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Volume 40(7)

2009

(October)

DEPARTMENT OF LINGUISTICS
UNIVERSITY OF HAWAIʻI AT MĀNOA
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2009

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INCONGRUITY TRIGGERS THE SEARCH FOR A METONYMIC MAP[1]

JAWEE PERLA

Metonymy is a linguistic process in which the name of a salient attribute, part, or function of a particular domain is used to refer to another part of the same domain. Because salient characteristics can be used to activate other referents within a semantic domain, (Lakoff 1987, Deane 1991), sometimes these tags can be used metonymically, even in novel instances (e.g., *The man scolded the truck at the intersection*). Such sentences may depend on an immediate "animacy incongruity effect" between the verb phrase (*scolded*) and the direct object (*truck*) to trigger the metonymic construal. In canonically ordered sentences, the incongruity is recognized on the metonym itself, but what happens when the metonym is fronted? This study presents evidence that the incongruity trigger is a central part of metonymic sense resolution, regardless of where it appears in the sentence.

1. INTRODUCTION. How do metonyms successfully activate their intended semantic targets? Fundamentally, metonyms function as referential markers in which one conceptual unit—attribute, category, quality—is triggered through the mention of a related concept. *The suits on wall street* means *people* on Wall Street when the lexical trigger (*suits*) activates a related semantic target (*people*) within the same idealized cognitive model (Lakoff 1987, Radden and Kövecses 1999). Although there has been some attempt to provide a taxonomy of the various "X FOR Y" conceptual maps that license metonymic reference, relatively little attention has been given to the sentence processing of metonymy and polysemy in general. The purpose of this paper is to explore the online sentence-processing aspects of semantic resolution in context-free metonymic language.

2. BACKGROUND. Understanding the meaning of a sentence involves successfully integrating its component parts into a semantically viable predication. We might assume that "the listener is under a strong Gricean convention that the speaker is being semantically coherent, particularly at lower levels of semantic composition, such as predicate-argument and head-modifier constructions … [such that] the listener will generally try as much as possible to adjust the meanings of the parts to yield a coherent interpretation of the whole" (Croft 1993). With metonymy, the listener knows that *Chicago rejected the proposal* cannot refer to something the physical city did; the utterance is coherent only when the subject-predicate incongruity triggers a reanalysis to another salient referent within the semantic domain, in this case an INSTITUTION or set of PEOPLE. Because listeners are trying to make sense of what they hear, these referential "adjustments" may be prompted immediately by semantic anomalies at the predicate-argument level. This is particularly evident when inanimate nouns appear in predicates with animate verbs as in Nunberg's (1979) well-known example: *The ham sandwich is getting impatient with his check.* A metonymic interpretation is immediately evoked by flouting the expected referential dependency between a prototypically inanimate subject and the type of verb that it takes.

Therefore, it is reasonable to expect metonymic sentences to involve an additional step of semantic processing compared to literal sentences. However, while the examples above make it tempting to posit a "literal-first" model (Grice 1975, 1989; Searle 1979), in which the figurative interpretation is only reached after the literal meaning has been found to be incompatible with the context, this "literal-first" approach is now largely rejected in the literature. A number of studies demonstrate that, with the right context, figurative language is processed just as rapidly as literal language (Gibbs and Gerrig 1989; Harris 1976; Onishi and Murphy 1993; Ortony et al. 1978; Shinjo and Myers 1987).

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[1] I would like to thank Ben Bergen, Amy Schafer, William O'Grady, and Albert J. Schütz for their valuable comments on previous drafts of this paper. All remaining errors or omissions are my responsibility.

Nevertheless, metonyms are often recognized because of a semantic discrepancy. *Ham sandwich* is prototypically inanimate, so it may be the prototypical (rather than the literal) referent for any given noun phrase that is activated first, particularly since in the absence of a larger context, the verb-argument relationship is expected to be coherent. The problem is that previous work on the processing of literal and figurative language, or of polysemy in general (Klein and Murphy 2001, 2002; Rodd, Gaskell, and Marslen-Wilson 2002) has not explored how the activated referent interacts with the rest of the sentence as part of the semantic resolution process. This remains a gap in the literature because the compatibility of predicate-level elements might be exactly what determines when this kind of metonymic target is activated in the first place.

One notable exception is Pickering and Frisson 2001, which showed that figurative sentences that exhibit animacy incongruities at the verb-argument level for can often be resolved just as easily and as straightforwardly as literal sentences. Pickering and Frisson used eye-tracking to measure response latencies on the reading times of words that appear either in a metonymic or literal condition—the word (*convent*)—when compared with a control word (*stadium*) in sentences such as *The blasphemous woman had to answer to the* convent/stadium *at the end of last March, but did not get a lot of support.* Interestingly, they found that despite the animacy incongruity between verb *answer to* and the argument *convent*, reading times on that critical noun did not differ from sentences in which *convent* is used literally (*The businessmen tried to purchase the convent…*) However, a significant latency was observed for *stadium*, since no PLACE FOR INSTITUTION metonymic map could be identified in that context.[2]

Although Pickering and Frisson were able to provide processing evidence that contextually supported metonyms are no more difficult than literals, their research leaves open the question of what triggers the search for the metonymic map in the first place. Their results can be explained if we assume that the mention of a word activates a number of related concepts, some of which are more "central" to the frame than others. The semantic frame of *convent* includes a closely associated animate target available for metonymic appropriation in the process of "adjusting" to the animate-biased "verb" (*answer to*), but since no such element was available for *stadium,* it would have been more difficult, if not impossible, to resolve metonymically. One might expect a different outcome for the verb *cheer*, for which the *stadium* frame contains a more accessible animate component as a potential metonymic target. The point is that the inability to resolve *stadium* metonymically would have resulted from a failure to *find* a viable semantic target, rather than a failure to initiate the *search*. The ease of resolving one metonym over the other may have therefore occluded the effect of an "incongruity trigger" that initiated the search for a coherent metonymic map, independent of its relative ease or difficulty of resolution.

This study presents evidence for an "incongruity-trigger" manifested by an observable latency on reading times for inanimate nouns in a metonymic condition when compared with a literal control. It is argued that the verb-argument discrepancy is what initiates the search for a metonymic interpretation. For canonically ordered sentences with a metonymic direct object, the incongruity is recognized on metonym itself; having already seen an animate-biased verb, listeners must "re-adjust" their interpretation of the inanimate noun phrase as it is encountered.

Of course, not all metonymic sentences put the verb before the object: when metonymic object is preposed, as in a *wh* question, the incongruity must be recognized on the *verb*. Sentence processing research has been able to show that these referential dependencies can even span long distances. (Miyamoto and Takahashi 2004; Aoshima, Phillips, and Weinberg 2004). Therefore, a second objective is implied for the current study; in addition to presenting evidence for the incongruity trigger, this study will compare the different the *sources* of the trigger: whether the verb in extracted sentences or the critical NP itself for canonically ordered sentences.

[2] Note that *stadium* can easily participate in alternative metonymic maps such as place for people: *The stadium booed the team off the field.*

At issue is the effect the "active-search" mechanism has on semantic resolution. In sentences like *Which driver did you scold __ at the intersection?* research has shown that upon encountering the *wh* element, the parser immediately initiates a search for the potential "gap" site. (Frazier and Clifton 1989, Stowe 1986). This search is continuously "active" as the sentence unfolds, rather than operating only at the syntactically appropriate position. Independent evidence for the active search hypothesis is presented in Stowe 1986, which demonstrated that the processor attempts to immediately fill the gap in sentences like *My brother wanted to know who Ruth will bring us home to at Christmas* (a gap is assumed to immediately follow the transitive verb *bring* and is filled incorrectly with the preceding *who.*) The presence of *us* indicates an incorrect parse, and the "filled gap effect" results in a reanalysis and measurable latency when compared with the control (Stowe 1986).

Because canonically ordered sentences do not involve this active search mechanism, it may be reasonable to expect verb-argument incongruities in non-extracted sentences to trigger a semantic (or metonymic) reanalysis more rapidly than those in an extracted condition. On the other hand, it is possible that the active-search mechanism would actually facilitate resolution instead, especially if, as the parser searches for an appropriate gap-site, it shows increased sensitivity to the semantics between the argument and upcoming verb. This is predicted by the "direct association" accounts, which construe filler-gap relationships as actually involving a direct dependency between the *wh*-filler and the verb itself (Pickering and Barry 1991).

This study does two things: (1) It presents evidence of an incongruity effect in the metonymic condition, whether triggered by the incongruent verb (for extracted sentences) or incongruent noun (for canonical sentences). This supports the direct association account; rather than syntactic gaps, verbs themselves are what trigger the incongruity in a way similar to nouns in the canonically ordered sentences. (2) The findings hint at an interesting interaction-effect between word and sentence type at the disambiguating region, suggesting interesting processing differences between extracted and canonical sentences, despite the robust incongruity trigger. Though a significant latency was observed on metonyms, comprehension did not differ from the same sentences in the literal condition, although both extraction and animacy-mismatch reduced acceptability judgments. This evidence implies that, in context-free sentences in which the verb-predicate relationship highlights a non-prototypical target, metonymic mapping involves an additional processing component as part of the referential resolution process, regardless of extraction.

3. EXPERIMENT. This study presented subjects with metonymic and literal sentences in both fronted *wh* sentences and canonical *in-situ* word order. To create sentences that allowed the region of incongruity to occur before encountering the gap, the critical metonymic NP was always placed in object position. Furthermore to balance the extracted and *in-situ* sentences for verb tense, all critical sentences used embedded clauses. This gave rise to the sentence types shown in table 1:

TABLE 1: An example of metonymic and literal words in two sentential conditions

	METONYM	LITERAL
EXTRACTED	Which truck did you say he scolded __ at the intersection?	Which driver did you say he scolded __ at the intersection?
IN SITU	You said the guy scolded the truck at the intersection.	You said the guy scolded the driver at the intersection.

3.1 PARTICIPANTS. Participants were twenty-seven native English speakers from the University of Hawai'i undergraduate population with normal-to-corrected vision, participating for course credit in psychology or introductory linguistics classes. Non-native English speakers were excluded from the data.

3.2 MATERIALS AND DESIGN. Sixty-four test sentences were created and presented to subjects by e-prime psychological testing software. Of these, thirty two were fillers, and the other half were critical

items. Each experimental item was placed in four conditions, randomized across four counterbalanced lists.

Because not all metonymies involved a literal-to-figurative conceptual path (Gibbs 1994), special attention was given to make sure the critical items were prototypically inanimate noun phrases matched with obligatorily animate verbs. Without biasing contexts, if metonymic construal is triggered by an animacy incongruity between the verb and direct object, latency on incongruent elements provides the clearest source of processing information, particularly if the disambiguating region is located at a specific point in the sentence. As shown in table 2, this was region W7 across all conditions. For extracted sentences, region W7 was the locus of the verb; for in-situ sentences, it was the site of the critical noun phrase. Since the intended semantic target was always animate, and the metonym a prototypically inanimate noun, the verb was selected to obligatorily subcategorize animate objects that tended to be speech acts (*scolded, angered, asked*, etc.).

TABLE 2. Critical regions of interest

	w1	w2	w3	w4	w5	w6	w7	w8	w9	w10	# of tokens
METONYM	Which	truck	did	you	say	he	scolded	at	the	intersection?	8
	You	said	the	guy	scolded	the	truck	at	the	intersection.	8
LITERAL	Which	driver	did	you	say	he	scolded	at	the	intersection?	8
	You	said	the	guy	scolded	the	driver	at	the	intersection.	8

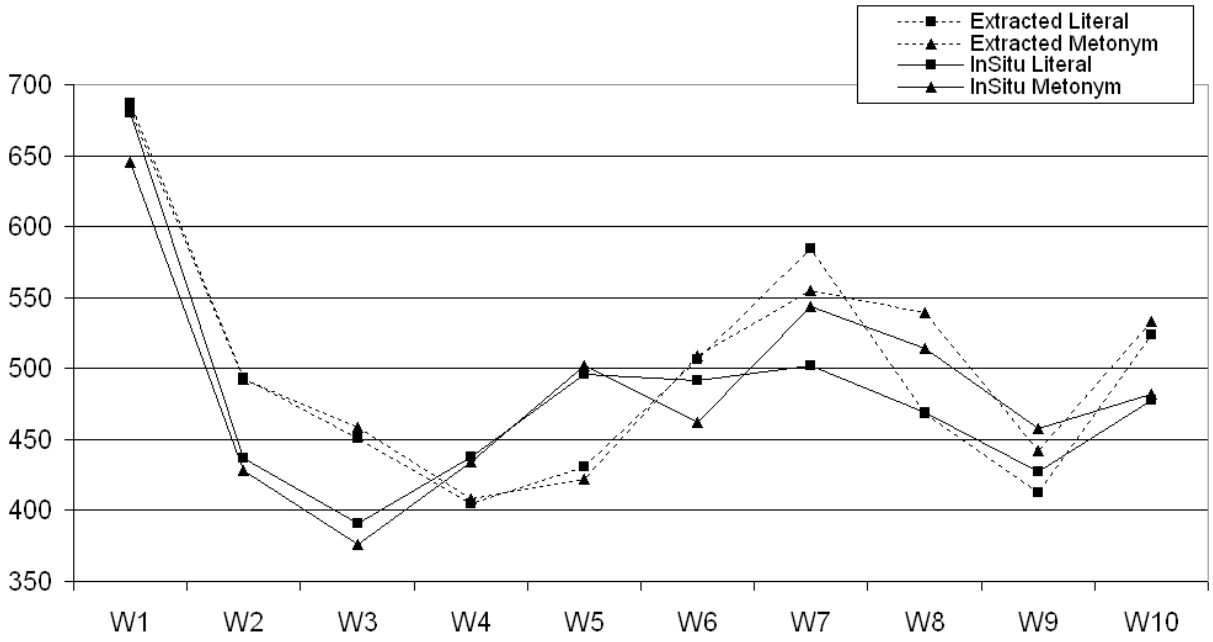
With eight trials per condition, each word-type (metonym or literal) had two levels (extracted and in-situ). Since all sixteen metonyms needed to be inanimate for the referential mapping to work, all metonymy trials used inanimate NPs, and all sixteen literal trials used animates. Therefore, a balance of sixteen animates to sixteen inanimates was provided by the fillers. Since fillers had to be similar to critical sentences, they were also balanced for sentence type, with sixteen *wh* fronted sentences and sixteen *in-situ.*

3.3 PROCEDURE. After a short briefing about the general procedure, subjects were seated in front of a computer that displayed black text on a white background. Participants were timed on a phrase-by-phrase self-paced non-cumulative moving-window reading task (Just, Carpenter, and Woolley 1982). Reaction times were collected at button-presses to advance to the next word. Stimuli sentences were presented in random order.

Randomized within the block of sixty-four trials were sixteen comprehension questions as a measure of accuracy. Comprehension questions were divided evenly between conditions with eight questions for critical items and eight questions within the fillers. Trials were divided by a fixation cross and a "Press TAB to continue" screen to allow participants to rest between trials without affecting their performance on the critical task. After the last word of each trial, a screen appeared asking participants to rate the sentence they had just read on a seven-level acceptability scale ranging from –3 to +3, including Ø. Participants were instructed to indicate how "strange" they observed the preceding sentence to be.

4. RESULTS. Since reaction time was expected to vary across different regions of interest, rather than exclude outliers that conflated the RT across all words, a region-specific cutoff of >2.5 standard deviations was calculated, above which scores were removed. Additionally, items with accuracy < 80% were also excluded. Together these exclusions resulted in 2.5% of observations across the four conditions. Additionally, one subject's mean RT was greater than 2.5 standard deviations from the mean, and so was removed. No items were removed. Exclusions were relatively uniform across conditions (>3.4%, with an average of 2.5% across all conditions) so it is reasonable to assume that they did not affect the overall outcome of the trials. No scores were removed in the acceptability task since all scores were between 2–3 standard deviations from the mean. A word-by-word analysis of the reaction times is provided in figure 1:

FIGURE 1: Average reaction time over all regions of interest



In general, the two extracted sentences (dotted lines) and in-situ sentences (solid lines) are fairly tightly time-locked until the region of incongruity, W7, where reaction times in each condition begin to diverge significantly as the result of encountering the unexpected element.

FIGURE 2. Average reaction times at the region of semantic incongruity

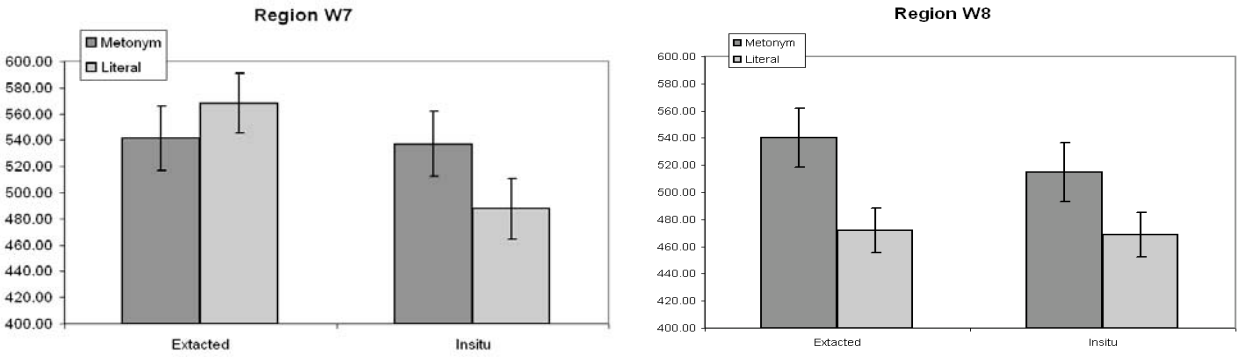


Figure 2 displays the mean reaction times for each condition on critical regions W7 and W8. On critical region W7, a repeated-measures ANOVA revealed a significant main effect of sentence type in the subjects analysis: $F_1(1,27) = 9.771$, $p = .004$; $F_2(1,16) = 2.119$, $p = .166$, but no effect of word type $F_1(1,27) = .260$, $p = .615$; $F_2(1,16) = .169$, $p = .687$. There was no interaction effect in either the subject or items analysis: $F_1(1,27) = 2.983$, $p = .096$; $F_2(1,16) = 1.978$, $p = .180$. The largest mean RT difference was between extracted literals at 80ms, but was only 4ms between extracted and in-situ metonyms. Post-hoc pair-wise comparisons revealed a significant difference of sentence type only for literals: p=.017.

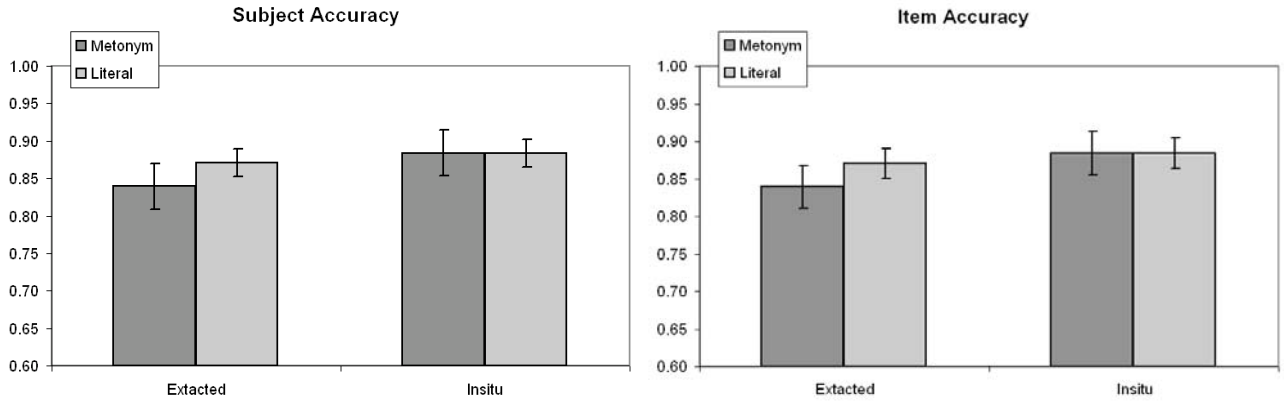
However, on the spill-over region W8 *just after* the critical incongruity, a significant word type difference emerged, with the repeated-measures ANOVA revealing a significant main effect of word type in both

the subject and items analyses: $F_1(1,27) = 35.140$, $p < .001$; $F_2(1,16) = 9.406$ $p = .008$, but no effect of sentence type $F_1(1,27) = .073$, $p = .789$; $F_2(1,16) = .102$ $p = .754$, and no interaction; $F_1(1,27) = .393$, $p < .536$; $F_2(1,16) = .954$ $p = .344$. In extracted sentences, the mean RT of the metonymic condition was significantly longer than in the literal condition (68ms). The same was true for the in-situ sentences, with metonyms on average 46ms longer than in the literal condition. This difference was confirmed by pairwise t-tests that revealed a significant word-type difference in extracted (p=.009) as well as in in-situ (p=.038) sentences.

Grammaticality judgment scores differed significantly across the conditions as well. A repeated-measures ANOVA revealed a main effect of sentences type: $F_1(1,27) = 10.807$, $p = .003$; $F_2(1,16) = 2.623$ $p = .126$, word type, $F_1(1,27) = 53.200$, $p < .001$; $F_2(1,16) = 16.803$ $p = .001$, with no significant interaction effect: $F_1(1,27) = 2.698$, $p = .113$; $F_2(1,16) = .982$ $p = .337$.

Nevertheless, despite the lower grammaticality judgments for both extracted and metonymic sentences, final comprehension did not differ for these conditions. The same repeated-measures ANOVA for comprehension questions did not find significant differences for sentence-type, $F_1(1,27) = 1.514$ p=.230 $F_2(1,16) = .194$ $p = .292$, nor for word-type $F_1(1,27) = .889$ p= .352,: $F_2(1,16) = .471$ $p = .503$ with no interaction effect $F_1(1,27) = .772$ p=.358; $F_2(1,16) = .474$ $p = .504$. Therefore, regardless of greater latencies and lower grammaticality judgments on metonymic sentences, accuracy did not differ significantly from that in the literal controls. In general, the means for extracted metonymic sentences were slightly lower than their in-situ counterparts, but not significantly so, as shown in figure 3.

FIGURE 3. Subject and item accuracy



5. DISCUSSION. The results above demonstrate that processing metonyms takes significantly longer than processing literal words. This latency can be interpreted to be the result of the hypothesized semantic incongruity: prototypically inanimate nouns were subcategorized by animate-biased verbs. As predicted, the incongruity led to an observable delay just after the critical region in metonymic sentences, regardless of whether the critical region was an incongruous verb (for extracted sentences) or the critical noun (for in-situ). Though metonyms exhibited a significant latency compared to literal words, they were no less understood; mean accuracy across all conditions, regardless of sentence type, was ≥85% with no significant differences across the conditions. However, incongruity introduced by the context-free metonym was enough to reduce acceptability judgments for the metonymic sentences.

Several findings warrant further discussion: (1) The main effect of word type was observed not *on* the region of semantic incongruity, W7, but immediately after it, on the spill-over region W8, with a lingering effect on W9. (2) As mentioned above, extraction from the embedded clause significantly reduced the acceptability judgments, as did the use of metonyms. (3) Control analyses revealed no significant differences between animate and inanimate noun phrases outside of the literal and metonymic conditions. Each of these is discussed in turn below.

Spill-over effects are common in psycholinguistic literature, particularly for semantic effects such as those observed here. In their comparison of reading-comprehension paradigms, Just, Carpenter, and Woolley (1982) observed that such spill-over effects were particularly likely for "higher-level processes, such as inference-making." Because this animacy incongruity is precisely a matter of predicate-argument inferencing in metonymic resolution, it is reasonable to expect the spill-over region to be the locus of the effect, particularly if motor action has been executed before full semantic resolution has taken place. This was confirmed by the latency on W8 with continuing and significant spill-over on W9. Since region W8 was the same word across all conditions, it is reasonable to interpret the mean reaction-time discrepancies in this region to be indicative of lingering conceptual processing effects introduced by the preceding word. Unlike the literal words, which were integrated instantaneously, metonyms resulted in an observable delay without affecting ultimate comprehension.

However, metonymy, as well as sentence type, did significantly reduce the overall grammaticality judgments. As for sentence type, Kluender and Kutas (1993) conducted an analysis of the effect of extraction on subsequent grammaticality judgments and found that, in general, *wh* questions were consistently assigned lower acceptability ratings than other types of questions (yes/no). Particularly, "questions with embedded *that* clauses were considered more acceptable than sentences with embedded *if*-clauses, which in turn were rated more acceptable than sentences with embedded *wh* clauses." The results presented here confirm those of Kluender and Kutas (1993) in that the *least* acceptable of the three sentence-types they examined (*wh*-extraction from an embedded clause) were found here to be rated consistently lower than canonically ordered, non-extracted sentences.

Grammaticality judgments were also reduced by the use of metonyms; they were rated an average of 4.17, whereas literal sentences were rated 5.40 out of a possible 7, a difference of 17.5%. Thus, although participants were able to resolve the semantics of the anomalous noun phrase, they may nevertheless have been conscious of the anomaly. In general, though none of the metonyms were familiar, the type of mappings may have differed in their degree of conventionality. Research by Pickering and Frisson (2007) demonstrated a significant latency on the unfamiliar word *Needham* compared to a familiar word *Dickens* in sentences like *She often read Needham/Dickens when she had the time*. However, they were also able to show that the provision of a biasing context (that introduced *Needham* as an author) eliminated the effect of unfamiliarity. In the present study, metonymic sense resolution was the point itself, so familiar metonyms (such as proper names) were not used. Because none of the metonymic sentences were introduced with any contexts other then the incongruity cue itself, the verb-argument animacy mismatch may have been particularly conspicuous. Moreover, participants were instructed to indicate which sentences seemed "strange" with a lower number, so responses may not have been as direct a measure of grammatical acceptability in the same way as those of Kluender and Kutas 1993, which utilized a timed, forced-choice task.

Finally, it might be argued that metonymic sentences had the observed latency effect because metonyms were always inanimate nouns and literals were always animate. Instead of resulting from an animacy mismatch between verb and direct object, perhaps the RT latency was due merely to longer processing times on inanimate words in general. A control analysis was therefore conducted comparing inanimate to animate words at W2, outside of the metonymic condition. No processing-time difference between inanimate and animate noun phrases was found by pair-wise t-tests in region W2 for animate (M= 490ms SD= 146ms) or inanimate (M=481ms; SD=137ms) in the subjects analysis, t_1=(1,25)=0.4262, p=0.6734 or items; animate (M=493ms SD=80ms) inanimate (M=492; SD=96.29) t_2=(1,15) =0.0246, p=0.9807. The effect of word type therefore emerges only at the point of an incongruity driven by a semantic contrast, with metonyms taking an average of 57ms longer than literals in both sentence types.

A particularly interesting finding is that the interaction of both metonymy and extraction at region W7 seems to approach significance. Why would this be? There are a number of reasons to expect a reaction-time difference between an incongruity introduced by an anomalous noun given the preceding verb (verb-argument mismatch), and the incongruity introduced by an anomalous verb given an "active" filler (filler-gap mismatch). For one, "the incongruity trigger" is different. Whereas in one case it is a noun, and the other a verb, it is possible that these different grammatical elements are simply integrated with the mean-

ing of the sentence differently. More important, the amount of intervening material differed dramatically between verb-argument (W5–W7) and filler-gap (W2–W7), such that it would be reasonable to expect the filler-gap incongruity, if evident at all, to be less pronounced than that of the more adjacent verb-argument.

However, what is most surprising is the *direction* of these effects. At W7 of extracted sentences, participants lingered on verbs preceded by literal objects longer than they did for verbs preceded by metonymic extracted objects, though the interaction is not quite significant: $F_1(1,27)=2.983$, $p=.096$; $F_2(1,16)=1.978$, $p=.180$. Shortly thereafter, the hypothesized metonymic latency effect emerges significantly for all sentence types, but why would the effect be *reversed* only for extracted literal sentences immediately at the point of the incongruity? Why would it take longer to integrate extracted literal words upon encountering their verbs?

Pair-wise comparisons between the literal condition and metonymic condition are informative. Between extracted and in-situ literals, the difference is quite statistically robust: $t=(1,26)=3.3642$, $p=0.002$. However, no such difference was observed between extracted and in-situ metonyms $t=(1,26)=0.1552$, $p=.877$. This discrepancy suggests significant processing differences between literals and metonyms exactly at the point of incongruity for the extracted condition. Not surprisingly, the easiest to process were in-situ literals (M=487, SD=117), since they contained neither an incongruity nor long-distance grammatical dependency. Next were both types of metonym: extracted (M=541, SD=113) and in-situ (M=537, SD=142), suggesting some difficulty in semantic resolution at the point at which they are first encountered. On the other hand, the fact that extracted literals took the longest to compute (M=568, SD=122) suggests that their long-distance filler-gap dependencies were being resolved. The difference between the two sentence types for literal language does indeed replicate previous research on filler-gap dependencies in general (Frazier and Clifton 1989, Frazier 1987, Stowe 1986). By W8, the fact that only metonymic sentences continue to exhibit the latency further suggests rapid semantic resolution for literal over metonymic language.

Further investigation is warranted by this observation, particularly since the W7 interaction effect is promising, and could reach significance with more participants. Furthermore, it may be case that the "filler-gap" latency observed here is better explained by construction-grammar-based accounts that view *wh*-utterances as constructions in their own right, not derived from canonically ordered sentences. For example, such an account might view the latency to be more a matter of semantic integration than purely structural recovery, predicted by the filler-gap account. The nature of the incongruity also implies further questions. This study exploited a fairly blunt type of semantic mismatch (animacy) in order to measure how metonymy can highlight parts of domain that are normally "secondary" in context-free environments. But this phenomenon is quite likely to differ for polysemy of different types since the "literal" sentences *Proust was smiling*, or *Time magazine is going downhill* (meaning the physical magazine travelling down a hill), also profile non-central elements with respect to what is prototypically highlighted in their respective domain matrices. It would be informative to explore how processing these sense ambiguities compare to reference-resolution in the metonymy explored here.

6. CONCLUSION. The rapid resolution of the clear animacy discrepancy between verbs and objects (both extracted and canonical) provides evidence in favor of the "incongruity-trigger" hypothesis. The use of metonymic words, even those in the more difficult (extracted) syntactic position did not reduce comprehension/accuracy, but both extraction and metonymy significantly reduced acceptability judgments. The type of metonymic sentences explored here was no doubt unusual, but the use of sentence-processing methodology in the exploration of the incremental nature of metonymic domain highlighting is a promising avenue of research.

APPENDIX : CRITICAL STIMULI

1. Which blue Toyota / driver did you say the teenager angered at the intersection?
2. Which BLT / customer did he mention the waitress scolded for trying to leave without paying?
3. Which Jerseys / team did we think the fans turned against at the end of the game?
4. Which suits / executives did you say the boss fired during the fiasco?
5. Which inheritance / heiress did he mention the people hated because of her heartless comments?
6. Which office / officials do we think the victim informed after the accident?
7. Which brains / professors did you say the dean fired in the Anthropology department?
8. Which table / customers do he mention the waiter told their food was almost ready?
9. Which new faces / new people did we think the host introduced at the beginning of the party?
10. Which strong bodies / strong boys did you say the coach hired for the team?
11. Which right arm / trusted official did he mention the subordinates obeyed before they are promoted?
12. Which strong backs / strong men did we think the ladies thanked for carrying your bags?
13. Which newspaper / reporters did you say the politician intimidated before the election?
14. Which guns / soldiers did he mention the villagers asked for protection when the tanks invaded?
15. Which nightclub / bouncer did we think the man angered with his bad behavior?
16. Which country / fans did you say the rock star disappointed for cancelling his tour?
17. We thought the guy scolded the red pickup / driver for taking his parking space.
18. You said the waiter placated the ham sandwich / customers who were getting impatient.
19. He mentioned the fans turned against the blue helmets / team as they began winning the game.
20. We thought the CEO helped the suits / brokers on wall street steal all your money.
21. You said the people hated the new inheritance / heir because she flaunted all her riches.
22. He mentioned that she informed the office / employees before she left the country.
23. We thought the committee hired new brains / professors for the math department.
24. You said the manager reassured the table / customers their food would be out soon.
25. He mentioned the host introduced the new faces / new people to the guests at party.
26. We thought the recruiter wanted some strong bodies / strong guys for the team so they'd win.
27. You said the employees obeyed his right arm / assistant in matters pertaining to the company.
28. He mentioned the women asked the strong backs / big guys if they could do the lifting.
29. We thought the governor bullied the newspaper / reporters into publishing good things about him.
30. You said the people asked the guns / soldiers to join their fight against the regime.
31. You mentioned the woman angered the restaurant / manager by acting inappropriately.
32. He thought the comedian saddened the city / fans by deciding not to perform.

Filler Sentences

1. Which fruit did you mention they served at the party?
2. Which bicycle did they think the cars hit at the intersection?
3. Which shoes did she say we needed to go bowling?
4. Which laptop did you mention she bought from the computer store?
5. Which soap did they think the women used when they got their beauty treatments?
6. Which textbooks did he say we need for the class next semester?
7. Which sunglasses did you mention Bono wore during the concert?
8. Which towels did they think you stole from the hotel?
9. Which children did they say the men beat with their wooden canes?
10. Which diplomats did she mention the politician met for dinner on Friday?
11. Which dogs did you think the boy released from the pound?
12. Which janitors did they say they hired back in January?
13. Which chefs did he mention you hired for the reception dinner?

14. Which people did you think you insulted with that terrible T-shirt?
15. Which suspects did they say the police saw leaving the scene of the crime?
16. Which women did she mention the teacher spoke to about their kids' behavior?
17. We thought the guy scolded the child for touching his tools.
18. She said the police arrested the woman for how she behaved at the park.
19. They remembered the professor failed all the students when they didn't come to class.
20. We thought the gunshot frightened the old ladies as they left the house.
21. He said the car hit the old dog as it was crossing the street.
22. They remembered the tree that covered the old man as he napped in the park.
23. We thought the suspect attacked the policeman before fleeing the scene of the crime.
24. She said the tractor ran over the farmer almost three years ago.
25. They remembered the host undercooked the eggs that he served for breakfast.
26. He thought the boys ate all the crayons that were in the box.
27. They said the teacher forgot his chalk every day of the semester
28. We remembered the chicken laid their eggs at the strangest times.
29. She thought the mother censored the movie for her young kids.
30. They said the burglar forgot his wallet on the living room rug.
31. We remembered the old man shot his foot with his shotgun last year.
32. We thought the sun melted the snow before we could go sledding.

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