'Echo' then, may be interpreted differently depending on the meaning of the idiom. Together, reinterpretation and focusing are powerful tools for making sense of idioms.

7. Conclusions

7.1. Idioms and conceptual structures

We have used the conceptual metaphor approach (e.g., Lakoff and Johnson, 1980a) as an example, but our arguments apply to any theoretical attempt to link idioms with conceptual structures. Such theories suggest that idioms reveal conceptual structures because these structures motivate the idiomatic expression and its meaning: The link between the idiom and its meaning is systematically constrained by conceptual structures. If this is true, then conceptual structures should constrain not only the link between the expression and what it actually means – they should also constrain the link between the expression and what it *could* mean. They should underlie any meaning that preserves the idiom's transparency, such as 'release someone from captivity' for *spill the beans*. This implies that when an idiom's meaning *does not* make sense, it could not be motivated by such conceptual structures. We have argued that this does not hold. The same meaning may make sense under some circumstances and not under others. For example, some meanings make sense once

they are 'declared' as the official meaning of an idiom, and they seem opaque otherwise. The reasons for the perceived transparency or lack of transparency of idioms, then, may have less to do with conceptual motivation than with the nature of interpretive strategies.

7.2. *The nature and consequences of transparency*

We argued that idioms may be good candidates for revealing our repertoire of strategies for making sense of linguistic expressions. One can explore what possible meanings are transparent for specific idioms and what strategies are invoked to make the different links. An interesting finding concerning the interpretive system is that once the system makes sense of one meaning, other potential meanings of the idiom become less sensible. This by itself may induce the intuition that an idiom reveals an inherent structure – yet this intuition may simply reflect the knowledge of the meaning to begin with.

We end with an example that illustrates the constraining effect of the interpretive system. Recall our discussion regarding expressions that use the form '(action) against X', as in *swim against the current* and *go against the grain*. We suggested that the basic form of doing something against X could only mean 'doing something in the face of opposition', and could never convey the opposite meaning 'doing something with no opposition, with relative ease'. Furthermore, had there been an expression that meant the opposite, and had that expression used this construction, then it should be opaque. Consider the expression *to go against traffic*. Commuters always try to go against traffic, because then they drive in the opposite direction of the heavy traffic. In other words, when one goes against traffic one drives with relative ease and with no opposition. What is striking about this example is not that it means the opposite of the typical expression that uses 'go against X'. Instead, what is striking about the expression is that it makes perfect sense – it is transparent. Why is it transparent? Because we can tell a story that would make it so. Why did it take us so long to think about this example? Because our intuition told us that when one goes against X, one encounters opposition. This knowledge prevented us from considering alternatives.

References

Akmajian, Adrian, Richard A. Demers and Robert M. Harnish, 1987. Linguistics: An introduction to language and communication. Second edition. Cambridge, MA: The MIT Press.

Brame, Michael K., 1978. Base generated syntax. Seattle: Noit Amrofer.

Bresnan, Joan, 1981. The mental representation of grammatical relations. Cambridge, MA: MIT Press.

Cacciari, Cristina, 1993. The place of idioms in a literal and metaphorical world. In: C. Cacciari and P. Tabossi, eds., Idioms: Processing, structure, and interpretation. Hillsdale, NJ: Erlbaum.

Cacciari, Cristina and Sam Glucksberg, 1991. Understanding idiomatic expressions: The contribution of word meanings. In: G.B. Simpson, ed., Understanding word and sentence: Advances in psychology 77. Amsterdam: North Holland.

Cacciari, Cristina., and Patrizia Tabossi, eds., 1993. Idioms. Hillsdale, NJ: Erlbaum.

Chomsky, Noam, 1980. Rules and representations. New York: Columbia University Press.

Clark, Herbert H., 1983. Making sense of nonce sense. In: G. B. Flores d'Arcais and R.J. Jarvella, eds., The process of language understanding. London: Wiley.

Clark, Herbert H. and Eve V. Clark, 1977. Psychology and language: An introduction to psycholinguistics. New York: Harcourt Brace.

Coulmas, Florian, 1981. Idiomaticity as a problem of pragmatics. In: Herman Parret, M. Sbisà and J. Verschueren, eds., Possibilities and limitations of pragmatics: Proceedings of the Conference on Pragmatics, Urbino, July 8–14, 1979. Amsterdam: Benjamins.

Cruse, D.A., 1986. Lexical semantics. Cambridge: Cambridge University Press.

Culicover, Peter, 1976. Syntax. New York: Academic Press.

Cutler, Anne, 1982. Idioms: The colder the older. Linguistic Inquiry 13: 317–320.

Dickens, Charles, 1967. The Oxford illustrated Dickens: The old curiosity shop. London: Oxford University Press.

Fraser, Bruce, 1970. Idioms within a transformational grammar. Foundations of Language 6: 22–42.

Gibbs, Raymond W., 1980. Spilling the beans on understanding and memory for idioms in conversation. Memory and Cognition 8: 449–456.

Gibbs, Raymond W., 1992a. What do idioms really mean? Journal of Memory and Language 31: 485–506.

Gibbs, Raymond W., 1992b. Categorization and metaphor understanding. Psychological Review 99: 572–577.

Gibbs, Raymond W., 1994. The poetics of mind. Cambridge: Cambridge University Press.

Gibbs, Raymond W. and Gayle P. Gonzales, 1985. Syntactic frozenness in processing and remembering idioms. Cognition 20: 243–259.

Gibbs, Raymond W. and Nandini P. Nayak, 1989. Psycholinguistic studies on the syntactic behavior of idioms. Cognitive Psychology 21: 100–138.

Gibbs, Raymond W. and Nandini P. Nayak, 1991. Why idioms mean what they do. Journal of Experimental Psychology: General 120: 93–95.

Gibbs, Raymond W. and Jennifer E. O'Brien, 1990. Idioms and mental imagery: The metaphorical motivation for idiomatic meaning. Cognition 36: 35–68.

Glucksberg, Sam, 1991. Beyond literal meaning: The psychology of allusion. Psychological Sciences 2: 146–152.

Glucksberg, Sam, Mary Brown and Matthew S. McGlone, 1993. Conceptual metaphors are not automatically accessed during idiom comprehension. Memory and Cognition 21: 711–719.

Glucksberg, Sam, Boaz Keysar and Matthew S. McGlone, 1992. Metaphor understanding and accessing conceptual schema: Reply to Gibbs (1992). Psychological Review 99: 578–581.

Heringer, J., 1976. Idioms and lexicalization in English. In: M. Shibitani, ed., The grammar of causative constructions (Syntax and semantics 6), 205–216. New York: Academic Press.

Hiraga, Masako K. and Joanna Radwanska-Williams, eds., 1996. Literary pragmatics: Cognitive metaphor and the structure of the poetic text. Special issue of Journal of Pragmatics 24(6).

Jackendoff, Ray S. and Deborah J. Aaron, 1991. Review of *More than cool reason: A field guide to poetic metaphor* by George Lakoff and Mark Turner. Language 67: 320–338.

Katz, Jerrold, 1973. Compositionality, idiomaticity, and lexical substitution. In: S. Anderson and P. Kiparsky, eds., A festschrift for Morris Halle. New York: Holt.

Keysar, Boaz and Bridget Bly, 1995. Intuitions of the transparency of idioms: Can one keep a secret by spilling the beans? Journal of Memory and Language 34: 89–109.

Keysar, Boaz and Sam Glucksberg, 1993. Metaphor and communication. Poetics Today 13: 633–658.

Keyser, Samuel Jay and Paul M. Postal, 1976. Beginning English grammar. New York: Harper.

Kövecses, Zoltán, 1986. Metaphors of anger, pride and love. Amsterdam: Benjamins.

Kreuz, Roger J. and Arthur C. Graesser, 1991. Aspects of idiom interpretation: Comment on Nayak and Gibbs. Journal of Experimental Psychology: General 120: 90–92.

Lakoff, George, 1987. Women, fire, and dangerous things. Chicago, IL: University of Chicago Press.

Lakoff, George and Mark Johnson, 1980a. Metaphors we live by. Chicago, IL: University of Chicago Press.

Lakoff, George and Mark Johnson, 1980b. The metaphorical structure of the human conceptual system. Cognitive Science 4: 195–208.

Lakoff, George and Mark Turner, 1989. More than cool reason: A field guide to poetic metaphor. Berkeley, CA: University of California, Berkeley.

McGlone, Matthew S., 1996. Conceptual metaphors and figurative language interpretation: Food for thought? Journal of Memory and Language 35: 544–565.

McGlone, Matthew S., Sam Glucksberg and Cristina Cacciari, 1994. Semantic productivity and idiom comprehension. Discourse Processes 17: 167–190.

Murphy, Gregory L., 1996. On metaphoric representations. Cognition 60: 173–204.

Nayak, Nandini P. and Raymond W. Gibbs, 1990. Conceptual knowledge in the interpretation of idioms. Journal of Experimental Psychology: General 119: 315–330.

NTC's American Idioms Dictionary, 1990. Chicago, IL: NTC Publishing group.

Ortony, Andrew, 1988. Are emotion metaphors conceptual or lexical? Cognition and Emotion 2: 95–103.

Ortony, Andrew, Diane L. Schallert, Ralph E. Reynolds and Stephen J. Antos, 1978. Interpreting metaphors and idioms: Some effects of context on comprehension. Journal of Verbal Learning and Verbal Behavior 17: 465–477.

Oxford Dictionary of Current Idiomatic English, 1990. Oxford: Oxford University Press.

Popper, Karl Raimund Sir, 1959. The logic of scientific discovery. New York: Basil.

Quinn, Naomi, 1991. The cultural basis of metaphor. In: J. W. Fernandez, ed., Beyond metaphor. Stanford, CA: Stanford University Press.

Reagan, Robert T., 1987. The syntax of English idioms: Can the dog be put on? Journal of Psycholinguistic Research 16: 417–441.

Schmidt, A., 1985. Young people's Dyirbal. Cambridge: Cambridge University Press.

Schweigert, Wendy A., 1986. The comprehension of familiar and less familiar idioms. Journal of Psycholinguistics Research 15: 33–45.

Swinney, David A. and Anne Cutler, 1979. The access and processing of idiomatic expressions. Journal of Verbal Learning and Verbal Behavior 18: 523–534.

Turner, Mark 1987. Death is the mother of beauty: Mind, metaphor, criticism. Chicago, IL: University of Chicago Press.

Wasow, Thomas, Ivan Sag and Geoffry Nunberg, 1983. Idioms: An interim report. In: S. Hattori and K. Inoue, eds., Proceedings of the XIIIth International Congress of Linguistics, Tokyo.

Boaz Keysar is an Associate Professor of Psychology at the University of Chicago. He received his Ph.D. in Cognitive Psychology from Princeton University in 1989. His research is on the way people use language, with a focus on figurative language and processes of perspective taking.

Bridget Martin Bly received her Ph.D. in Cognitive Psychology from Stanford University in 1993. She now works for a private research firm in Brookline, Massachusetts.