Chapter 3
ARGUMENT STRUCTURE

3.1 THREE TALES OF SEMANTIC DECOMPOSITION: CAUSATIVES, COERCION, AND METAPHORS[1]

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Abstract
Virtually all accounts of lexical causatives, semantic coercion, and metaphors assume that feature decomposition underlie semantic representation. We present psycholinguistic data rejecting the idea that understanding a sentence entails the recovery of the semantic features of its token lexical constituents, or the sensitivity of these constituents to particular contextual demands. Instead, we support a view of sentence comprehension that relies on atomic, non-decompositional semantic representation of lexical items and their contribution to a compositional semantic representation of sentences. We contend that analytic entailments commonly attributed to lexical-semantic complexity are better viewed as pragmatic inferences—which support comprehension beyond linguistic computations.

Keywords
sentence comprehension; semantic decomposition; causative verbs; semantic coercion; metaphors; pragmatics; psycholinguistics.

1. Introduction

Once upon a time, there were strong linguistic arguments for doubting that causative verbs such as *kill* were semantically represented by a definitional template such as [[*x* ACT] CAUSE [*y* BECOME <*die*>]] (Fodor, 1970). Fodor's arguments were based on the distribution of *kill* and its periphrastic counterpart, *cause to become dead*, which were supposed to be represented by the same structure. In short, if *kill* is represented semantically by a definition such as *cause to become dead* and if the definition itself was represented by primitive constituents, it was expected that *kill* and *cause to become dead* behave the same way—and entail the same state of affairs—in linguistic expressions of which they were constituents. This was not the case. Nonetheless, linguistic arguments for the decomposition of causatives have persisted to this day (e.g., Levin & Rappaport Hovav, 2005), notwithstanding some psycholinguistic evidence and theoretical arguments to the contrary.

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A less prominent but nonetheless equally fertile ground for lexical-semantic decomposition theories comes from the so-called semantic coercion phenomenon. In semantic coercion, the alleged case of semantic decomposition of nominals comes from the interpretation of sentences such as *The man began the book*. The verb *begin* is said to "coerce" the entity *book* (*x*) to be interpreted as *an activity performed with x* (e.g., Jackendoff, 1997). This coercion process is supposed to rely on the semantic analysis of the entity, which makes available information about what that entity is typically used for, thus licensing an interpretation of *The man began the book* as *The man began reading the book* (Pustejovsky, 1995, 2002). However, empirical evidence for this sort of semantic decomposition is slim, at best. We believe that even if supporting evidence for this kind of process is real, it can be accounted for by a structural analysis of the predicates and with the aid of pragmatic inferences that make *begin the book* to be abductively interpreted as *begin reading the book*.

And finally, there are metaphors of the form *x is y*, such as *life is a journey*. The dominant view is that it is because *journey* can be understood as a set of features such as {*long*, *arduous*, *adventurous*, etc} that *life* is understood as being predicated by the features that *journey* projects onto it (see, e.g., Tversky, 1977). This view also assumes that the analytic entailments of *journey*—i.e., its hypothesized semantic features—can actually determine the interpretation of *the metaphor* directly, without one having to compute its literal meaning (Glucksberg, 2003). Here again we take it that the structure of the metaphorical expressions can account for a predicative interpretation without relying on the decomposition of its constituents; we assume that a literal representation of the expression is a necessary step in its understanding, for the meaning of a metaphor is primarily form-driven.

In this chapter we analyze these three *tales* of semantic decomposition; we discuss some recent experimental results from our laboratory suggesting that there is no clear supporting evidence for decompositional analyses of lexical-semantic representation. We suggest instead an atomistic—i.e., non-decompositional—account of semantic representation for causatives, for coercion effects, and for the interpretation of metaphors. We argue that an atomistic theory of lexical-semantic representation is preferred, for one is not committed to establishing an analytic/synthetic distinction for constituent features of concepts. We further stress the role of linguistic-structural properties of causatives, coerced, and metaphorical expressions, suggesting that semantic representation is to a large extent structurally determined, and work as a trigger to pragmatic inferences

supporting comprehension beyond linguistic representation.

2. Causatives

We begin with the semantic representation of causative verbs, which has been perhaps the most pervasive case for lexical-semantic decomposition in linguistics (e.g., McCawley, 1973; Levin & Rapppaport Hovav, 2005). The predicate decomposition story goes as follows: if a verb entails an act which causes a change of state in an object, then it is represented by a complex two-predicate semantic template, one encoding the action event and the other, the change of state event. Suffice it to say that causatives of this kind take an agent argument (who does the act) and an object argument, that which undergoes the change of state. So far, this is a representation of the argument structure of the verb—the structurally specified components of the verb that map onto the meaning of its carrier sentence. The lexical-semantic literature, however, assumes that the relation between these two arguments is encoded within a semantic or conceptual structure which contains two predicates, [*x* ACT] and [*y* BECOME < >], where "< >" represents the idiosyncratic information about the change of state event (or the "root" of the verb; e.g., *close*). In Levin and Rappaport Hovav's (2005: 69) analysis, the predicate CAUSE takes two arguments, an entity and an event, which are realized as the subject (*x*) and object (*y*) of the two sub-events and mapped onto the syntactic arguments of the surface verb. The key point of this analysis is that one verb is represented by a two-predicate structure at the semantic or conceptual level. But where do these two predicates come from? And what are the (semantic) consequences for the relation between the two arguments of the surface verb when these arguments are fillers of sub-events in conceptual structure?

Fodor's (1970) early analysis of the distribution of causatives showed that there were situations in which *x* can *cause y to become dead* without *x killing y*. For instance, if *kill* and *cause to die* are represented by the same semantic template (thus, if they are synonymous), *John caused Mary to die on Saturday by swallowing her tongue on Friday* predicts the anomalous *John killed Mary on Saturday by swallowing her tongue on Friday.* One can assume that this sort of analysis extends to all causatives, even those which enter into the so-called causative/inchoative alternation: thus, one can expect that $close_{tr}$ and *cause to become* $closed_{intr}$ also entail different state of affairs: for instance, *John closed the door* is not the same as *John caused the door to become closed*, because given contexts of the kind *John wanted the door to be closed and sent a petition to the*

condo president who, in turn, ordered the door to be closed, one can say that *John cause the door to become closed*, but one cannot say that *John closed the door.* While this line of argument suggests that definitional templates are bound to lead to the wrong semantic representations, if they are to be replaced by their lexical equivalents, this has not prevented semantic templates from becoming virtually universally accepted as modes of representation for causatives. We see little impact of this type of distributional evidence in current lexical-semantics.

In the psycholinguistics literature, there have been few attempts to investigate the assumption of predicate decomposition of causatives. Perhaps the main one has been the experiments reported by Fodor, Garrett, Walker, Parkes (1980), which assumed that if decomposition occurs there is a "shift" in the relations between the two arguments of the surface verb when they are mapped onto semantic representation. For instance, if *John killed Mary* is mapped onto [[*John* ACT] CAUSE [*Mary* BECOME <*dead*>]], then the agent of *kill* is now the agent of *ACT* (or the agent of *CAUSE*, depending on the analysis), while *Mary* is not the patient or object of *kill* but is the "agent" of the intransitive change of state event – *death*. The surface syntactic roles of the two arguments of *kill* do not hold their positions at the semantic level of a decompositional analysis.

Fodor *et al.* contrasted lexical causatives such as *kill* with "simple transitive" verbs, such as perception verbs, which are not decomposable, even for proponents of predicate decomposition. And because they predicted null effects—no difference between causatives and simple transitives—Fodor et al. employed a control procedure to verify whether or not their experimental techniques picked up structural differences between verbs if they were to occur. Their control comparison was a contrast between verbs that take a direct NP internal argument, such as *persuade*, and verbs that take sentential complements such as *expect*. They showed that *John*, in *Mary expected John to leave,* is not the object of *expect*, but it is the object of *persuade* (and controller of the subject of the infinitive clause) in *Mary persuaded John to leave*. In a task involving rating the closeness of pairs of words in the context of the sentence (e.g., *John-leave*, *Mary-leave*, etc.), they found that subjects were sensitive to the structural relations between *John and Mary* in the case of *expect* vs. *persuade*: subjects rated the two nouns to be structurally "closer" in *persuade* than in the *expect* type of sentences. But at the same time, subjects did not rate *John* and *Mary* to be any closer in *John heard Mary* than in *John killed Mary*, as it would be predicted if the two nouns were semantically represented as arguments of

different predicates in semantic structure. Some of the experiments reported by Fodor et al. (1980) were replicated by de Almeida (1999) and extended to new materials and techniques. Overall, the structural differences shown in the *expect/persuade* contrast were not observed in the *causative/perception* contrast, neither using off-line rating and forced choice tasks, nor in online cross-modal and priming tasks.

More recently, two studies have attempted to investigate semantic-template complexity employing other timed techniques. For instance, McKoon and Macfarland (2002) presented participants with two types of causative sentences, one which they argued denoted an externally caused change of state event as in (1a) and one which denoted an internally caused change of state, as in (2a), with semantic templates such as (1b) and (2b) representing their analyses. They found that the more complex type of sentence (1a) took longer to accept then the simplex type of sentence (2a).

1a. The cement crumbled
1b. [[x ACT] CAUSE [y BECOME <crumble>]]
2a. The potatoes rotted
2b. [x BECOME <rot>]

We are not certain these analyses are representative of these verbs' conceptual encodings. One might assume that the representation of the difference between "externally caused" and "internally caused" changes of state require knowledge of the physical and biological properties of the relevant objects. And we are not simply referring to some sort of naïve physics and biology, for we assume knowledge of how the molecules of individual objects might breakdown requires knowledge of the kind Putnam (1970) said might be only in the minds of specialists (although we suspect that *rot* is the act of external agents such as bacteria).

Even if we take the results they obtained at face value—i.e., the difference between the two classes of change of state predicates—we doubt that predicate decomposition is the only plausible explanation on offer. The "internally caused" change of state class could only take one argument—they are *unaccusatives*—and thus they could require less time to process than the "externally caused" class which in principle could partake in transitive and intransitive structures.

Similarly to McKoon and Macfarland (2002), Gennari and Poeppel (2003) found that differences in semantic template complexity predict verb reading

times. For instance, they found that a sentence such as (3) takes longer to read at the verb position than a sentence such as (4), for their supposed semantic templates suggest that *events* are more complex than *states*. The same result was also found outside the sentential context, in a simple lexical decision task on the verb.

3. *The older daughter interrupted her father*
4. *The older daughter resembled her mother*

We investigated semantic template complexity in two studies: one employing a technique similar to Kintsch's (1974, Chapter 7), manipulating recall as a function of propositional complexity, an another using an auditory acceptability judgment (de Almeida & Turbide, 2004; de Almeida & Dwivedi, 2006). In these studies participants were presented with causative sentences such as (5) and transitive perceptual sentences such as (6).

5a. *The cook boiled the soup*
5b. *The cook thickened the soup*
5c. *The cook caused the soup to boil*
6a. *The cook tasted the soup*
6b. *The cook re-tasted the soup*
6c. *The cook tasted the soup again*

If recall was a function of semantic/propositional complexity, as obtained by Kintsch, and if (5a)-(5c) were represented by the same semantic template, they should be recalled equally well, but better than sentences in (6), which have simple transitive verbs. A similar prediction was made for the acceptability experiment: acceptability times should be a function of purported semantic template complexity. But it was found that lexical causatives are in fact better recalled than their morphological (5b) and periphrastic (5c) counterparts. And this effect could not be attributed simply to surface or morphological complexity because no difference in recall for sentences in (6) was found. A similar pattern of results was obtained in the acceptability studies: sentences with lexical causatives were accepted faster than both morphological and periphrastic causatives, with no difference between the two complex causatives, (5a) and (5b); there was no difference either between the three transitive sentences.

The previous studies aimed at showing that experimental data do not

support a processing cost for lexical decomposition. In the remainder of the section, we present additional experimental evidence casting doubt on the role of decomposition but also shedding light on another dimension of verb representation and verb structural properties that may account for processing difficulties.

Argument-structure and argument realization, but not semantic-template complexity seems to be the key factor affecting verb processing. For instance, in a recent study (Manouilidou & de Almeida, 2010) we contrasted the effects of semantic complexity and non-canonical argument realization in a self-paced reading task by comparing reading times in agentive verbs with and without change of state (e.g. *kill* .vs. *kiss*) to verbs with and without non-canonical argument realization (e.g. *frighten* vs. *fear*). Results showed that it is non-canonical argument realization that increases the processing cost and not the alleged change of state component of verb meaning.

Moreover, further evidence for the effect of canonicity in argument realization, beyond the lack of decomposition effects, has been demonstrated in pathological populations. Alzheimer's patients appear to have more difficulty with *experiencer* verbs—i.e., verbs that do not take an agent argument but take an *experiencer* argument such as verbs of perception (*see*) and psychological verbs (*watch*)—than with causatives, which are supposed to have more complex structures (Mobayyen, 2007). Alzheimer's patients also find psychological verbs—which are *non-canonical* in terms of argument realization—more difficult than agentive verbs (e.g., *kick*). These patients also seem to be affected by the relative position of the non-canonical *experiencer* argument: sentences with object-experiencer (7a) are more difficult than those with subject experiencer (7b) (see Manouilidou, de Almeida, Schwartz, & Nair, 2009; Manouilidou & de Almeida, 2009).

7a. The performance amused the spectators
7b. The spectators enjoyed the performance

Although linguistic arguments and cross-linguistic data abound, psycholinguistic evidence is not consistently in favor of semantic decomposition, with several studies rejecting the predicate decomposition hypothesis. What we take to be complex about a verb is its argument structure, whereby number of arguments or even the type and canonicity of the structural realization of these arguments might affect sentence processing, as shown by Manouilidou et al. (2009). We take this picture to be representative of the state of the art of lexical

semantic hypotheses about predicate decomposition and verb complexity. But as paradigmatic as is, it is not the whole story about semantic decomposition. We now turn to a less prominent, but nonetheless equally pervasive case for semantic decomposition.

Coercion

A sentence such as *John began the book* is often taken to license an interpretation such as *John began reading the book.* The usual claim is that this supposedly licensed interpretation is afforded by the internal analysis of the nominal *book*, which makes information about its own nature and use—what Pustejovsky (1995) called *qualia* structure—available to the semantic representation of the sentence. This view of semantic composition—an enriched form of compositionality—is by and large adopted by several researchers, both in linguistic circles and in psycholinguistic and neurolinguistic experimentation. This view—which we can call *lexical-semantic* for its reliance on lexical-semantic decomposition—contrasts with a semantic minimalist perspective, which takes so-called coercion effects to be the result of pragmatic inferences over indeterminate sentences. This second perspective—which we can call *pragmatic*—assumes that sentences such as (8a) contain VP structures such as (8b), which take the verbal gap (represented by *e*) to trigger pragmatic inferences thus helping determine the implicatures of the sentence (de Almeida & Dwivedi, 2008). We assume that these implicatures are structurally determined, although the range of possible interpretations cannot be.

8a. The man began the book
8b. [VP [V^0 began [V^0 e [OBJ the book]]]]

The majority of empirical studies on coercion are taken to support the lexical-semantic view (McElree et al., 2001; Pickering et al., 2005; Traxler et al., 2002; Traxler et al., 2005). McElree et al. (2001), for example, employed a self-paced reading technique contrasting sentences such as (9) aiming to show delayed reading times at post-verbal positions for "coerced" sentences (9a) compared to "preferred" sentences (9b) (according to their fill-in the blank norms) and "non-preferred" sentences (9c). The authors interpreted delayed responses at or after *memo* in (9a) to reflect coercion processes, whereby information is extracted from the lexical representation of the object *memo* and interpolated into the structure yielding an interpretation such as (4d).

9a. The secretary began the memo before the annual sales conference
9b. The secretary typed the memo before the annual sales conference
9c. The secretary read the memo before the annual sales conference
9d. The secretary began typing the memo before the annual sales conference

A similar effect was found by Traxler et al. (2002) using an eye-tracking paradigm also with sentences such as those in (9). As noted by de Almeida and Dwivedi (2008), Traxler et al.'s results showed that only *second-pass* and *total time* reading times associated with the *verb* region were significantly longer in (9a) compared to (9b) and (9c). That is, the verbs are shown to be different (or engender different reading times) either because the verb *classes* are different or because they trigger a more complex process of interpretation—which is compatible with both the lexical-semantic *and* the pragmatic views of coercion mentioned above. At the NP region (*the memo*), where alleged coercion effects are supposed to be triggered, only *first-pass regressions* (i.e., a re-entry into the region after an initial fixation) were statistically longer for coerced sentences relative to controls, but only in pairwise analyses between types of constructions. It is important to note that Traxler et al.'s study showed no statistically significant differences in first-pass time analyses, suggesting that, if coercion effects are obtained, they occur relatively late, at a second, not first reading of the crucial regions of the sentence.

In a study employing self-paced reading with materials modified from McElree et al.'s (2001) study, de Almeida (2004) did not replicate McElree et al.'s effects of delayed reading at post-verbal positions for sentences such as (9a). These results are in consonance with Traxler et al.'s lack of difference in first-pass reading times for these constructions. In a second experiment, employing contexts such as (10) preceding the target sentences in (9), de Almeida (2004) found that a preferred construction such as (9b) is read significantly faster than both coerced and non-preferred sentences.

10. The secretary would always be sure to work ahead of schedule. She was asked to work on a memo.

De Almeida (2004) and de Almeida and Dwivedi (2008) suggest that the found difference between preferred (9b) and both coerced and non-preferred ((9a) and (9c)) sentences can be attributed to contextual fit with reading times for preferred sentences having an advantage over the others. Thus, effects of coercion are not distinguishable from contextual inadequacy (or a pragmatic

violation within a context). If coercion effects were the product of lexical-semantic operations, then contextual information would not dispense with the process of lexical-semantic interpolation. If this was the case, delayed reading times for post-verbal positions in sentences such as (9a) would be above simply contextual incongruence and (9a) would still be different from (9b), which was not the case.

A recent fMRI study (de Almeida, Riven, Manouilidou, Lungu, Jarema, & Gillon, 2009) suggests that coerced structures produce similar effects as pragmatically anomalous sentences, increasing the BOLD signal in the right hemisphere and in the anterior cingulate cortex, an area which has been identified with high-level cognitive processes such as conflict monitoring (Botvinik, 2007). These areas were not significantly active in the cases of preferred and non-preferred sentences. Although we cannot take this result to be clear-cut evidence for greater pragmatic processes involved in coerced sentences, we assume these results are consistent with the view that these expressions require pragmatic inferencing to aid in the resolution of their indeterminacy, as suggested by de Almeida and Dwivedi (2008).

We can see that this view of indeterminate sentence resolution, relying on pragmatic inferences to support possible interpretations, can dispense with lexical-semantic decomposition. This view attributes to the computation of linguistic structure (including logical form) the role of tagging potential gaps in semantic interpretation. This is not entirely new: both in semantic and in pragmatic research several approaches to indeterminate sentence interpretation put emphasis on early linguistic computation to be the key determinant of later implicatures. These are derived from what is said—even if what is said is incomplete or has semantic gaps (see, e.g., Bach, 1994; Carston, 2002; Cappelen & Lepore, 2005). We take that coercion is one such phenomenon: not only does the argument structure of the verbs typically employed in these studies (aspectual verbs such as *begin*) license an internal predicate which is often non-lexicalized, but the *de facto* interpretation of sentences such as (9a) cannot but be abductively inferred taking into account all possible sources of information, chiefly the context of the utterance.

We turn now to our third *tale*: the interpretation of metaphors—an area in which the lexical decompositional account has flourished.

3. Metaphors

Metaphors of the form *x is y* (*life is a journey*) are often taken to be expressions whose semantic representations entail literally false statements. The

most common take on these expressions is that the predicative relation between *life* and *journey* relies on what is possibly an analysis of the feature constituents of *journey*—thus licensing an interpretation of *life* as something like "long, adventurous, etc"—in fact, whatever *journey* entails. So, what is predicated of the topic is not *journey* per se but what it entails, its own constituent features. This phenomenon can arise either as an explicit set of features, as in Tversky (1977), a categorization procedure, as in Glucksberg and Keysar (1990), or even in a process of alignment between *life* and *journey* properties, as in Gentner's model (e.g., Wolff & Gentner, 2000).

The key characteristic of this way of thinking about metaphors is that its implicatures (what is intended by the expression) are often taken to be derived from analytic entailments mostly from the vehicle (*y*). This is of course taken to be a necessary process in understanding *life* as being *long,* etc. But what if there is no semantic decomposition? How can one get the *intended* meaning—which is clearly not coming from a literal assertion about life being an actual journey? The gist of our view is that there is *only* a literal semantic representation of metaphors such as *x is y*. What is taken to be the metaphorical representation arises from the types of implicatures that the expression's formal representation triggers. This is a variant of what is known in the field as the *pragmatic* model (akin to what we discussed above) and it is credited mostly to Searle (1979) and Grice (1987).

Before we move to sketch our theory and present some supporting evidence, it is worth making explicit a key motivation for our investigating metaphors, in line with what we discussed in previous sections. The question is whether or not literal (viz., compositional) representation of a linguistic expression is a necessary step in understanding a metaphor (or an idiom, an irony, a metonymy, etc.), i.e., apparently non-compositional forms of expression. More specifically in the case of metaphors, the controversy is over the so-called primacy of the literal (see, e.g., Glucksberg, 2003): Can a metaphor be understood *directly*, that is, *qua metaphor* without requiring first the representation of its literal meaning? For instance, is it possible to understand *lawyers are sharks* without ever accessing the referential (i.e., denotative) meaning of *shark* (the fish)? To us, the short answer is *no.* But most researchers in the field, we believe, endorse a context-sensitive, or a *direct* process of figurative language understanding (e.g., Giora, 2003; Glucksberg, 2003), often bypassing a literal representation.

The fundamental claim of the *pragmatic* model is that understanding a metaphorical expression implies decoding its linguistic properties and mapping

it onto a literal form of representation—in fact mapping it onto the *only* representation that preserves the denotation and compositional structure of the constituents of the expression. According to this proposal (see Searle, 1979, for its most well developed version), the interpretation of a metaphor involves three stages: (a) literal interpretation, (b) followed by the realization of its contextual inappropriateness (or that literal interpretation is *defective*), (c) with suppression of the literal representation, and search for non-literal forms of interpretation (namely, implicatures). Let us assume for a moment that this is the only possible way to conceive the directionality from literal to metaphorical, or what Searle (1979) referred to as the process of looking for the utterance meaning (the speaker's intentions) after finding sentence meaning *defective*.

This view has been almost unanimously rejected. Glucksberg (2003), for instance, says that "there is a consensus in the field that literal meaning does not have unconditional priority" over figurative interpretation. And more: "metaphor comprehension can be as easy as literal" (p. 92). The "consensus" that Glucksberg talks about comes mostly from a lack of difference in judgment time between literal and figurative interpretations for different types of expressions. But the psycholinguistic experimentation supporting this "consensus" is rather murky.

For instance, both Orthony, Schallert, Reynolds, and Antos (1978) and Inhoff, Lima, and Carroll (1984), presented evidence that they assume goes against the pragmatic model. In an eye-tracking reading study manipulating strength of context preceding metaphorical and literal expressions, Inhoff, et al. (1984) found that when subjects are presented with a short supporting context such as (11a) and (11b), reading a sentence such as *The hens clucked noisily* takes longer when the context biases a metaphorical interpretation, than when it is biased towards a literal one. With long supporting contexts (12a)-(12b), however, they found no difference in processing time between the target expressions. They took this effect to support the view that given appropriate context, the metaphorical interpretation can be interpreted *directly*, without the need to process the literal form first.

11. a. At a meeting of the women's club, the hens clucked noisily
b. In the back of the barn, the hens clucked noisily

a. At a meeting of the women's club the youngest member requested the floor and brought up the issue of supporting the equal rights amendment. The importance of the issue outweighed her discomfort in speaking before the

group. They reacted as she expected. The hens clucked noisily.

b. In the back of the barn, the farmer's youngest child gathered pebbles and skipped them deftly across a puddle by the chicken coop. He knew that he was supposed to be feeding the animals but he kept on flicking at the birds. The hens clucked noisily.

To us, these results more readily support the *pragmatic* model proposed above: A strongly biasing context might simply speed-up the search for implicatures, while a weak/short context might delay that process, for the context itself might generate implicatures which are then matched against possible interpretations of what is said.

Another example of this "consensus" can be seen in the work on irony reviewed by Giora (2003). She assumes that a statement such as (12a) in a context in which, say, it is raining heavily would require the computation of Searle's three stages in the classical pragmatic fashion to yield an interpretation such as (12b).

12. *a. What a lovely day for a picnic*
b. What a lousy day for a picnic

In order to get to (12b), the hearer needs to suppress what (12a) says. In an experiment manipulating context followed by a target sentence (similar to Inhoff et al., 1984), Giora, Fein, and Schwartz (1998) found that no effect of suppression occurred, with the literal interpretation still available some time after the figurative (in this case, ironic) interpretation had been accessed. While Giora supports that access to the literal meaning occurs, she takes the apparent lack of suppression of this meaning (i.e., that *lovely* means LOVELY) to argue against the classic pragmatic model. She advances, instead, a model in which "saliency", based on frequency, contextual appropriateness and other usage factors determine the type of interpretation that will ensue after the metaphorical one.

We do not necessarily view the apparent failure to suppress a literal (hence, compositional) representation as posing any threat to the classic pragmatic model. In fact, it is possible that among the inferences that are triggered by the semantic representation of a given expression are the *actual* entailments consistent with its literal content; and thus, it may not be the case that the literal interpretation fails to be suppressed *tout court*. But then, those who assume a *direct* form of metaphor comprehension, may take an alternative route: Glucksberg and Keysar's (1990) model of metaphor comprehension, for example,

assumes that, because neither evidence for suppression nor evidence for the defectiveness-finding stage have been conclusive, the alternative is to consider metaphors such as *lawyers are sharks* as true instances of categorization. These are not false categorizations because the proposal is that the vehicle *shark* stands not for the fish but for a superordinate category representing the features commonly attributed to sharks. The word *shark* also serves to name a given category to which sharks belong (say, the category of *aggressive* things) and, by implication, it includes *lawyers* in it. The lexical token *shark*, then, is the name of the category that includes lawyers but also sharks (the fish). This creates the following situation: a word will stand for itself (i.e., for its own meaning: *shark* means SHARK) but it also stands for all possible meanings one can encode/entertain (i.e., *shark* means AGGRESSIVE, or it means SWIMMER, or anything else that one can think of are attributable to shark, including perhaps things not commonly attributed to sharks).

Of course, this just begs the question of how one knows that *shark* (meaning SHARK—the fish) is *not* the appropriate referential use of *shark*. And how does one get to access the *shark*-AGGRESSIVE interpretation? Notice that this is virtually the same problem for the ironic *lovely*-LOUSY mapping. The (interim) moral of this story is this: if you cannot get LOVELY from *lovely*, and if you cannot get SHARK from *shark*, all bets are off. The solution is to run inferences that eventually will get you to possible intended meanings. But the *shark*-SHARK mapping will need to be accessed for this process (finding the appropriate interpretation) to be triggered.

To take this point a little further: If by hearing *hot* in (13) you do not get HOT, what do you get? In contexts where the temperature is below freezing one needs to have *hot* accessing COLD (or perhaps NOT HOT) directly, while in contexts where the temperature is near 40 C, *hot* accesses HOT.

(13) It's hot in here

In addition, as discussed by Searle (1979), there are many ways in which a sentence such as (13) can be interpreted: literally, ironically, as an indirect speech act (a request to open the window or to turn the air conditioning on, for instance), or metaphorically, to express the belief that a given discussion is getting out of control. But one cannot possibly legislate on what (13) is used to express *a priori*, besides its literal meaning. We contend that there is only one guaranteed understanding process for (13) (given, of course, the appropriate conditions of lexical and syntactic competence of the hearer): it is that it expresses the proposition *P*, such that *P* predicates *hotness* to *it* in the context to which the

indexical *here* refers. Given this basic recipe for understanding (13), one can only imagine what (13) is actually used for, beyond *P*.

We propose that regardless of their intended meaning, expressions of the form *x is y* are predicative, for the behavior of such expressions determine that *y* predicates something of *x*, no matter *y*'s grammatical category or what it stands for. We propose further that these expressions are formally represented by different predicate structures containing arguments belonging to different semantic types, as in (14).

14. BE (e (<e,t>))

Our analysis relies on understanding that the univocal *be* projects an argument structure that specifies different semantic types for its internal and external arguments. The basic form is that of predication in which *e*, an entity (referent) is taken to be the topic to which the predicative type *<e, t>*, applies (see Partee, 1986). It is possible that the arguments in (14) are subject to type-shifting operations—e.g., shifting the internal argument from a basic entity type to a predicate. In fact, our proposal is that for similes of the form *x is like y* (*lawyers are like sharks*) this is exactly what happens: the predicate *be-like* type-shifts the internal argument for the purposes of comparison between two arguments of the same type, as in (15).

15. BE (LIKE (e (e)))

If our analysis is correct, the structure of the expression makes available its constituent types (say, that *y* is predicative). This form serves as the basis for a default interpretation that leaves the actual intended meaning of a given expression indeterminate. It is then a matter of computing implicatures for which there can be no strict boundaries.

We take this way of looking into so-called figurative expressions as a way of preserving compositionality and, moreover, as way of further supporting a classical form of a pragmatic model for language interpretation. The way we layout the expressions in (14) and (15) also puts us in a collision route with traditional models that see metaphors as similes in disguise (e.g., Miller, 1979), or those that see similes as categorizations like metaphors (Glucksberg & Keysar, 1990). It is because they have different structures that they yield different interpretations.

Recent studies by Roncero, de Almeida, Smyth, and Kennedy (2010) and Roncero, Ashby, and de Almeida (2010) suggest that metaphors and similes are

interpreted in different ways and thus that they are not underlain by the same semantic representation. For instance, given sentences such as (16a) and (16b) *followed* by explanatory contexts such as (16c), eye-tracking results found that participants regressed from the explanation region more often in the metaphor condition (16a) than in the simile condition (16b). Moreover, they fixate longer on the vehicle of the metaphor than on the vehicle of the simile.

16. *a. Mary believes liquor is a crutch*
    b. Mary believes liquor is like a crutch
    c. …because it is used in difficult situations.

These results can be interpreted as supporting both, the view that underlying these expressions are different semantic representations and the theory that the vehicles in the two expressions belong to different types.

We argue, in summary, that there is no need to postulate lexical semantic decomposition of the constituents of a metaphorical expression at the level of semantic analysis—to yield the sought after implicatures. The form *x is y* provides the basic ingredients for understanding the predicative relation between *x* and *y*. Thus this form allows for pragmatic inferences to follow abductively from *what is said* in a given context to determine *what is possibly intended*.

Conclusion: Atomism cum Inferences

We have shown that in these three case studies, lexical causatives, semantic coercion, and metaphorical expressions, there is sound psycholinguistic evidence that leads us to promote alternative treatments and possibly reject the prevailing decompositional analyses. We have proposed, instead, that we can account for all these cases by relying on two main postulates: lexical concepts are atomic and sentence meaning is sensitive to sentence structure. The interpretation of a given expression, then, is subject to classical compositionality, in which the semantic contribution of each token item is determined according to its function in a given structure. In sum, interpreting a given sentence requires at a minimum the computation of its constituents and its structure. But the intended meaning of an utterance cannot be determined purely by constituents and structure, for it requires contextual information which aid in the search for what is implicated. This way of looking into sentence interpretation serves both literal and so-called figurative forms of expression. The differences between the two, if any, are in the inferences they trigger, in the judgment of the computed *semantic* representation against a given utterance context. But we see no reason for the postulation of

decompositional analyses, which even at this point in time suffer from the lack of a clear-cut analytic/synthetic distinction.

In fairness to most linguistic and psychological theories that rely on analytic decomposition, it is clear that an account of categorization—including here verb semantic *classes*—is an advantage for these theories. Because atomism does not assume similarity of features between individual tokens, it does not have a clear account of categorization effects. However, atomism is not about conceptual relations as it is about epistemic properties supporting the *nomic*, referential properties of a concept. And, thus, it takes categorization to be in the realm of the inferences that concepts trigger, even when the inferences appear to make a strong case for content-constitutive properties.

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