

Embodied Grammar and Humor

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Abstract

Cognitive Linguistics is an approach to the study of language and the mind. Among its main foci are (1) what sorts of knowledge language users have about the form-meaning pairings of their language, and (2) how language use interacts with other cognitive mechanisms, like perception and action systems. In this paper, we survey two lines of Cognitive Linguistic research into how language is represented and processed, relevant to these two areas of interest: the pragmatics associated with particular sentence patterns and the role language plays in cueing visual and motor imagery. Neither has previously been extended to the study of language for the purpose of humor, but we demonstrate the relevance of each to understanding how linguistically conveyed humor works. More broadly, we argue that the use of language for humor is best understood in terms of theories in which linguistic knowledge arises from embodied experiences plus linguistic input, and in which language is interpreted by activating embodied world knowledge. Such theories provide useful insights into cognitive mechanisms used during humor production and understanding, like conceptual metaphor and frame-based knowledge. The upshot is that humor research both supports and is supported by an embodied theory of language.

(197 words)

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1. Introduction

Language is so central to humor that it is often taken for granted that the word "humor" refers to humor effected at least in part through language. Types of humor that do not involve language are qualified appropriately - "physical" humor, "musical" humor, and so on. Not only is humor often based on language, but humor is a large part of what language is used for. Humorous utterances constitute a significant portion of normal daily linguistic interactions, and stand as one of language's major and universal functions, along with conveying information and giving orders, among others.

Despite the centrality of language to humor and vice versa, linguists pay very little attention to the use of language for humorous purposes, focusing rather more intently on language in "neutral contexts". Leaving to the side the matter of how it is that a context can be considered "neutral", the important point is that mainstream theories of language use and language structure (e.g. Chomsky 1965, 1995) rarely take into consideration the particular social, cognitive, and structural details of humorous language. Similarly, while most humor researchers take the structure, production, and

understanding of humorous utterances as their basic domain of investigation, these studies rarely take into consideration general aspects of linguistic structure and use.

One may have one of several goals in studying the use of language for humor. It could be that one hopes to gain an understanding of the particular linguistic structures that are used in general forms of humor or particular instances of humor. It could alternatively be that one aims to understand the cognitive mechanisms that underlie the use of language for humorous purposes - how exactly does an individual construct an utterance intended to be funny, and how exactly does another individual process the resulting language such that it evokes a humor response? A final reason one might investigate language and humor might be to better understand the nature of linguistic structure and processing more generally, through the study of this particular domain to which it is applied.

Among linguistic theories, those that come closest to providing analytical and theoretical tools for answering questions like these go under the rubric of Cognitive Linguistics (Langacker 1987, Lakoff 1987, Talmy 2000, Fauconnier and Turner 2002), the study of language and the part it plays in the cognitive system. The applicability of Cognitive Linguistics to humor derives from its emphasis on the embodiment of language - how it is used by humans with particular sorts of brains and bodies, with particular physical and social goals in specific physical and social contexts (MacWhinney 1999, Chrisley and Ziemke 2002). This contrasts with mainstream theories of language, which focus more strongly on the formal and abstract nature of linguistic structures. An emphasis on the embodiment of language benefits an account of its role in humor for two reasons. First, as we argue below, the nature of the language used for humor is strongly influenced by the particular social contexts in which it is used and the social purposes to which it is put. Second, extralinguistic cognitive systems play an important role in processing humorous language. We show below that in order to account for what language users do when producing and understanding humor, an adequate account of how language is used has to have at least the following properties, which reflect these two observations. First, it has to allow for the fact that SENTENCE PATTERNS HAVE SPECIFIC PRAGMATICS associated with them, closely tied to particular usage situations. Second, it has to be able to represent how LANGUAGE SERVES TO CUE INTERNAL IMAGINATION of the content of an utterance.

The next two sections provide the theoretical background for these two claims - that language is structured around specific sentence types that are associated with particular pragmatics, and that language understanding makes use of detailed, embodied imagery. We subsequently demonstrate that both of these observations that hold of language generally apply specifically to humor as well. In the last section, we explore further ways in which embodied theories help explain aspects of humor

2. Embodied properties of grammar

2.1. Embodied theories of language

Cognitive Linguistic theories of language focus on linguistic knowledge and linguistic processing as they are instantiated in actual language users. Theories of this sort are often referred to as *embodied* since their focus is on language, not as a formal system, but as a system of declarative and procedural knowledge that humans, endowed with particular types of bodies, make use of in a particular range of physical and social environments. There are a number of approaches to grammar that have such an aim, like Cognitive Grammar (Langacker 1987), and various versions of Construction Grammar (Goldberg 1995, Kay and Fillmore 1999), including Radical Construction Grammar (Croft 2001) and Embodied Construction Grammar (Bergen and Chang 2004). What is centrally shared among these approaches to language is their emphasis on seeking explanations for

linguistic form in other cognitive capacities beyond language itself. In particular, these models share two main properties.

First, the basic units of language, rather than being abstract symbols representing just linguistic form, are pairings of form and meaning. These units, called *constructions* (Goldberg 1995) or *symbols* (Langacker 1987) range from the very specific (particular words) to the very general (like sentence patterns) but in all cases include aspects of form and meaning. Thus, sentence patterns, as constructions can include meaning components, and among these may be specific pragmatics, based on the particular contexts the constructions are used in and the particular entailments they usually encode. The way language users acquire this constructional knowledge is through use - they learn the details of how to use language and what to use it for on the basis of exposure to language in context, and generalize over it where possible and useful. This means that the human language faculty consists of not only universal and general linguistic knowledge, but also idiosyncratic and specific knowledge.

Second, meaning is seen in these theories as being composed of two parts. Deep understanding of the meanings of constructions and combinations of constructions consists in part of activating detailed and encyclopedic embodied world knowledge. Thus to truly understand a sentence like *Groucho hid inside the barrel* uses knowledge of what particular Groucho might be referred to, what the barrel might be like (including the size and contents), what the purpose might have been, how tight the fit, and so on. Such a detailed mental model of the described scenario is constructed on the basis of the meanings of the specific linguistic constructions used in the sentence, which meanings themselves are schematic representations of the detailed world knowledge they lead a language understander to access.

Based on viewing language as an embodied human cognitive system, the job of the cognitive linguist is to document the full range of linguistic knowledge that people have, which allows them to creatively produce and understand all the language they master. Such an approach may focus on what cognitive processes people actually use when producing or understanding language, on how language is meaningful, or on social aspects of language. In other words, such an approach is interested in how language is actually used, and what it's used for. Since linguistic constructions include a meaning pole, where meaning is defined to include knowledge about language use, the specific pragmatics associated with particular constructions can be represented as part of the constructions themselves. Moreover, idiosyncratic properties of language-specific constructions are learned from language exposure just as more general linguistically universal ones are, and thus constitute an object of linguistic study. Finally, interpreting an utterance as being composed of a set of linguistic constructions yields a mental simulation of the content, which can account for the dependence of language on imagination.

2.2. *The pragmatics of constructions*

Cognitively oriented theories of language view the building blocks of language as pairings of form and meaning - constructions. In the most straightforward case, simple words like *barrel* pair a schematic representation of their form (what the word sounds like or how it's spelled) with a schematic representation of their meaning (a schematization over the properties of barrels as experienced by the individual). Not only words but patterns of words also pair form and meaning and thus qualify as constructions. Certain specific sentence patterns, like "What's X doing Y?" (1) have a particular form - in this case a set of words (like *what* and *doing*), slots that can be filled in (X and Y), and ordering relations among these (Kay and Fillmore 1999). This sentence pattern actually has a particular meaning associated with it as well - inquiring as to the reason why X is at location Y. Notice that there is another possible interpretation of utterances like these, which ask about the

behavior of X at location Y. On this interpretation, the verb *doing* is interpreted as actually describing some action. Sentences like these arise from a different sentential construction or set of constructions.

- (1) a. What's that scratch doing in my desk?
- b. What's that fly doing in my soup?

Most constructions, especially ones larger than a word, are also associated with facts about the way they are used (Lambrecht and Michaelis 1996, Stefanowitsch 2003, Kay To Appear). One way this can occur is through the entrenchment of patterns of inference or other associated cognitive processes with particular constructions. Various lines of research have demonstrated such associations. Consider for example the X IS SO Y THAT Z construction (Bergen and Binsted 2004), seen in the examples in (2a) and (2b). Sentences making use of this construction encode a particular relationship between the proposition expressed in the first clause (that Dutch movie-goers are tall, or that Dean was livid) and the one that follows in the second clause (that their heads obstruct one's view or that he almost refused to come out and talk to the crowd). The relationship between the two clauses involves a notion of scale. Specifically, the first clause implies that X (the Dutch or Dean) is extremely Y (tall or livid), and the second clause describes a scenario that results from (and is thus evidence for) this high level of Y-ness. Important here is that for the utterance to be literal and meaningful, the scenario in the second clause must depict X as very Y, not more or less. Thus (2c) is uninterpretable because there is no such relationship between the two clauses; (2d) is pragmatically odd in that one's head usually sticks out over the back of movie seats, and (2e), while perhaps humorous, cannot be interpreted literally. (We will see in detail below how sentences like (2e) are humorous).

- (2) a. Dutch movie-goers are so tall that their heads obstruct one's view.
- b. Aides say Dean was so livid that he almost refused to come out to talk to the crowd.
- c. Dutch movie-goers are so tall that their heads are usually covered with blond hair.
- d. Dutch movie-goers are so tall that their heads stick out above the seats.
- e. Aides say Dean was so livid that he punched a hole in the wall with his face.

The point here is that there exists a pragmatic relationship between the first and second clause in sentences that use this X IS SO Y THAT Z construction, and utterances that violate this pragmatic relationship are awkward and difficult to process. This implies that part of what language users know about this sentential construction is the particular inferential mechanisms that are conventionally used to interpret it. The same is true of other sentential constructions, such as the WHAT'S X DOING Y construction, mentioned at the beginning of this section. Sentences like those in (2) are often uttered for a specific purpose, whether it's to enquire as to the origin of the X, to suggest that the X does not belong at the location Y, or even to make accusations about responsibility for the X being located at Y. These pragmatic inferences are conventionally associated with the WHAT'S X DOING Y construction, and as such, like other pragmatic inferences associated with particular sentential constructions, constitute part of a speaker's knowledge about language.

2.3. Imagery in language understanding

While Cognitive Linguists have long been proponents of a role for mental imagery in linguistic meaning (Casad 1982, Lakoff 1987, Langacker 1987), only recently has this notion accumulated systematic support from behavioral and neural imaging experiments, and started to become fully

articulated in a formal and computationally implementable model. The basic idea is that in order to understand an utterance, a language comprehender mentally simulates or imagines its perceptual or motor content. For example, comprehending a sentence like "John kicked the ball over the fence" might entail motor imagery - like what it feels like to kick a ball - as well as visual imagery - such as what it looks like for a ball to be kicked over a fence. On this view, language is meaningful when it effectively evokes mental simulations of this type - when it recreates experiences of "being there" in the mind of a language user.

Studies of various types are increasingly demonstrating that language comprehenders automatically and often unconsciously activate both perceptual and motor imagery in order to understand the content of language. Recent work has shown that people make use of particular parts of the visual field (Richardson et al 2003, Bergen To Appear) when a subject is processing simple declarative sentences whose meaning includes objects in those same areas, and that this visual imagination is reflected by actual eye movements (Spivey & Geng 2001). These linguistically evoked visual images include details about the orientation of objects (Stanfield & Zwaan 2001) and their shape (Zwaan et al 2002).

Motor imagery - imagining what it would be like to perform actions described - is also activated by language (Glenberg & Kaschak 2002, Bergen et al. 2003). Several recent studies show that parts of motor and pre-motor cortex areas associated with specific body parts become active in response to motor language referring to those body parts. Using behavioral and neurophysiological methods, Pulvermüller et al. (2001) and Hauk et al. (2004) found that verbs associated with different effectors were processed at different rates and in different motor cortex regions. In particular, when subjects perform a lexical decision task with verbs referring to actions involving the mouth (chew), leg (kick), or hand (grab), the motor cortex areas responsible for mouth versus leg versus hand motion received more activation, respectively. Tettamanti et al. (ms.) have also shown through an imaging study that passive listening to sentences describing mouth versus leg versus hand motions activates different parts of pre-motor cortex.

Behavioral methods (Glenberg & Kashak 2002, Bergen et al. 2003) have provided convergent evidence for the role of motor structures in understanding language that encodes actions. The findings from Glenberg and Kaschak's approach show that when subjects are asked to perform a physical action in response to a sentence, such as moving their hand away from or toward their body, it takes them longer to perform the action if it is incompatible with the motor actions described in the sentence. This suggests that while processing language, we perform motor imagery, using neural structures dedicated to motor control. Similarly, Bergen et al's approach has shown that subjects have more trouble deciding that a verb is not a good descriptor for a picture of an action when the action it describes uses the same effector (hand, foot, or mouth) as the action depicted. This finding demonstrates that detailed motor knowledge constitutes part of word meaning.

If, as the various studies described above indicate, understanding language entails performing visual and motor imagery, then this suggests that a complete understanding of how language is used for any given purpose, including its formal configurations, is only possible in a model that takes into account the human cognitive system that linguistic knowledge is embedded in. This system includes motor and perceptual knowledge, based on experiences interacting with the world. An approach to language that can accommodate this constraint along with the finding that grammatical constructions are bound to associated pragmatics, must thus be embodied it must allow the linguistic system to be shaped by the bodily, physical, and social environment in which it is embedded.

3. Funny grammar

Having now seen ways in which an embodied approach to language elucidates aspects of natural language, we turn to ways in which the details of linguistic structure pertain to linguistic humor. It is well known that a limited range of linguistic humor makes direct use of linguistic form - puns like (3a) play on phonological form and double-entendres like (3b) often rely on ambiguities of syntactic form. But beyond these restricted classes of linguistic humor, it may not be obvious how formal properties of sentences and their subparts are particularly relevant to the meaning or function of humorous language. For example, there are no dedicated syntactic structures or configurations that by themselves always trigger humor - there is no humorous equivalent of the ordinary English rule that determiners precede the nouns they modify, such that *monkey the* is the conventional funny version of *the monkey*. In other words, there is no such thing as "funny grammar", the content of undergraduate essays notwithstanding. We might then conclude that there is very little room for theories of grammatical knowledge and use in the study of linguistic humor.

- (3) a. Q: What's the difference between a sneezing elephant and a spy?
A: Nothing: they've both got a code in their trunk.
- b. One morning, I shot an elephant in my pyjamas. How he got in my pyjamas I don't know.

However, grammatical knowledge, broadly defined, is quite relevant to humor, in the following way. There exist particular pervasive canonical joke forms, which are specified in syntactic, lexical, and sometimes phonological terms. *Knock-knock* jokes are a prime example of formally specified jokes. Not only are the first, second, and fourth utterances lexically and syntactically fixed, but in canonical instances of these jokes, the fifth must necessarily begin with a pun on the name proffered in the third turn (4a) or on the response in the fourth turn (4b).

- (4) a. A: Knock knock
B: Who's there?
A: Nobel.
B: Nobel who?
A: No bell - that's why I knocked!
- b. A: Knock knock
B: Who's there?
A: Hawaii
B: Hawaii who?
A: I'm fine. Hawaii you?

Other examples of joke forms that place constraints on form include *what's the difference between X and Y* (5a), *how is X like Y* (5b), *what do you call X* (5c), *you know you're an X if Y* (5d), *how many Xs does it take to screw in a lightbulb* (5e), and *X was so Y that Z* (5f). It's important to note that while these joke forms are all familiar, they vary in their degrees of formal specificity. For example, it's pretty much imperative that jokes like (5e) include the word *lightbulb*, while utterances like (5f) have very minimal lexical requirements, as shown by the difference between it and (5g).

- (5) a. Q: What's the difference between a snow-man and a snow-woman?
A: Snowballs.
- b. Q: How is American beer like sex in a canoe?

- A: Both are fucking close to water.
- c. Q: What do you call a Chinese lady with just one leg?
A: Irene.
- d. You know you're a redneck if you've got more than one brother named "Darryl".
- e. Q: How many flies does it take to screw in a light bulb?
A: Two - the trick is getting them in there!
- f. Yo mama's so fat, when I yell "Kool-Aid," she comes crashing through the wall.
- g. It was such a cold day in New York City yesterday that the flashers were just describing themselves!

Joke forms like these, however, do not constitute evidence for funny grammar per se. While they are indeed lexically, syntactically, and sometimes phonologically specified, the sentence patterns they use are not used exclusively for humor - the same forms can be put to non-humorous uses. For example, consider the examples in (6). The first of these exemplifies a canonical joke form - *you know you're an X if Y*, which has saliently been used in recent years in the United States in redneck jokes. The humorous utterance in (6a) contrasts with the non-humorous one in (6b), but the difference in humorousness cannot be attributed to the grammatical forms of the two sentences, which are virtually identical. Rather, humorous utterances like the one in (6a) are specific uses of more general-purpose sentence types. Thus, while the grammar itself is not inherently funny, some humor has grammatical constraints, since it often uses particular sentence forms.

- (6) a. You know you're a redneck if you think genitalia is an Italian airline.
b. You know you're a prude if you think genitalia should not be discussed.

Moreover, when we look closely at particular joke forms, we find that both the force of the humor and the difference between the humorous and non-humorous versions depend on the particular pragmatics associated with the sentence form used. Recall that many sentence types are associated with a specific inferential structure and knowledge of conditions of use. Both the humorous and the non-humorous uses of the sentence forms rely on a particular inferential structure for their interpretability. For example, the *you know you're an X if Y* sentence form in (6) above has two clauses, related such that the first identifies a category, and the second describes a salient characteristic of members of that category. We can see in the example above that a significant difference between the humorous and non-humorous examples is that in the first, a particular stereotypical characteristic of rednecks, lack of world knowledge and formal education, is displayed in an exaggerated fashion in the second clause, whereas in the non-humorous example, the second clause provides a fairly reasonable, and thus unfunny, depiction of prudishness. Thus, the inferential structure associated with a sentence form makes non-humorous utterances meaningful, in that it structures the inferential relationship between the two clauses. On the other hand, the breaking of the expectations associated with this inferential structure is at least part of what makes humorous utterances that use this construction funny.

Knowledge of the pragmatics associated with particular sentence forms is part of being a competent speaker of a natural language, and being an efficient user of English includes knowing how to understand and perhaps produce jokes in most or all of the various forms discussed above. While their pragmatics are very similar, the humorous and non-humorous utterances differ in the uses to which they are put, a fact of which language users are well aware. Thus, after significant language exposure, speakers know how to participate in responsive joke forms like *knock knock* jokes, and are not actually surprised when exposed to a *you know you're an X if Y* joke that the expected inferential relationship between two clauses is violated - rather, they can be surprised by

the potentially novel way it is violated. In other words, knowledge about the particular pragmatics of sentence forms does not stop at conventional, non-humorous language; rather, it includes knowledge about the use of particular sentence forms for humorous purposes.

It should be noted that sentential pragmatics are used for humor, even when canonical joke forms are not involved, though this is of course harder to document systematically. For example, (7a) uses a sentence form wherein even the subject (a child of five) can be described by the predicate (could understand this), so anyone with greater capacity for doing what's in the predicate (understanding this) should also be able to do so. The implication in this particular case is that anyone unable to perform the task is less intelligent than a child of five. But the speaker of this utterance violates this potential pragmatic interpretation with the second sentence. Similarly, in (7b), the expectation that the second clause will be an example of something less complicated than the content of the first clause is violated by the description of a particularly difficult endeavor.

- (7) a. A child of five could understand this. Fetch me a child of five. [Groucho Marx]
b. Buying the right computer and getting it to work properly is no more complicated than building a nuclear reactor from wristwatch parts in a darkened room using only your teeth. [Dave Barry]

The relevance of grammar to humor, then, is not simply that there exist general rules for constructing humorous utterances. Rather, humorous language plays in part on the particular pragmatics of sentence forms used for humor. Of course, grammatical constructions are not humorous all by themselves - they always require additional mechanisms like imagery to be evoked in order for them to provoke humor responses.

4. Imagery and humor

Humorous utterances use existing linguistic structures, either recruiting their "normal" pragmatics, or, when conventionalized as being used for humor, having a humor-specific pragmatics cued by context. But much of humor depends on subtleties of interpretation relating to imagery.

Imagery is vital not just to understanding basic language about action and movement, as argued above, but also seems essential to linguistic humor as well. One documented example is the case of so-called *scalar humor* (Bergen and Binsted 2004). Scalar humor plays on a hearer's assumptions about what the possible values of certain scalar properties are, for particular entities. In order for scalar humor like (8) to be interpreted, a hearer must reconcile the claim in the first clause that "your mom is fat" with the alleged result of her fatness depicted in the second clause. A great deal of real-world knowledge contributes to understanding this example, including knowing that when you watch home movies, you often project images onto a large, white surface. But asking someone to wear white when watching home movies doesn't compositionally or conventionally imply that that a person is fat. Rather, only by imagining a very large woman wearing white clothes having a movie projected onto her can the hearer understand the hyperbole.

- (8) Yo' mama's so fat, when the family wants to watch home movies they ask her to wear white.

Let us expand briefly on this example, as it demonstrates the roles of both constructional pragmatics and mental imagery in humor comprehension. The linguistic knowledge brought to bear on understanding an utterance like (8) includes, aside from general knowledge of words and grammatical structures, a particular grammatical construction, which we've called X IS SO Y THAT Z (Bergen and Binsted 2004). This construction includes the specifications that first it includes a Noun

Phrase, indicating the topic (X), followed by the copula and the word *so* (or *such*), then a predicative description of the relevant attribute (Y), then an optional *that*, and finally a sentence that depicts the resultant state of affairs (Z). All of this is depicted schematically in Figure 1 below, where grammatical form is represented on the top, meaning on the bottom, and constructional characterization of constituents of the construction in the middle.

X IS SO Y THAT Z Construction

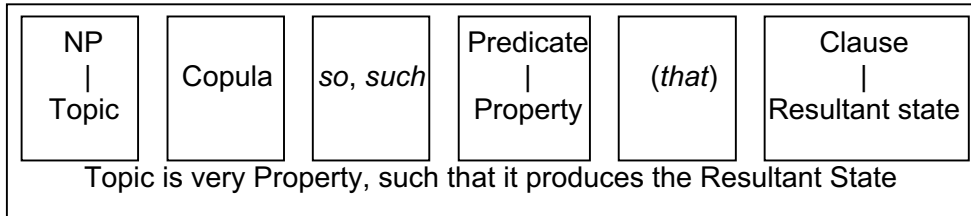


Figure 1 - A Schematic representation of the X is so Y that Z construction

A sentence like the one in (8) is easily seen as instantiating this X IS SO Y THAT Z construction, at least in terms of its formal and constructional properties. Thus, a language understander will naturally interpret an utterance like (8) as licensed by this construction. This entails that the global meaning of the construction, including the relationships among its constituents (described schematically at the bottom of the construction) is used as a template into which to fit the meanings of each of the constituent parts. But the templatic meaning of the X IS SO Y THAT Z construction is not superficially satisfied by its constituents in this particular utterance, since it's not transparently obvious why extreme fatness would result in having to wear white when the family watches home movies. This incompatibility cannot be resolved through basic linguistic or even simple inferential mechanisms alone. Rather, the sentence prompts a search for ways in which being asked to wear white when the family is watching movies indicates fatness. The understander, so encouraged, will consequently engage in the detailed imagery described above, in which a very fat person in white has movies projected onto her.

A second example of imagery playing a central role in making a humorous utterance interpretable is seen in (9). Here, the only relation between the description of the cold weather in the first clause and the description of Dick Cheney rubbing his hands together greedily in the second clause is the similarity of this action with the rubbing together of one's hands in order to stay warm. Thus the motor and visual imagery associated with the scene in the second clause again makes it a comprehensible depiction of a superficially unrelated topic from the first clause.

- (9) It was so cold last night I was rubbing my hands faster than Dick Cheney on an Enron payday.

This utterance, too, makes use of the X IS SO Y THAT Z construction, outlined in Figure 1, above. Once again, both constructional pragmatics and imagery are crucial to an understanding of the utterance's intended meaning. The language understander, when trying to interpret this sentence, is once again confronted with the task of satisfying the meaning of the X IS SO Y THAT Z construction when the content of the second clause is not transparently a depiction of someone's behavior when it is very cold. The severity of the cold described can only be ascertained by performing two relevant types of imagery - one where Dick Cheney is rubbing his hands together very quickly, due to anticipation of the large sums of money he is to receive from Enron, and a second one, where "I" am rubbing my hands together as just quickly, but due to the cold.

A final demonstration of the importance of imagery in understanding humorous utterances can be seen in (10), in which the framing of the scenario described in the question is provided by the punchline. In this case, it's at least partially auditory imagery, rather than the visual or motor imagery seen in the examples above, that fleshes out the scenario described in the punchline, and makes the joke coherent. In addition to general world knowledge, (10) requires more specific encyclopedic knowledge about Amish transportation conventions, and the sound of horse hooves.

- (10) Q: What goes clip-clop, clip-clop, clip-clop, clip-clop, bang, bang, clip-clop, clip-clop?
A: An Amish drive-by shooting.

In other cases, as in example (11a), imagery contributes most centrally to the humorousness of an utterance, and less centrally to its interpretability. Thus, while a bear wiping with a rabbit is not a particularly normal scenario, the content may nevertheless be understandable without resorting to imagery that is any more detailed than for understanding a less humorous sentence of the sort in (11b). However, the unexpected perversity of the events described in (11a), which the understander is forced to imagine, contribute to the humorousness of the joke

- (11) a. A bear and a rabbit are shitting in the woods. The bear asks the rabbit: "do you have trouble with shit sticking to your fur?" The rabbit says "no". So the bear wipes his ass with the rabbit.
b. A bear and a rabbit are hanging out in the woods. The rabbit tells the bear it has an itch. So the bear scratches the rabbit against a tree.

We have argued that imagery can be important to linguistic humor in at least two ways. In the first, for the joke to make sense at all, one has to perform detailed imagery, which allows the utterance to be coherent. In other cases, the utterance is interpretable without particularly detailed imagery but it is made funny by properties of evoked imagery.

5. Further embodied properties of humor

We have argued above that a viable account of the use of language for humor must have the following properties. It must be able to account not only for general sentence types, but also for very specific ones, like canonical joke forms. One important aspect of these grammatical patterns that it has to treat is their pragmatics - their conditions of use and the inferential structures they encode. Additionally, the language comprehension faculty must be tightly integrated with the ability to perform mental imagery, which allows for meaningful interpretations of the utterances and inferences that result in a humor effect. Adopting an embodied approach to language affords further predictions about how humor is structured and processed. Two central areas of study within the paradigm of embodied linguistics, conceptual metaphor and frame semantics, have direct applications to the study of humor.

One area of extensive research within the field of Cognitive Linguistics is into how words can have multiple meanings, and how these words are related (e.g. Lakoff 1987, Brugman 1981, Tyler and Evans 2001). In cases of multiple meanings for words, *polysemy*, certain of the meanings are often more concrete, or literal, than others (Lakoff and Johnson 1980). For example, the word *cold* can refer to low physical temperature as in (12a), a concrete, literal meaning, or alternatively to emotional detachment, as in (12b), which is more abstract and metaphorical.

- (12) a. My water is cold.

- b. Your girlfriend is cold.

Embodied approaches to language have observed that not only are many words conventionally used with these multiple meanings, but in addition words associated with the concrete, literal domain (also known as the source domain) can be used to describe aspects of the abstract, metaphorical domain (the target domain), even if there is no precedent for this use. For example, the word “arctic” has associations with low physical temperature but no conventional usage with respect to emotional accessibility. Nevertheless, it can be used with this novel sense, as in sentences like (13).

- (13) Jane's arctic personality put off her future mother-in-law.

What we can conclude from examples like this is that metaphor isn't simply a matter of particular words having multiple meanings. Rather there are systematic relations between domains of knowledge - in this case temperature and emotional accessibility. Though some words are conventionalized with multiple meanings, these meanings can also be constructed online during language use, because of the relations between the conceptual domains in question. The study of metaphor of this type is known as Conceptual Metaphor (Lakoff and Johnson 1980, Lakoff 1993).

Conceptual metaphors pop up in humor use in a variety of places. Puns are often based on them, and can be found in most every form of linguistic humor, for example (14). In the first, there's no conventional meaning of "fall off of" that pertains to a lawyer ceasing to have a professional relationship with someone, and yet this meaning must be accessible for language understanders to make sense of (14). Of course, this alternative, figurative meaning is well motivated by the systematic relationship or conceptual metaphor between abstract difficulties and physical burdens. For example, we talk about having a monkey on one's back, having a heavy burden on one's shoulders, and so on. The online construction of this secondary meaning of the expression "fall off of" can be seen as the result of the application of general, metaphorical knowledge.

- (14) Q: What is the difference between a tick and a lawyer?
A: A tick falls off you when you die.

The same argument can be made for (15). A chat room isn't a literal room, but rather a metaphorical one. It doesn't have most of the properties rooms do - it has no physical location or structure, it can't act as a literal container for people, etc. This use of the word "chat room" is conventional, despite being non-literal. By contrast, we don't usually use the word *fit* to describe people's relations to chat rooms. However, in (15), yo mama is described as not being able to fit into a chat room, and this is supposed to be evidence that she is very fat. For this humor to work, the understander must come up with a metaphorical interpretation of *fit in a chat room*. Since this isn't literally possible - chat rooms have no space, thus no size constraints, there is no way that being physically fat will lead to any plausible lack of such fit. The humor relies on the (fallacious) implication that yo mama is so fat that she can't even fit into a chat room, which has no size at all. The interpretation of this utterance thus relies on the polysemy of room, having a literal (physical) and a metaphorical (non-physical) sense.

- (15) Yo momma's so fat she can't even fit in a chat room.

Frame-based knowledge is also an important component of linguistic knowledge in embodied theories of language (Fillmore 1982). Frames (also known as *schemas* (Johnson 1987), *scripts* (Shank and Abelson 1977, Raskin 1985), etc.) are chunks of interrelated knowledge about entities and their

relations. A classic example is the Commercial Transaction frame (Fillmore 1982), in which a Buyer possesses some Money and gives it to the Seller in exchange for some Goods. Embodied models of language have argued that much of our linguistic knowledge is grounded in such encyclopedic knowledge. For example, what is a *buyer* but a role in the Commercial Transaction frame, and what is a *hypotenuse*, but part of a larger triangle frame? Frames fit into an embodied approach to language since they demonstrate yet another way in which linguistic knowledge is closely bound to the individual human experiences underlying the conceptual structures it is linked to.

Coulson (2000) and Coulson and Kutas (2001) argue that frame-based knowledge constitutes an important part of humor. Since so much of humor plays on world knowledge, one would expect that in understanding language in general and humorous language in particular, understanders regularly activate frames. Humor often requires a modification of the frame the language user is currently maintaining, which is part of what leads to a humor effect. For example, the sentences in (16) each involve a frame shift triggered by the final word. Coulson and Kutas found that when humorous sentences ended with words that did not fit the initial frame, like these examples, event-related brain potentials reflected difficulties with semantic integration, significantly more than when they ended with words that did fit the initial frame.

- (16) a. Statistics indicate that Americans spend 80 million a year on games of chance, mostly weddings.
b. She read so much about the bad effects of smoking she decided she'd have to give up reading.

Adopting an embodied perspective on language allows a broad range of cognitive linguistic phenomena studied in this area, like those described above, to be directly applied to humor research.

6. Conclusions

We have demonstrated above that there is a natural fit between the phenomena associated with linguistic humor and the theoretical apparatus of embodied linguistics; in particular, we have argued that humor makes use of constructional pragmatics and mental imagery, as well as metaphor and frames. Embodied grammars elucidate how language is used to produce and understand humor. Humor constitutes a domain of actual language use in which constructional pragmatics and mental imagery are not only obvious, but essential to the function of the language. Without imagery and knowledge of constructional pragmatics, we have argued, the language analyzed above would not only be unfunny, but uninterpretable.

Similarly, properties of humorous language help inform the nature of the human linguistic system in general. For example, the central roles of the two embodied characteristics documented above (imagery and constructional pragmatics) highlight the individual, human side of linguistic knowledge. Constructional pragmatics are acquired through exposure to language in particular social and discourse contexts, and as such, knowledge of them is strongly shaped by the individual's particular experiential history. Similarly, the importance of imagery to the meaningfulness and effectiveness of linguistic humor emphasizes the role that components of the human cognitive system other than strictly grammatical capacities play in human linguistic behavior. Together, the importance of constructional pragmatics and mental imagery evident in humorous language testify to the importance of the individual human experience to language use.

Humorous language, such as many of the examples cited in this paper, are instances of creative language use, on the part of the speaker or hearer or both. While creativity has long been an important component of linguistic theory (e.g. Chomsky 1965), this is usually restricted to the study

of how words and morphemes can be combined together in previously unobserved ways, by following general rules or principles (for example, given a new noun *wug*, how an English speaker knows that the plural is *wugs*). But the creativity evident in the human ability to produce or understand meaningful humorous utterances clearly far outstrips simple grammatical combination. Rather, it results from play with linguistic practice, including conventional inferences associated with particular constructions, and with the construction of detailed mental imagery. The moral to be drawn from the study of creative humorous language is that creativity cannot be distilled to a single rule-based process, but rather relies on multiple systems, including inference and imagery.

Embodied theories of language focus on language as it is actually used - embedded in a human being with a particular sort of cognitive system and a body of a particular sort, interacting in an environment with certain characteristics. Just as with other types of cognitively and socially integrated language use, such as instruction, argumentation, and requests, humor fundamentally involves a broad range of capacities outside of linguistic form proper, including other sorts of cognitive processes and social interactions. It is not surprising that understanding humorous language requires an understanding of the nature of the human beings that use it.

References

- Bergen, Benjamin and Kim Binsted. 2004. The Cognitive Linguistics of Scalar Humor. In Michel Achard and Suzanne Kemmer (Eds.) *Language, Culture, and Mind*. CSLI.
- Bergen, Benjamin and Nancy Chang. 2004. Embodied Construction Grammar in Simulation-Based Language Understanding. In Jan-Ola Östman and Miriam Fried (Eds.), *Construction Grammar(s): Cognitive and Cross-language dimensions*.
- Bergen, Benjamin, Shweta Narayan, and Jerome Feldman. 2003. Embodied verbal semantics: evidence from an image-verb matching task. *Proceedings of the Twenty-Fifth Annual Conference of the Cognitive Science Society*.
- Bergen, Benjamin. To Appear. Experimental methods for simulation semantics. To appear in Monica Gonzalez-Marquez, Irene Mittelberg, Seana Coulson, and Michael J. Spivey (eds.) *Methods in Cognitive Linguistics: Ithaca*.
- Brugman, Claudia. 1981. The Story of Over. MA thesis, University of California at Berkeley.
- Casad, Eugene, 1982. Cora locationals and structured imagery. Ph.D. dissertation, University of California, San Diego.
- Chomsky, Noam. 1995. *The Minimalist Program*. Cambridge: MIT Press
- Chomsky, Noam. 1965. *Aspects of the Theory of Syntax*. Cambridge: MIT Press.
- Chrisley, Ronald, and Tom Ziemke (2002). Embodiment. *Encyclopedia of Cognitive Science*, 1102-1108. Macmillan Publishers.
- Coulson, Seana. 2000. *Semantic Leaps: Frame-shifting and Conceptual Blending in Meaning Construction*. New York and Cambridge: Cambridge University Press.
- Coulson, S. & Kutas, M. (2001). Getting it: Human event-related brain response to jokes in good and poor comprehenders. *Neuroscience Letters* 316: 71-74.
- Croft, William. 2001. *Radical Construction Grammar: syntactic theory in typological perspective*. Oxford: Oxford University Press.
- Fauconnier, Gilles and Mark Turner. 2002. *The Way We Think: Conceptual Blending and the Mind's Hidden Complexities*. Basic Books.
- Fillmore, Charles J. (1982) Frame semantics. In *The Linguistic Society of Korea* (ed.), *Linguistics in the Morning Calm*, Seoul: Hanshin Pub. Co. (111-137).

- Glenberg, A. M., & Kaschak, M. P. (2002). Grounding language in action. *Psychonomic Bulletin and Review*, 9, 558-565.
- Goldberg, Adele. 1995. *Constructions. A Construction Grammar approach to argument structure*. Chicago: University of Chicago Press.
- Johnson, Mark. 1987. *The Body in the Mind*. The University of Chicago Press.
- Kay, Paul & Charles J. Fillmore. 1999. Grammatical constructions and linguistic generalizations: The What's X doing Y? construction. *Language* 75/1: 1-33.
- Lakoff, George and Mark Johnson. 1980. *Metaphors we live by*. Chicago: University of Chicago Press.
- Lakoff, George. 1987. *Women, fire, and dangerous things*. Chicago: University of Chicago Press.
- Lakoff, George. 1993. The contemporary theory of metaphor. In
- Lambrecht, Knud & Laura A. Michaelis. 1996. "Toward a construction-based theory of language function: The case of nominal extraposition." *Language* 72:2. 215-247.
- Langacker, Ronald (1987). *Foundations of cognitive grammar: Theoretical Prerequisites*. Stanford, CA: Stanford University Press.
- MacWhinney, B. 1999. The Emergence of Language From Embodiment. In B. MacWhinney, editor, *Emergence of Language*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Pulvermüller, F., Haerle, M., & Hummel, F. 2001. Walking or Talking?: Behavioral and Neurophysiological Correlates of Action Verb Processing. *Brain and Language* 78, 143–168.
- Hauk, O., Johnsrude, I. & Pulvermüller, F. 2004. . Somatotopic representation of action words in human motor and premotor cortex. *Neuron*. 41(2): 301-7.
- Kay, Paul. to Appear. *Pragmatic Aspects of Grammatical Constructions in Handbook of Pragmatics* edited by Laurence Horn and Gregory Ward, Blackwell.
- Raskin, Victor. 1985. *Semantic Mechanisms of Humor*, Dordrecht, Holland: D. Reidel.
- Richardson, D. C., Spivey, M. J., McRae, K., & Barsalou, L. W. 2003. Spatial representations activated during real-time comprehension of verbs. *Cognitive Science*.
- Shank, R.C. & Abelson, R. (1977). *Scripts, Plans, Goals, and Understanding*. Hillsdale, NJ: Erlbaum Assoc.
- Spivey, M. & Geng, J. (2001). Oculomotor mechanisms activated by imagery and memory: Eye movements to absent objects. *Psychological Research*, 65, 235-241.
- Stanfield, R.A. & Zwaan, R.A. (2001). The effect of implied orientation derived from verbal context on picture recognition. *Psychological Science*, 12, 153-156.
- Stefanowitsch, Anatol. 2003. A construction-based approach to indirect speech acts In Klaus-Uwe Panther and Linda L. Thornburg (eds.) *Metonymy and Pragmatic Inferencing*. John Benjamins
- Talmy, Leonard. 2000. *Toward a cognitive semantics*. Cambridge: MIT Press.
- Tettamanti, M., Buccino, G., Saccuman, M. C., Gallese, V., Danna, M., Perani, D., Cappa, S. F., Fazio, F., & Rizzolatti, G. Unpublished Ms. Sentences describing actions activate visuomotor execution and observation systems.
- Tyler, Andrea and Vyvyan Evans. 2001. Reconsidering prepositional polysemy networks: The case of over. *Language*, 77,4, 724-765.
- Zwaan, R.A., Stanfield, R.A., Yaxley, R.H. (2002). Do language comprehenders routinely represent the shapes of objects? *Psychological Science*, 13, 168-171.

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