Metaphor is Generic

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Abstract

An approach to sense extension tailored for polysemy associated with non-literal language expanded to include belief revision generally. The relationship between metaphor and genericity as rhetorical devices is discussed, and both are accounted for as related species within the same framework of dynamic semantics. The theoretical apparatus is related to a dominant theory of metaphor interpretation and processing which holds metaphorical utterances to be class inclusion statements involving dual reference for the the metaphorical vehicle.

1. Background

The aim of this paper is to closely link the theory of metaphor interpretation to that of natural language generics. Both forms of expression have curious truth conditions, and it is argued that both can be understood in terms of forms of belief revision in first order languages augmented with sense distinctions. Influenced by work in dynamic semantics that formalized accounts of anaphora in discourse as eliminating possible models of sentences with pronouns, on the basis of restricting assignment functions that map variables into the domain, as pronouns are resolved to potential antecedents (Kamp and Reyle, 1993; Groenendijk and Stokhof, 1991), as well as research in belief revision (Alchourrón et al., 1985), Lemon (1998) proposed a framework for first-order logical languages which admitted both information increase and retraction ("updates" and "downdates", respectively).

Vogel (2001) proposed a comparable system for information increase only, but with the additional dimension of intensionality in that indices for interpretation were provided to account for the multiplicity of senses that a predicate name or name of individuals might have. In particular, that system provided for static interpretation which is classical, if relativized to sense, and dynamic interpretation, which in all but certain well-defined syntactic and semantic contexts has the capacity to update the characteristic functions of sets corresponding to the denotation of relation names and constants. A feature of this system is that metaphoricity is captured as a partial order that classifies indices, thus accommodating the intuition that today's novel metaphor is tomorrow's conventionalized non-literal expression, and the next day's dead metaphor, literal language. The system took advantage of the fact that natural languages supply mechanisms to indicate that non-literal interpretation is intended. For example, it has been noted that the appearance of "literally" in a sentence is a fairly reliable indicator that the sentence it appear in is not to be interpreted literally (Goatly, 1997). It also supposed that languages have internal means to support the disambiguation of the intended sense of an expression (even if the latter are periphrastic, for example, "I mean 'bank' in the sense of 'a financial institution"'). The intent was to offer a proof-of-concept response to Davidson's claim that metaphor is not within the remit of semantics, but of pragmatics (Davidson, 1984). Vogel (2001) provided a truth-functional compositional semantics that could accommodate metaphor and sense extension (expansion of predicates to new entities, and multiple senses for names of entities and relations), but rejected Davidson's claim that "special senses" are not involved in metaphoricity.[1]

In contrast, Vogel and McGillion (2002) argued that natural language generics, phenomena well studied in the formal semantics of natural language (Krifka et al., 1995; Carlson and Pelletier, 1995; Cohen, 1999; Cohen, 2001), are not in the remit of semantics but of mathematical formulation of a cognitive theory of concepts. The basis of this argument is that unlike the case of metaphor, there are no overt markers of genericity. While there is ample treatment of the ability of definite NPs, bare plurals, mass nouns and even indefinite singulars to sustain generic readings, they do not demand them. This argument essentially ignores the possibility that actually the unmarked case is generic reference, such as in determinerless classifier languages where the specific reading is what may optionally be marked as such if context of use does not clarify.

(1) Hurricanes happen in the Atlantic and Caribbean.

(2) Leslie smoked cigarettes.

(3) Leslie smoked three cigarettes.

Habituals (1) with unbounded subjects, and comparable constructions with terminative aspect (see Verkuyl (1993)) make this more clear: without a specific bound or clear definite marking on the object NP in (2), the preference is to understand the sentence as a past tense habitual, a form of generic. On the other hand, (3) exhibits terminative aspect. The test between the two potential readings is in whether

[1] Van Genabith (2001) resisted the idea of a "designer logic" and attempted an account based on higher-order logic with types and a translation of all metaphors into corresponding similes, a move disfavored by many.

the sentence tolerates modification by "for a day" or "in a day"—(2) can be continued with "for a day" but not "in a day", and (3) has the reverse pattern. To obtain the specific episodic reading, explicit marking is necessary on the object NP.[2]

The purpose of this paper is threefold. Firstly, the paper intends to improve upon the dynamic semantics provided by Vogel (2001) to account for aspects of metaphoricity, by incorporating downdates, and thus more clearly separating the dynamics of information assertion and retraction from the orthogonal dimension of metaphoricity. Secondly, the paper argues a close relationship between metaphoricity and genericity (the former is expansive, and the latter is restrictive in subsequent interpretation potential). This move, as suggested by the title, resonates with one dominant theory of metaphor understanding that holds metaphors to be class inclusion statements (Glucksberg and Keysar, 1993; Glucksberg, 2001). Thus, the third purpose is to show how the semantic approach put forward here is compatible with important aspects of Glucksberg's theory.

One important aspect of the theory is the emphasis on a difference in interpretation requirements between novel and established metaphors. The main explanatory mechanism of the theory is allowance of dual reference in the vehicle of a metaphor in its predication of the topic, ambiguous in predication of the topic between literal reference and an abstraction over that reference that retains salient attributable properties. Asymmetries of metaphors (in contrast to the symmetry of similes) are anchored in the distinction between given and new information, with respect to qualifiable dimensions in the given information and potential attributions supplied by the new information.

The next section of the paper spells out the formal system for update and downdate which is richer than the starting point provided by Lemon (1998) in a few respects (it does not require that every element in the domain have a name in the language; it admits multiplicity of sense; it admits sense designation into the language) and is conceptually more complete than the framework provided by Vogel (2001) in forcing a clearer separation between information assertion and retraction and the role of metaphoricity. Then, §3. demonstrates the relationship between the resulting system and the restricted quantification of genericity (essentially, generics are also treated as special non-literal senses). Finally, the paper shows how some of the desiderata of Glucksberg's theory are met. Others of them (for example, conflation of subject-object asymmetry in metaphors with topic-comment information packaging) are disputed.

2. Dynamics of first-order information

2.1. Intuitions about revision

To a child learning about the world via science documentaries broadcast on television, it may be news that (4) is true. The literal truth of the statement is about NPs at the same level of abstraction.

(4) A whale is a mammal.

(5) A whale is like a mammal.

Even if the sentence is provided as a voice accompanying a picture of two whales, such that the child anchors the subject NP to one of the two whales arbitrarily, (4) remains a literally true statement. As an accepted piece of news, the child extends whatever meaning of "mammal" was in place before, with the new information that one or more whales is also in that set. If the child knows that whales are not fish, the child may retract the prior creative hypothesis that the swimming fish-like thing is not a fish. Note that (5) is also true because whales are mammals, and things are generally like themselves.[3] Moreover, (5) is reversible. Glucksberg notes that metaphors are not only asymmetric, they are also sometimes only reversible with a change of meaning into a different metaphor. Glucksberg (2001, pg. 45) notes the difference between (6) and (7).

(6) Some surgeons are butchers.

(7) Some butchers are surgeons.

The former presumably has negative connotations, and the latter, positive. Later the issue of reversibility returns with emphasis on the fact that the constraint is not simply on the linear presentation of topic and vehicle (see (48)).

However, (8) is also felicitous if it is taken to mean that a specific kind of mammal is the kind "whale", and if it is taken to mean that a particular individual mammal is of the whale sort, or maybe least likely if a particular specific indefinite is both a mammal and a whale.

(8) A mammal is a whale.

Duality of reference is not unique to metaphorical expressions. Or, perhaps, generics are metaphors.

The point of the example (4) is to show that there are needs for asserting and retracting information about entities and relationships that hold among entities in the world, independently of whether the utterance accepted as effecting the change fits criteria for some figure of speech or other. A mechanism for assertion and retraction is a necessary part of information processing.

2.2. A formal model of first-order belief revision

Lemon (1998) provided a framework for modelling first-order belief revision of incomplete theories. A theory is understood in this framework as a set of agent beliefs about the world and the individuals and first-order relations within it. An agent can obtain new beliefs or retract old ones. Beliefs may be about the truth of propositions or of properties holding of named individuals. A common simplifying assumption is made that every individual in the domain has a name (Gamut, 1991). Additional beliefs may include quantificational statements, and in fact may be about any well formed sentence in a standard first order language. Beliefs, quantificational or not, may be added or subtracted. Rationality postulates are provided to ensure a consistent belief state under deductive closure.

[2] Glasbey (2007) notes that aspectual class can diverge between literal and non-literal readings of idiomatic expressions.

[3] It is felicitous for someone to say, "He is not like himself today."

> In the semantics, theory growth is modelled by way of model elimination (information update, written "$s\ [\![\phi]\!]$ " for state s and formula ϕ), and theory contraction ($T \dot{-} \phi$) is modelled by "downdates" (denoted "$s\ ]\!]\phi[\![$ ") which involve *rational* model *construction*. Revision ($T \dot{+} \phi$), a consistency-preserving update, is a combination of these operations, denoted $s\ ]\!]\phi]\!]$ in the semantics (Lemon, 1998, pg. 86).

In retracting a belief from a theory, in general there will not be a unique subtheory of T that fails to entail the retracted formula (e.g. ϕ). Lemon refers to maximal subtheories of T with that status as, $T \perp \phi$, and defines a choice function α to pick out members of that set, and an intersection over all possible choices yields a total retraction of the formula ϕ from the theory T. To retract a universally quantified formula involves total retraction of a single formula in which the quantifier is removed and free instances of the erstwhile bound variable are substituted with a constant, the name of the individual which causes the universal to be retracted. Total retraction of an existentially quantified formula similarly requires retraction of all formulas obtained by substitution of each constant for now free instances of the formerly bound variable. This method works because of the substitutional approach taken to quantification. Names are taken as rigid designators and the naming of individuals in the domain is only ever monotonically increasing—it is not possible to un-name an individual, although individuals may have more than one name.

2.3. First-order belief revision adapted to sense extension

Assume a first order language, let the language have a denumerable set of constants, C, a supply of variables V, predicate names $\mathcal{R}$, indications of sense M, and the usual logical connectives. An indication of sense may be provided periphrastically and/or deixis accompanying an utterance; sense indications may supply information about reference.

(9) If c is a constant and m is an indication of sense, then c_m is a constant.

(10) If P is an n-ary predicate name, $n \geq 0$, and m is an indication of sense then P_m is a predicate name.

(11) The usual combination rules with respect to forming predications of n-tuples, complex formulae and sentences apply

As constructed, a predication (including those applied to zero arguments), may be accompanied by an indication of the sense in which it is to be interpreted, and the same for constants.

In general, dynamic semantics supposes that there is an input to interpretation and that the output of interpretation can be a truth value, but also a change in the model of the world that is input to interpretation of subsequent utterances. In classical logic, one thinks of a meaning function defined for arbitrary sentences relativized to a model which consists of a domain and interpretation function. Assuming a fixed domain, with dynamic interpretation, relativization is to the input and output interpretation function. Thus, a basic meaning function is going to be annotated with the input and output interpretation functions (as well as assignment functions for free variables), accordingly. In the case of static interpretation, the inputs and outputs are identical. In the case of dynamic interpretation, there can be an expanded or contracted interpretation function.

In extensional treatments of semantics, the interpretation of a predicate is the set of tuples each of which the predicate is true of; the interpretation of a constant is some element of the domain. Suppose the simple world of integeters given by the domain D in (12).

(12) $D = \{1, 2, 3\}$

(13) $C = \{i, ii, iii\}$

(14) $\mathcal{R}$ = {even, odd, lucky, $<$ }

A standard interpretation of the Roman numeral system might interpret the constants in (13) as (15) in functional notation, or equivalently as the set of tuples that constitute that function as in (16). The proper subset symbol (the symbol $\subset$ is used rather than $\subseteq$) makes clear that this is a proper subset of the interpretation function I: the predicates in (14) require interpretation as well, and thus supply another subset of I.

(15) $I(i) = 1$
$I(ii) = 2$
$I(iii) = 3$

(16) $\{\langle i, 1\rangle, \langle ii, 2\rangle, \langle iii, 3\rangle\} \subset I$

Similarly, the meanings of relations are spelled out in terms of the entities that stand in the relations. It is equivalent to provide them as functions or as the appropriate sets of tuples as in (17)–(20).

(17) $I(even) = \{2\}$
$\{\langle even, 2\rangle\} \subset I$

(18) $I(odd) = \{1, 3\}$
$\{\langle odd, 1\rangle, \langle odd, 3\rangle\} \subset I$

(19) $I(lucky) = \{2\}$
$\{\langle lucky, 2\rangle\} \subset I$

(20) $I(<) = \{\langle 1, 2\rangle, \langle 1, 3\rangle, \langle 2, 3\rangle\}$
$\{\langle <, 1, 2\rangle, \langle <, 1, 3\rangle, \langle <, 1, 4\rangle, \langle <, 2, 3\rangle\} \subset I$

There are no other tuples in I for any language, at the outset, besides those spelled out for the basic terms and predicates. Updating or downdating with the language means adding tuples to or subtracting tuples from the interpretation function for the language.

Additional parameters are needed for interpretation to accommodate multiple senses. So, consider the one place predicate, "lucky". One sense of this expression is in terms of chance—at some moment in time 2 might be a fortuitous outcome for some event, like a draw of a card from a deck.

Another sense is in terms of omens—seeing three seagulls on the bow might have some relevant meaning to seafarers. Thus, the meaning of "lucky" (19) might be relativized to the appropriate sense as in (21) or (22).

(21) $\{\langle lucky, chance, 2\rangle\} \subset I$

(22) $\{\langle lucky, omen, 3\rangle\} \subset I$

For the purposes of this paper, novel uses of expressions involve the creation of new senses for predicates. Sense extension involves the accumulation of new tuples in the interpretation for a predicate relative to a given sense. Belief revision in general, through dynamic interpretation, is modelled by allowing that tuples may be added or subtracted, and the logical closure computed.

In what follows, the meaning function ($[\![.]\!]$) is spelled out. The construction stipulates what arbitrary sentences of the language should mean, relativized to a model, which includes the domain and interpretation function for expressions of the language. Because the system should ultimately be dynamic in that the interpretation function is altered as expressions are analyzed, the function is annotated with the input interpretation on the left, and output interpretation on the right (${}^{I}[\![\pi]\!]^{O}$). Because the system is a first order one, assignment functions are provided for the interpretation of variables. These function like contexts that provide the reference of pronouns. Two additional aspects of context also anchor the interpretation—the default sense of an expression and the default 'world' in which interpretation is happening.[4]

2.3.1. Sense-relative static interpretation

Interpretation is relative to models consisting of a domain of entities and an interpretation function I for basic expressions in the language, which is presented in terms of the tuples comprising it. An important parameter of interpretation function is the index at which a basic expression is to be interpreted.

Let W be a collection of possible senses. Sense selection functions s map sense indicators to indices. That is, basic expressions must be interpreted within a model relative to the sense of the expression at stake, either signalled or fixed by default. Assignment functions g map variables to elements of the domain; this is the alternative to interpretation of variables via substitution of constants (Gamut, 1991). Constrain the basic interpretation function, I, as follows in (23)–(32).

(23) $\forall c \in C, w \in \mathcal{W}, \exists \overset{!}{d} \in D : \langle c, w, d\rangle \in I.$

(24) $\forall P^n \in \mathcal{R}, n \geq 0, \forall \tau \in D^n, \langle P, w\rangle \oplus \tau \in I$ iff P is true of the tuple τ at index w.

The constraint in (23) indicates that for every constant and every sense, there is a unique element of the domain that the constant can denote in the provided sense; (24) provides the list of tuples of entities in the domain that constitute a relation as a particular sense of a predicate name. A term t is either a constant or a variable. The symbol $\oplus$ denotes sequence concatenation.

[4] An article in *The Economist* may use without penalty "bank" in an article reviewing property values on one side of the Seine.

(25) The meaning of a constant, relative to an input and output interpretation function and to ${}^{I}[\![c_m]\!]^{I,\langle s, g, w\rangle} = I(c, s(m))$, iff $s(m)$ is defined, otherwise, ${}^{I}[\![c]\!]^{I,\langle s, g, w\rangle} = I(c, w)$.[5]

(26) ${}^{I}[\![x]\!]^{I,\langle s, g, w\rangle} = g(x)$

(27) ${}^{I}[\![\langle t^1, ..., t^n\rangle]\!]^{I,\langle s, g, w\rangle} = \langle {}^{I}[\![t^1]\!]^{I,\langle s, g, w\rangle}, ..., {}^{I}[\![t^n]\!]^{I,\langle s, g, w\rangle}\rangle$

(28) A predication is true if the denotation of its arguments, as a tuple, is in the interpretation of the predicate at the relativized sense. If the tuple is 0-ary, then it is a proposition which is true in the relevant sense if and only if the predicate name and sense pair exist in the general interpretation function (and the proposition is otherwise false.

${}^{I}[\![P^n(\sigma)]\!]^{I,\langle s, g, w\rangle} = 1$ iff $n \geq 0, \mid \sigma \mid = n$ and $\langle P, w\rangle \oplus {}^{I}[\![\sigma]\!]^{I,\langle s, g, w\rangle} \in I$

(29) ${}^{I}[\![\neg P]\!]^{I,\langle s, g, w\rangle} = 1$ iff ${}^{I}[\![P]\!]^{I,\langle s, g, w\rangle} = \emptyset$

(30) ${}^{I}[\![P \wedge Q]\!]^{I,\langle s, g, w\rangle} = 1$ iff ${}^{I}[\![P]\!]^{I,\langle s, g, w\rangle} = 1$ and ${}^{I}[\![Q]\!]^{I,\langle s, g, w\rangle} = 1$

(31) ${}^{I}[\![\forall x\phi]\!]^{I,\langle s, g, w\rangle} = 1$ iff ${}^{I}[\![\phi]\!]^{I,\langle s, g[x/d], w\rangle} = 1$ for each element d of the domain, where $g[x/d]$ is an assignment function just like g apart from the assignment to x, which is instead d.

(32) Existential quantification is interpreted in predictably different metalanguage from (31).

These clauses are static in that the output interpretation is always identical to the input interpretation.

2.3.2. Sense-relative assertion

This section refines the definitions for assertion provided by Vogel (2001). In that proposal, static interpretation was reserved for senses classified as literal and dynamic interpretation for senses classified as non-literal. What is correct about this distinction is that the difference between a literal sense and a non-literal sense is convention in classifying it as such. Here, a partial ordering in that dimension is assumed (this emerges more below, particularly in how this relates to genericity). Evidently, people are able to perceive degrees of metaphoricity (Ortony, 1979). I argue that Vogel (2001) was incorrect in leaving open the suggestion that only non-literal expressions are open to belief revision; the independent need for sense extension and contraction was motivated in §2.1. Assume that δ is an act of deixis or reference designation that may be used to pick out individuals or tuples of individuals. Again, let t be a term, a constant or a variable. In some cases, assertional interpretation is not defined as such, but reduces to static interpretation.

(33) Given an input interpretation function, assertional interpretation of a constant with a particular designation

[5] This "otherwise" reference to a default sense is to be assumed consistently throughout the remainder.

of sense may point to an individual referred to with accompanying deixis; the constant refers, and the interpretation function is augmented with an additional tuple, appropriately.

${}^{I}[\![c_m]\!]_{+}^{I \cup \{\langle c, s(m), \delta(c)\rangle\}, \langle s, g, w\rangle} = \delta(c)$, iff $\delta(c)$ is defined .

(34) If no designation of sense if supplied, then assertional interpretation of a constant is relative to a default sense,[6] if an individual is also designated, and otherwise assertional interpretation of a constant reduces to static interpretation.

${}^{I}[\![c]\!]_{+}^{I \cup \{\langle c, w, \delta(c)\rangle\}, \langle s, g, w\rangle} = \delta(c)$, iff $\delta(c)$ is defined .

(35) $${}^{I}[\![\langle t^1, ..., t^n\rangle]\!]_{+}^{O, \langle s, g, w\rangle} = \langle {}^{I}[\![t^1]\!]_{+}^{O^1, \langle s, g, w\rangle}, ..., {}^{O^{n-1}}[\![t^n]\!]_{+}^{O, \langle s, g, w\rangle} \rangle$$

(36) Note that the assertional interpretation of a predication (or proposition) always succeeds relative to either a designated or default sense. It has the effect of adding a tuple (possibly empty for a proposition) to the characteristic function for the n-ary predicate for the relevant sense. The interpretation of constants used as arguments may be extended to new senses denoting new individuals along the way, via (35)

$${}^{I}[\![P_m^n(\sigma)]\!]_{+}^{I \cup \left\{ \langle P, s(m)\rangle \oplus {}^{I}[\![\sigma]\!]_{+}^{O, \langle s, g, w\rangle} \right\} \cup O, \langle s, g, w\rangle} = 1$$

By construction, the assertional interpretation of (36), if repeated for sufficient designations of elements of the domain, can come to make the static interpretation of the universal quantifier provided in (31) work out to be true, and it can make existential generalizations true in a single application for the relevant sense. While in §2.3.1., static interpretation clauses for implication and disjunction are omitted because they can be defined from negation and implication, omission of clauses here should imply that interpretation is static. That is, there is no direct clause for extending the sense of a predicate under the scope of a quantifier, but doing so with individual constant terms will have the effect of making static interpretation relative to the selected sense work out to be true. On the other hand, senses of predicate names and constants cannot, by this construction, be augmented under the scope of negation. However, because extension of a predicate at an index for a sense provides grounds for static interpretation of an existential generalization to be true, it equally supplies grounds for a formerly true negated existential generalization to be false. Even just addition of truths inside the model yields nomonotonicity in support of sentences in the language.

[6]In general, if a sense is not designated then interpretation reverts to being relative to the default; the same holds for (36), for example.

2.3.3. Sense-relative retraction

Like Lemon (1998), I will assume that names of individuals cannot be retracted. Thus, names and tuples of names will be interpreted as what they mean according to a static designated sense. The output of retracting information about a particular tuple of individuals from the denotation of a predicate for some sense of the predicate is an interpretation function which is smaller (if that tuple was in I for the predicate at that sense in the first place), and the formula will evaluate to be false. Subsequent static interpretation of the negated formula, picking out exactly that same tuple, will evaluate as true because the non-negated form is now false.

(37) $${}^{I}[\![P_m^n(\sigma)]\!]_{\dot{-}}^{I - \left\{ \langle P, s(m)\rangle \oplus {}^{I}[\![\sigma]\!]^{I, \langle s, g, w\rangle} \right\}, \langle s, g, w\rangle} = 0$$

Universally quantified formulae (possibly complex) may be retracted by deleting a tuple from the interpretation function that creates an exception. Existentially quantified formulae may be retracted by deleting all tuples that support the existential generalization. The only generalization over Lemon's work provided in this section is that retraction of information is relativized to the sense of the predicate at stake. It uses an extensional unpacking of intensions.

2.4. Initial reflections on metaphoricity

The discussion which precedes has not provided the logic which fits the constraints on updating and downdating models as specified. Ensuring the correspondence between alterations to models and closure of the set of sentences true in those models is a separate exercise. However, it can be seen from what is discussed what sentences will gain or lose support and that the entire system is non-monotonic, because the underlying models are non-monotonic: relations can expand and contract. The location of dynamic semantics for the language is in the non-logical expressions—proposition and predicate names as well as names of individuals (all relative to senses of them). It is possible to imagine varying the interpretation of the logical constants ($\wedge, \neg$, etc.) so that they do not behave in classical ways (Kuhn, 1981); however, that is not of focus here. The language is set up such that in NPs, head noun restrictor sets; in VPs, verbal heads; in APs, adjectives and adverbs; in PPs, prepositions may expand and contract the sets that they are true of as individuals or tuples of individuals corresponding to relations.

It is assumed that these sets are the input to generalized quantifier constructions (Barwise and Cooper, 1981) to, for example, construct an NP as a set of sets which "lives on" its head noun set, and such that a sentence involving an NP and an intransitive VP or copula-linked predication is true just if the set given by the predicate is an element of the set of sets provided by the NP. If metaphorical statements are taken to be class inclusion statements, this analysis in terms of generalized quantifiers will demand modification to achieve the same effect. In fact, the inclusion statement is that the "lives on" property holds: whether the characteristic set χ corresponding to any predicate is an element of the quantifier depends only on the intersection of the head noun set (N) from the quantifier with χ. For any χ that is in the GQ denotation supersets or subsets will either have to also be elements of the GQ donation as well (or must not be) depending on the determiner that combines with the head noun set to form the GQ. Thus, the "lives on" property takes care of class inclusion, but also exclusions where necessary. The reason to accept generalized quantifier theory is its robust account of evidently syntactic puzzles (e.g. the "definiteness effect" in partitive constructions), semantic puzzles (e.g. licensing of negative polarity items by downwards monotone determiners), as well as predicting processing facts about natural language determiners (e.g. monotonic increasing determiners (e.g. "some" and "all") are easier to evaluate than monotone decreasing determiners (e.g. "no" and "few"), which are in turn easier than non-monotonic determiners (e.g. "exactly three")) that are supported by empirical evidence (Moxey and Sanford, 1993). Ample reason to move to a generalize quantifier account are provided by Barwise and Cooper (1981); primary is that first-order logic does not have the expressive capacity to represent the meaning of "counting" as is required by relatively mundane natural language determiners like "most" or "many".[7] Finally, in presenting the invariants associated with generalized quantifiers, Barwise and Cooper (1981) assumed a fixed-model constraint to address the variance in determiner meaning that depends on contextual factors like expectations. For example, a different number of people, even a different proportion of a relevant head noun set being quantified over, might count as "many" depending on the expectations. The fact, that the cardinality or ratio involved in "many" is to be interpreted with varying models in generalized quantifier theory is a background support for the kind of variation in interpretation depending on signalled sense to account for aspects of metaphoricity in this paper. Consider the highlighted portion of (38).[8]

(38) There was never a solicitation for money at these events, but of course, the President hoped that people in this category of friends and prior supporters would give money afterwards. *And, in fact, many did, and many did not.*

It is clear that metaphoricity is handled here by classification of senses of predicates as metaphorical or not, and degrees of metaphoricity can be represented. It remains to discuss more about the nature of the distinct senses of predicates and what makes them stand in special relationships to their base forms. The basic idea is that by addressing predicates and their related senses, one has access to a larger characteristic function for the set than is relevant to any literal sense of the predicate. Each possible sense is the characteristic function corresponding to an abstraction over salient properties associated with the characteristic function for the predicate. There can be any number of such abstractions, and one does not expect each of them to have a unique name (Glucksberg, 2001). Each additional sense of a predicate has its own characteristic function, and as has been seen, the set determined by each such function can be expanded or contracted using the dynamic interpretation mechanisms specified above. Equivalence classes of senses of a predicate form the space of polysemy for a predicate (as distinguished from its having unrelated homonymic senses), and all of the tuples in the entire equivalence class form a larger set than those in the basic literal sense.

3. Metaphoricity and Genericity

As constructed, predicates cannot be extended to cover new tuples under the scope of negation, but negations can be made true by retracting tuples from the characteristic functions of particular senses of predicate names. It is tempting to say that novel use of metaphor involves the generation and population of new senses of predicates; conventionalized metaphor is about the re-use of old senses, and dead metaphor does not even involve extending the predicate to a fresh set of tuples. However, a key point here is that information assertion and retraction about individuals and tuples of individuals is independent of metaphoricity being involved. It happens with literal information also.

If senses associated with predicates are individuated, then it is possible to consider subsets of the interpretation function as bundling predicates together by senses that are shared. For example, there is a financial institution sense of "bank" that is in common with a particular sense of "bond". The two words do not mean the same thing: even relative to that shared sense the words participate in different networks of implications and are true of different tuples. It is possible to partially order names of relations paired with their senses in a cline of metaphoricity. The different senses of predicates will ultimately be true of different sets of tuples. In discussing abstractions that yield senses of predicates and constant names related to metaphoricity, one obtains sets that have more entities in them in their totality than the literal sense that one started with.

Genericity provides an alternative sense to predicates that has nearly identical properties to metaphorical sentences, but on the analysis provide here, they are explained by appeal to construction of related contracted senses of predicates. Like metaphors, generics can be predications over nominals (39)-(41) or can involve the verbs directly as well (42). Generics certainly cannot be understood as universally quantified statements, as their nature is to have exceptions. Thus, if generics are taken to be category inclusion statements, they turn out to be false in their literal sense. However, generics cannot be truthfully understood as asserting even that *most* of the entities in the subject NPs head noun set have the predicated property, because (39)-(41) would remain true if there tend to be more male platypuses than female ones, or even if most platypuses die before reaching the age of being able to reproduce. Similarly, (42)

[7] Note that Glucksberg (2001, pg. 22) recalls experiments from 1982 and 1989 which revealed significant differences in responses to metaphorical statements with quantified subjects depending on the determiner of quantification ("some" vs. "all"); one might anticipate that a wide range of variability is indexed by exactly the monotonicity properties of the determiner.

[8] Attributed to Lanny Davis, special White House counsel, February 25, 1997. OnLine Focus interview with Elizabeth Farnsworth (`http://www.pbs.org/newshour/bb/white_house/february97/davis_2-25.html` — last verified March 5, 2008.

might be uttered to mean that the only time Leslie smokes, it's after dinner, or among the times that Leslie smokes, after dinner times are included. The safest "strong" reading of a generic in first-order languages is that the sentences make an existential claim that, for example, there is at least one platypus that has produced an egg. However, the existential readings are a challenge for sentences like (43) in which there is no real entity in the domain that satisfies the existential generalization, but perhaps appeal to fictional entities could provide some sort of straw to grasp to make it work.

(39) The platypus is an egg laying mammal.

(40) A platypus is an egg laying mammal.

(41) Platypuses are egg laying mammals.

(42) Leslie smokes after dinner.

(43) Unicorns are white.

(44) An egg laying mammal is the platypus.

The truth conditions of generics are thus as troubled as those of metaphors. Note further that reversing the predications is possible, but changes the meaning slightly, admitting a Gricean implicature in (44) that there are other egg laying mammals as well. This reversibility issue is comparable to the situation referred to above (6) and (7) with metaphors.

It is common to understand generics as involving a restricted domain of quantification over salient individuals. This is rather the converse of what happens with metaphor understanding. Thus, the proposal to unify the treatment of metaphoricity and genericity in this dynamic framework is to allow for alternative senses of literal predicates which are reduced by individuals or tuples[9] that challenge the literal truth of universal quantification over the full domain. Metaphors are class inclusion statements that involve expanding hitherto un-named categories, and generics are class inclusion statements that involve shrinking categories with prior names. Among the alternative senses for predicates are those which stand systematically in this way via relevant restriction over the characteristic set of the predicate at some sense.

4. The framework in light of Glucksberg

One aspect of the system that merits discussion is its main area of divergence from the work of Glucksberg and colleagues. This is with respect to the question of asymmetry of metaphor, which I argued above extends somewhat to genericity. The divergence is in that the system doesn't place great emphasis on the asymmetry beyond the order of arguments in a tuple, which is in each case an ordered sequence. The system, through multiplicity of senses for predicates and terms, admits duality of reference, but it is not prejudiced to require that the dual argument must be in a non-subject position. Interestingly, Glucksberg (2001) comments in a number of places less on the asymmetry of subject and object, as with respect to new and given. This is also called the topic-comment distinction, and it often in English coincides with the grammatical subject, but it is not analytically identical (Keenan, 1975).

(45) Einstein [my brother points at a clever companion] can work out how the remote control works.

(46) It is sharks that lawyers are.

(47) Sharks, Lawyers are.

First of all, (45) shows that the Demjanjuk examples of Glucksberg (2001, pg. 40) involving abstract categories can occur in subject position. The cleft (46) and topicalization (47) are both constructions that move canonical objects into a topic position for information packaging purposes, and in these cases it turns out to be the abstract category that form topic, and the finite sentence with an object gap that forms a predication for the comment. Perhaps one would want to argue that the subject remains given in these and related constructions, but it is clear that it is not the linear order of presentation that matters as much as the information packaging into topic and comment.

However, a more robust class of examples of non-literal expressions best understood as class inclusion statements, but with the class in the initial position, has an exemplar in (48).[10] This construction relates directly to predication metaphor (49). A counterpart construction for simile is perhaps anomalous (51).

(48) "Anyone who has lived in the ethnic shouting match that is New York City knows exactly what I mean"

(49) New York City is an ethnic shouting match.

(50) Anyone who has lived in the New York City that is an ethnic shouting match knows exactly what I mean.

(51) the jail that is like Sandy's job

In (48) both terms of the predication can be understood via literal referent or as concepts, but there is evidently a preference for "the ethnic shouting match" to be understood as a name for category which is asserted to have the literal New York City within it. The relevant nonliteral constituent of (48) can be equally understood via (49). An adapted formulation is provided in (50) to show that reversibility does obtain and "New York City" does not appear to be forced into a sub-kind level expression, although it has to be at least a category here for the definite reference to work. The point is that there is more to explore about the asymmetry facts associated with metaphor. They appear to be not simply about the order of presentation of topic and vehicle and their reversibility. The facts seem to depend upon the construction which is used to package the relevant information. In the system provided in this paper, (35) gives the dynamic interpretation of terms in a tuple, interpretation of the output of the first as the input to the second, and so on. The tuples are ordered by the argument structure of the predicate, rather than the information packaging of the construction it appears in. There may well be empirical

[9] Individuals are singleton tuples, anyway.

[10] Attributed to Andrew Sullivan by Roberts (2007).

consequences that depend on alternative information packaging associated with argument terms, but it is not clear that they have much significance. That is, while a tendency to restrict reversibility of arguments and correlation with topic-comment structures may be useful diagnostics of metaphoricity, the dual reference theory seems to be able to stand up independently in cases where the data seems slightly at odds with the asymmetry claims.

5. Final Remarks

This paper has argued that metaphoricity and genericity are best handled within the same semantic framework, one that admits information update, names of individuals and predications paired with senses. The formal machinery has been sketched in an extensional unpacking of the main ideas. Pairs of predicate names and senses can be partially ordered to achieve a continuum of metaphoricity. Glucksberg (2001) has argued that metaphors are best analyzed as class inclusion statements involving dual reference. Generics and habituals certainly look like class inclusion statements and show many of the same properties of non-literal interpretation that metaphors do. It has been shown exactly how metaphors relate to each other within a non-monotonic system for information change.

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