

The Baltic International Yearbook of  
Cognition, Logic and Communication

October 2011

Volume 6: *Formal Semantics and Pragmatics:*

*Discourse, Context, and Models*

pages 1-30

DOI: 10.4148/biyclc.v6i0.1572

MICHAEL HEGARTY  
Louisiana State University

## TWO TYPES OF BELIEF REPORT

**ABSTRACT:** Ascriptions of belief and other doxastic propositional attitudes are commonly interpreted as quantifying over a set of possible worlds constituting doxastic alternatives for the belief experiencer. Katz (2000, 2003, 2008) has argued that belief predicates and other stative attitude predicates, along with stative predicates generally, lack a Davidsonian event argument and therefore do not report on any eventuality (event or state). Hacquard (2010), in contrast, assumes that all attitude ascriptions describe an event corresponding to the mental state of the attitude experiencer. The present investigation suggests that the strengths of doxastic predicates can be modeled by generalized quantifiers over the doxastic alternative set, permitting us to formulate and test predictions based on standard interactions of these quantifiers with negation when these ascriptions are negated. This provides a middle ground between Katz and Hacquard, whereby some belief ascriptions are interpreted as nothing more than a quantified condition over a doxastic alternative set, while others attribute a Davidsonian belief state to the experiencer. In the latter case, the condition involving quantification over doxastic alternatives is an essential content condition which serves to individuate the eventuality described by the belief report, and to identify it across possible worlds.

### 1. INTRODUCTION

Katz (2000, 2003, 2008) argues that a theory of the interpretation of stative sentences does not require us to posit states of the world which are described by such sentences, and that phenomena explained by doing so are better explained without such states. Correspondingly, Katz argues, if we adopt a Davidsonian approach to the interpretation of action sentences, we should not posit Davidsonian state variables in the argument list of stative predicates, or in the representations of the meanings of stative sentences which we construct with them. Katz includes stative propositional attitude ascriptions such as ascriptions of belief in the scope of this proposal.

Hacquard (2006, 2010) proposes, to the contrary, that all attitude ascriptions have an associated event or state, with a corresponding event variable.

In this paper, I chart a middle course, finding reason to distinguish two types of propositional attitude ascription. One type has no associated event or state; it simply states a condition on possible worlds according to whether or not they are consistent with the propositional attitude being ascribed. The other type is interpreted as characterizing a mental state, an emotional state, or an act of assertion, which I take the attitude verb to introduce as one of its arguments. In this second type, the content condition involved in the first type of interpretation is used as a criterion of individuation of such an event or state, and of its identity across possible worlds. For both types, I propose that differences in strength can be captured in terms of the quantificational force of different generalized quantifiers. For reasons of space, the discussion in this article is limited to belief ascriptions.<sup>1</sup>

For the purposes of this discussion, I assume that a sentence of natural language is interpreted by interpreting its LF phrase structure tree compositionally in a model  $\mathbf{M}$ , following the practice of Heim & Kratzer (1998).

### 2. BELIEF ASCRIPTIONS

Belief ascriptions can be called doxastic reports, since they report on the doxastic state of the experiencer subject.<sup>2</sup> Consider the belief as-

criptions in (1).

- (1) Sam believes / thinks / expects that the President will resign.

To interpret these, suppose that the experiencer subject, *Sam* denotes the individual  $a_3$  in the domain  $\mathbf{D}$  of  $\mathbf{M}$ , and that  $\mathbf{S}_1 = \text{the President will resign}$  is the LF structure of the complement clause.<sup>3</sup> Then the belief ascription in (1), following common practice, can be interpreted in  $\mathbf{M}$  by quantifying with a universal quantifier over the set of doxastic alternatives for the experiencer, representing ways the world could be according to the experiencer's beliefs. Letting  $\text{DA}(a_3, w)$  be the set of doxastic alternatives of Sam in the possible world of evaluation  $w$ , we can write truth conditions for (1) in  $\mathbf{M}$ , as in (2).

- (2)  $[[ \text{Sam believes that } \mathbf{S}_1 ]]$   $\mathbf{M}, w = 1$  iff  $\forall v \in \text{DA}(a_3, w): [[ \mathbf{S}_1 ]]$   $\mathbf{M}, w = 1$

As a first step toward generalizing this approach to a wider range of attitude ascriptions, I first seek to extend it to predicates which are intuitively stronger or weaker than *believe*. This is undertaken in section 2.1. The intuitions regarding the relative strengths of these predicates are illuminated and made manifest when ascriptions with them are negated; this is taken up in section 2.2.

### 2.1. Variation in Strength

Now consider the ascriptions in (3).

- (3) Sam is sure / certain / convinced that the President will resign.

These seem to make a stronger statement about Sam's doxastic alternative set than any of the ascriptions in (1). But if we interpret them as involving quantification over the set of Sam's doxastic alternatives, there is no evident way to make the interpretation stronger than the truth conditions formulated in (2) other than by the addition of an otherwise unmotivated strength modifier. If the truth conditions in (2) "max out" on the dimension of strength that seems relevant to the difference between (1) and (3), then there is a problem formulating suitable truth conditions for the stronger ascriptions in (3).

The ascriptions in (4) seem to make a weaker statement about Sam's doxastic alternative set than (1).

- (4) Sam imagines / suspects that the President will resign.

Based on (2), it would be natural to suppose that the ascriptions in (4) have analogous truth conditions with an existential quantifier over  $\text{DA}(a_3, w)$ . But there are two problems with this supposition. First, this would make (4) paraphrasable as "Sam thinks it is possible that the President will resign," or, "Sam cannot rule out that the President will resign," which seems to be too weak an interpretation. If Sam cannot rule out that the President will resign, this isn't enough to make (4) true unless Sam also thinks that the possibility of a resignation is high enough to be salient, even if not high or salient enough for (1) to be true. Second, and related to this, Kai von Stechow notes (personal communication), that if *imagine* and *suspect* had the quantificational semantics of existential quantification over the set of doxastic alternatives of the experiencer subject, then ascriptions with these verbs would have the force of a possibility modal (though quantifying over a different domain), and thus, alongside sentences such as *It is possible that the President will resign and it is possible that the President will not resign*, we should find a sentence such as the following to be felicitous: *#Sam suspects that the President will resign and Sam suspects that the President won't resign*. This expectation is not borne out; such sentences are infelicitous. So *imagine* and *suspect* are stronger than mere existential quantification, and stronger than mere possibility, but weaker than *believe* and *expect*.

We have encountered a series of doxastic predicates, (*imagine, believe, be sure*), which differ from one another primarily just in strength, for which truth conditions of the sort given in (2), with standard logical quantifiers  $\forall$  and  $\exists$ , seem to be inadequate. This suggests that we replace the quantifier in (2) by a generalized quantifier of appropriate strength. Following Lewis (1975) and Kratzer (1979, 1981, 1989), generalized quantifiers show up not just in quantified noun phrases, but in the interpretation of conditionals and sentences restricted by *when*-clauses. If we are to adopt an analysis of doxastic predicates as quantifying over a set of doxastic alternatives, we should use generalized quantifiers of appropriate strength. With reference to a wider range of quantificational phenomena, this section will provide evidence that *be sure* is the analog of the determiner quantifier *every*, the adverb of quantification *always*, and the modal operator *must*, and that *believe*

is the analog of the determiner quantifier *most*, the adverb of quantification *usually*, and the modal operator *should*. Let EVERY be the generalized quantifier for this first group, and MOST be the generalized quantifier for the second.<sup>4</sup> On this basis, we might have expected that *suspect* and *imagine* would have the force of the generalized quantifier SOME, manifested in the determiner quantifier *some*, the adverb of quantification *sometimes*, and the modal operator *might*. But this is not tenable, as discussed above. I leave the quantificational force of *suspect* and *imagine* unspecified for now, to be determined in section 2.2. Letting Q be the undetermined generalized quantifier for *suspect* and *imagine*, the results of this analysis of doxastic predicates are given in (5).

- (5) a.  $[[ \text{Sam is sure that } S_1 ]]^{M,w} = 1$  iff  
 $(\text{EVERY } v: v \in DA(a_3, w)) [[ S_1 ]]^{M,v} = 1$   
 b.  $[[ \text{Sam believes that } S_1 ]]^{M,w} = 1$  iff  
 $(\text{MOST } v: v \in DA(a_3, w)) [[ S_1 ]]^{M,v} = 1$   
 c.  $[[ \text{Sam suspects that } S_1 ]]^{M,w} = 1$  iff  
 $(Q v: v \in DA(a_3, w)) [[ S_1 ]]^{M,v} = 1$

The right-hand sides of these conditions express three different set-theoretic relations in the model between the sets  $DA(a_3, w)$  and  $\{v: [[ S_1 ]]^{M,v} = 1\}$ . The discussion of section 2.2 below provides further support for these proposals, where the value of Q will be determined through its interaction with negation.

The doxastic alternative set of Sam,  $DA(a_3, w)$ , at a world of evaluation  $w$ , is the set of possible worlds consistent with what Sam believes in  $w$ . Let us understand possible worlds to be possible ways the world could be (or is). I take the set of possible worlds consistent with what Sam believes to be very large, since I assume that if  $u$  is any possible world in  $DA(a_3, w)$ , consistent with what Sam believes in  $w$ , and  $v$  is a possibility that differs from  $u$  in some way which we can articulate and which makes no difference to Sam's beliefs, then  $v$  is a member of  $DA(a_3, w)$  too, distinct from  $u$ . The generalized quantifiers in (5) thus have substantial sets on which to operate. I will assume here that these sets are nevertheless finite, so we can employ the standard semantics of generalized quantifiers. If the sets of possibilities were infinite, further

apparatus involving sample sets and probability distributions could be introduced to achieve the same purpose.<sup>5</sup>

## 2.2. The Value of Q

The naturally occurring example in (6a) was uttered by tennis announcer John McEnroe in commentary before the Wimbledon final round match between Venus Williams and Marion Bartoli on July 7, 2007; the examples in (6b,c) are constructed.

- (6) a. I'm not sure Venus will crumble like Henin did yesterday.  
 b. I'm not sure we can get in there.  
 c. Sam's not convinced that the President will resign.

Example (6a) was uttered with some tentativeness, appropriate in light of Bartoli's consistency through the Wimbledon fortnight, and a tendency toward inconsistency in the play of Venus Williams. It could be suitably paraphrased as, "Venus might not crumble like Henin did yesterday." The predicate *be sure* is intuitively a strong doxastic predicate; the negated ascription in (6a) has a much weaker value, as suggested by the paraphrase. The same is true of the constructed examples in (6b,c).

To interpret (6a), we use (5a), negating the truth conditions for **I'm sure that  $S_2$** , where  $S_2 = \text{Venus will crumble like Henin did yesterday}$ , and  $a_1$  is the speaker, resulting in (7).

- (7)  $[[ \text{I'm not sure that } S_2 ]]^{M,w} = 1$  iff  $(\text{SOME } v: v \in DA(a_3, w)) [[ \sim S_2 ]]^{M,v} = 1$ .

That is, (6a) is true just in case it is at least possible that Venus will not crumble as Henin did. This result is consistent with the paraphrase given above. Thus, we can interpret (6a) by using classical negation-quantifier interactions to import negation, converting the generalized quantifier in the lexical representation of the attitude predicate to its dual. I will call this Neg-Importation with Dualization (NID).

Can we do this for an ascription with *believe*, as in, *The Senator doesn't believe that the bill will pass*, using (5b)? Taking *believe* in isolation, it is hard to say what its dual is. Partly this stems from the intrinsic vagueness of *most*.

Instead, put negation with *believe* aside for the moment, and consider negation with *imagine* and *suspect*, as in (8).

- (8) a. Sam doesn't imagine that the President will resign.  
 b. I don't imagine we can get in there.  
 c. I don't imagine you can lend me a hundred dollars.

The best paraphrase of (8c) is along the lines of, "I expect that you can't lend me a hundred dollars." The form in (8c) is a more polite form of the request than, "Can you lend me a hundred dollars?" because it is interpreted as in the paraphrase just given, as asserting that the addressee probably can't make the loan, thus taking pressure off the addressee to comply with the indirect request. The predicate *imagine* is intuitively somewhat weaker than the mid-point of the scale for belief ascriptions, and what we get when we negate it, as in (8c), is an ascription with strength somewhere above the mid-point of that scale. This holds for the other ascriptions in (8).

Using (5c), we interpret (8a) as in (9), where  $Q^\perp$  is the dual of the generalized quantifier  $Q$ .

- (9)  $[[ \text{Sam doesn't imagine that } S_1 ]]^{M,w} = 1$  iff  
 $(Q^\perp v: v \in DA(a_3, w)) [[ \sim S_1 ]]^{M,v} = 1$ .

The ascription in (8a) has (at least approximately) the force of *Sam believes that the President will not resign*. This suggests that MOST is (at least approximately) the dual of  $Q$  in (9), that is,  $Q^\perp = \text{MOST}$ , which means that  $\text{MOST}^\perp = Q$ . Now we can interpret **Sam doesn't believe that  $S_1$**  using (5b), to interpret a negated belief ascription as having the force of *imagine*, as in (11); this gives us the interpretation of the negated sentence in (10) under the "Neg-Raising" interpretation on which negation is associated with the lower clause. This interpretation of (10) can be paraphrased as, "Sam is inclined to believe that the President will not resign."

- (10) Sam doesn't believe that the President will resign.

- (11)  $[[ \text{Sam doesn't imagine that } S_1 ]]^{M,w} = 1$  iff  
 $(\text{MOST}^\perp v: v \in DA(a_3, w)) [[ \sim S_1 ]]^{M,v} = 1$  iff  
 $(Q^\perp v: v \in DA(a_3, w)) [[ \sim S_1 ]]^{M,v} = 1$ .

Predicates such as *believe* have strength somewhere above the mid-point of the doxastic scale, but below the top of the scale, which is occupied by *be certain* and *be sure*. The dual of *believe* is correspondingly weaker than the mid-point. How much weaker depends on the exact force of the original predicate, which I assume, following (5b), to have the force of MOST. Applying the general rule in (12), we see that if MOST means  $>70\%$ , for example, then  $\text{MOST}^\perp (= Q)$  corresponds to  $\geq 30\%$ .

$$(12) \sim(Qx: A(x)) B(x) \text{ iff } (Q^\perp x: A(x)) \sim B(x)$$

In the limiting case where MOST means "more-than-half",  $\text{MOST}^\perp$  corresponds to "half-or-more," which is just slightly weaker than "more-than-half". (If it is not the case that more-than-half of A are B, then half-or-more of A are not-B.) The stronger the meaning of MOST, the weaker the meaning of  $\text{MOST}^\perp = Q$ . I allow that MOST can mean  $N\%$ , for some  $N$  within the range  $50 \leq N < 100$  depending on speaker and context. But for most uses, MOST (and therefore *believe*) will be interpreted with  $N$  around 75, midway between the mid-point and the top of the scale, since *believe* needs to have sufficient distance between *be certain* and *be sure* at the top of its scale, and sufficient distance from its own dual, *suspect* and *imagine*, lying at a mirror-image point on the other side of the mid-point. That way, *suspect* and *imagine* have the strength of a weak version of *believe* ("inclined to believe"), somewhere below the mid-point of the scale, but well above the strength of a possibility modal. This is in accord with the fact that it is infelicitous to say, #*Sam suspects that the President will resign and (Sam suspects) that the President will not resign*, since this is akin to saying that Sam is inclined to believe  $p$  and inclined to believe  $\text{not-}p$ .

### 3. EVENTS AND STATES

The interpretations given in (5) relate the doxastic state of the belief experiencer to the content of the belief complement for a range of doxastic attitude predicates. In other propositional attitude reports, it is clear that more must be going on. For example, a report of attitude assertion, such as *Sam said that the President will resign*, is a report of an event, a saying event, in which the content of the complement

clause and the doxastic state of Sam and his addressees somehow figure. These are beyond the scope of the present paper. But the literature is divided on whether plain belief ascriptions such as that in (1) likewise report on something going on in the world, namely, an event or state corresponding to what is going on in Sam's head, and this is directly relevant to the topic of the present paper. I take it up in section 4 below. In order to address this issue, it is necessary to first review some ideas on the individuation and identification of objects and events, and their role in semantic theory.

### 3.1. *Individuating Objects and Events: Part-whole relations and causation*

The ontology of events assumed here is essentially that outlined in the "Events" chapter of Lewis (1986), with the role of part-whole relationships on events as elaborated by Moltmann (1997). A similar view is sketched by Carlson (1998). The view, in sum, is that events are individuals in the world and, as such, they participate in multi-dimensional part-whole relationships in the same way as other individuals. How we delineate events, and the relationships among them, depends on the interests and purposes that motivate or inform us in undertaking the delineation. This has implications for the identification of events across possible worlds. Events can have counterparts across possible worlds, but which events participate in the counterpart relation—and thus count as "the same event"—depends on our interests and purposes, just as with other individuals.

Compare this view of events with the situation of physical objects, whose part-whole structure can be delineated along various dimensions, at various levels of granularity. The breakdown of an automobile engine along functional lines might result in a small number of relatively complex parts, such as the fuel injection system, the cooling system, the electrical system, and so on. Some of the components in such a functional breakdown, such as the electrical system, can be quite distributed in space. The parts causally interact with one another, and may interpenetrate one another in intricate ways. In a more atomistic delineation of physical parts, the entire engine might break down into a fairly large number of simplex objects, including nuts, bolts, plates, fans, belts, hoses, wires, and electronic sensor components, and

a few large simplex objects, such as the engine block and the radiator box. The objects we delineate as parts of the engine depend on the dimension and level of granularity chosen, which in turn depend on our purposes in making the delineation.

Following the lead of Lewis (1986) and Moltmann (1997), a similar approach will be adopted here for events. If three children, Keisha, Kieran and Kevin, are hopping about in a room together, we can individuate the event of all three of them hopping, and we can individuate three distinct sub-events, one for each child's hopping. With sufficient motivation, we can even individuate distinct sub-events consisting of any two of the children hopping. At a lower level, we can identify each hop by a single child as a sub-event, and at a lower level still, the impact of the child with the floor upon his or her descent in a given hop as a further sub-event. If Keisha twists her ankle while hopping, we can identify the larger event of the children hopping as the cause of this mishap (they shouldn't have been hopping on a concrete surface), or the sub-event of Keisha's participation in the hopping, or her last, wayward, hop, or the impact upon descent from this hop, when the ankle was injured. Combinations of events usually do not compose larger events, but sometimes they do, just as amalgamations of objects do not usually compose a larger object, but they sometimes do. This leaves open questions about the resolution of sub-events in a descending sequence of ever-smaller sub-events, parallel to analogous questions about the smallest components of matter. These questions about sub-event resolution can have significance for semantic theory, as Eckhardt (2005, 2008) has argued. But these questions don't have to be fully settled in order for us to appeal to a domain of events in a Davidsonian semantic theory, any more than physics has to settle comparable questions about the composition of physical objects before we can define a domain of physical objects for semantic theory.

### 3.2. *Davidsonian Semantic Theory with Lewis's Conception of Events*

Turn now to the interpretation of a typical action sentence such as (13) in Davidsonian semantic theory.

(13) Max kicked the ball.

The standard Davidsonian interpretation of (13) would assign it the truth conditions in (14) in  $\mathbf{M}$ , at world of evaluation  $w$ , where the bold-faced rendition of the sentence is its LF phrase marker,  $a_5$  and  $a_6$  are members of the domain  $\mathbf{D}$  of  $\mathbf{M}$ , the referents of *Max* and *the ball*, respectively, and  $e_4$  is a member of a special subset of  $\mathbf{D}$ , the set of individuals that are events.<sup>6</sup>

$$(14) \text{ [[ Max kicked the ball. ]]}^{\mathbf{M},w} = 1 \text{ iff } \exists e_4 [\text{kick}(a_5, a_6, e_4)]$$

Davidson assumed that events are individuated according to their causal relationships: one event is identical to another just in case they have the same causes, and the same effects. As a result, there is a unique event  $e_4$  whose existence is asserted by (14). If the ball breaks a window, sparking a lawsuit and other entanglements, these results are all results of the impact of Max's foot with the ball. And if we tried to identify  $e_4$  as a larger event, any cause of this larger event would be a cause of the impact of Max's foot with the ball. For Davidson, the choice of  $e_4$  as the event being described is quite determinate, since all events with the same causal efficacy as  $e_4$ , which might also be described by (13), are in fact identified with  $e_4$ .

In contrast, in line with the discussion in section 3.1, I assume that *Max kicked the ball* can be used to describe any event in which the particular kicking of the ball by Max took place, and the granularity chosen will reflect our interests and purposes. For some purposes,  $e_4$  would be taken to be a very local event, encompassing the impact of Max's foot with the ball, and little else. For other purposes, this impact might be simply a salient part of a larger event in which the ball broke a window and thereby initiated a feud between neighbors. We can take (13) to assert the existence of an event at some level of granularity, which has the smallest event of Max kicking the ball as a (possibly improper) sub-event. To this end, interpret the predicate of (13), **kicked the ball**, consisting of VP and Aspect, as in (15) below, asserting the existence of an event  $e_4$ , at some level of granularity or other, which can be characterized by the condition 'x kicked  $a_6$ ' in the model.<sup>7</sup> Composing with the subject DP **Max**, we obtain the truth-conditions in (16).

$$(15) \text{ [[ kicked the ball. ]]}^{\mathbf{M},w} = \lambda x \exists e_4 [\text{Part-of } e_4: x \text{ kicked } a_6]$$

$$(16) \text{ [[ Max kicked the ball. ]]}^{\mathbf{M},w} = 1 \text{ iff } \exists e_4 [\text{part-of } e_4: a_5 \text{ kicked } a_6]$$

The idea might be clearer with the more storied example in (17).

(17) Buck shot Ed.

The event described by (17) could be very small, centered about the squeezing of the trigger by Buck, as in, *In that second, just as Bill entered the room, Buck shot Ed*. Or the granularity could be larger. In discussing a spy operation, (17) could be a report on one of the "achievements" of the spy agency during the month of March, an elaborate operation involving weeks of planning, leading up to Buck shooting, and thereby assassinating, Ed. (*Achievement number 16: Buck shot Ed*.) This usage is also seen in the example in (18), where Sam reminds Bill of a party they attended, at which Buck shot and wounded Ed, a commotion ensued, and it took three hours after the police and ambulance arrived for things to settle down to the point that Sam and Bill could leave; in this report, Sam's use of the demonstrative *that* refers to a rather larger event consisting of the shooting and its aftermath.

(18) Remember, we had a drink in the bar downstairs and talked to Maria for a while. Then Buck shot Ed. After *that*, we left and went to a diner for a late snack.

On this view, the granularity is determined by context or ostension, as needed. This is possible since the required "size" of the event intended, in which Buck shot Ed, with some antecedent lead-ins and some subsequent consequences possibly tacked on, can be circumscribed by its spatio-temporal boundary. Variation across possible worlds would serve to fix the granularity to a finer grain since the lead-ins and consequences of the pulling of the trigger could vary across possible worlds and still permit identification as the "same event" as in the actual world. But the pulling of the trigger, caused (directly or indirectly) by Buck, resulting in the bullet hitting Ed, is common across all trans-world variants of the event.

In this paper, I am, in effect, adopting Davidson's semantics for action sentences in the context of Lewis's (1986) view of events. For Lewis, an event is a property of spatio-temporal regions, and thus can be identified (extensionally) as a class of regions, at most one per possible world (p.245). We can take the Davidsonian interpretation to assert the existence of an event at a chosen level of granularity, where

a coarser grain typically corresponds to a larger spatio-temporal region. Lewis notes the difficulty in trying to identify an event uniquely through a description of the event. But such difficulties shouldn't surprise or disturb us. Individuals have properties, but it is typically hard to specify individuals uniquely by description, except by using relational properties which identify the individual in terms of its relation to other individuals (e.g., *a is three feet due north of b*). The difficulties involved in uniquely describing an event are parallel: it is easy to uniquely specify an event using relational properties to delimit an event, fix its granularity, and place it in space and time. In this, events simply share in the behavior of other complex individuals.

Before returning to belief reports, let us take a momentary digression on trans-world identity - how we identify individuals and events as the "same individual" or the "same event" across possible worlds.

### 3.3. Identifying Individuals and Events across Possible Worlds

In the classical example of the ship of Theseus, the planks of the ship are replaced one by one, as the ship continues to sail and dock at ports, until all the planks have been replaced, at which point the discarded planks are re-assembled, reconstituting the original ship. In this example, we can identify the physically reconstituted ship assembled from discarded planks as the "same ship" as the original, if sameness of material constitution is most important to us, or, alternatively, we can identify the result of plank-by-plank substitution as the "same ship," if spatio-temporal continuity is most important. We might have different individuating criteria, yielding different results, depending on our interests and purposes. For tax purposes, with concern for the operation of the ship as it sails the sea and puts into port, spatio-temporal continuity might be paramount. For purposes of historical preservation, to create a museum display of the physical ship which was sailed during key historical events and which bears historically inflicted scars and marks, the ship assembled from discarded planks might be paramount.

In a variant of the ship of Theseus example, we can imagine the original ship persisting untouched in the actual world,  $w_o$ , while the process of removing and replacing planks one by one, and then physically reassembling the discarded planks, all happens in a world  $w'$ , distinct from  $w_o$ . At a given point in time after the reassembly of the

planks is complete in  $w'$ , we can ask which ship in  $w'$  is the counterpart of the ship in the actual world: the one which has maintained spatio-temporal continuity with what was previously the unambiguous counterpart of the actual ship, and which has (we will assume) continued to sail missions and put into port in  $w'$  as its planks were replaced one by one, or the museum ship reassembled from the discarded planks? The answer depends on our criteria of cross-world identity, which in turn, depend on our interests and purposes.

We can pose similar problems for the individuation and identification of events across possible worlds. Suppose that Max works for the CIA. One night, in the actual world,  $w_o$ , Max types up and prints a list of CIA agents who work abroad, along with their contacts, and arranges to meet with Maria, whom he knows to be the agent of a hostile power, on the pier, at midnight. He gives her the list, thus betraying his country. In another world,  $w'$ , Max creates the same list, and meets the same person Maria at the same spot on the same pier at the same time, and gives her the list; but in  $w'$ , Max knows that Maria is a friendly double-agent, and by giving Maria the list, he is making it possible for a warning to be sent to the listed agents and their contacts, thus preventing them from being compromised and arrested. Ten minutes later in  $w'$ , however, sitting in his office, Max changes his mind and with the press of a key on his computer keyboard, transmits the list to the agent of a hostile power. Which of the two events in  $w'$  is the counterpart of the event in the actual world? If the physical execution of the action is used as the criterion of identity, then the counterpart event will be that of Max meeting Maria on the pier at midnight, and handing her the paper with the list of names printed on it. That might be identified as the "same event" if what we are tracking is how Max caught a chest cold which aggravated his acute bronchitis and caused him to die two days later (in both  $w_o$  and  $w'$ ). If the functional significance of the event and its ramifications for the spy agency and the country are used as criteria of identity, then the physically quite different event of Max pressing the button on his computer keyboard in his warm, cozy office is the counterpart event.

Thus, identifying counterparts of individuals or events across possible worlds involves specification of criteria of identity, dependent on our interests and purposes.

### 3.4. A Role for Content

In a step toward the interpretation of belief ascriptions, consider examples in which ordinary individuals are endowed with content. To this end, suppose we are standing in a room of a long-abandoned mansion, taking stock of the furniture and art which are sitting about, dusty and displaced, but otherwise still in good condition. One of us points to a painted portrait of Benjamin Franklin, and utters (19a), referring to two windows in the room, or (19b), referring to the colonial era portrait artist Joseph Siffred Duplessis.

- (19) a. The portrait of Benjamin Franklin must have hung between the two windows.  
 b. The portrait of Benjamin Franklin must have been painted by Duplessis.

We approach the interpretation of the modal statements in (19) according to a theory of identity across possible worlds in terms of finding a best counterpart for the purposes and interests at hand. Would the interpretation of the modal include worlds in which the best counterpart of the portrait was a portrait with nearly the same spatio-temporal history as the actual one, but one which happened to be a portrait of an obscure contemporary of Franklin? That depends on the purposes and interests of the participants in the discourse. If the portrait and other objects are being addressed simply as items of furniture and decoration in (19a), with no regard for the content or historical significance of who is depicted in the portrait, then the interpretation of the modal would not strongly favor possibilities in which the portrait was of Franklin, but instead, might favor possibilities in which the portrait counted as the “same item of furniture,” by virtue of a shared or similar spatio-temporal history as furniture. The modal interpretation would then include worlds in which the portrait was of someone else, and count it as “the same portrait” for the purpose of a statement about what sort of furnishings the room had. An otherwise similar possible world to the actual one, in which the portrait is of someone else and didn’t hang between the two windows, could count as falsifying (19a). In contrast, in a suitable context for (19b), where the fact that the portrait is of Benjamin Franklin is critical to the purposes and interests of the conversation (for example, one concerned with the historical

or monetary value of the portrait), worlds in which the same canvas was used for a portrait of an obscure contemporary of Franklin’s, and subsequently underwent the same spatio-temporal journey, would not be included. If there is such a world, otherwise similar to the actual world, in which the portrait is of someone else and not by Duplessis, this would not falsify (19b) since the portrait would not count as the same portrait, and so this world wouldn’t be included in the evaluation of the modal statement. When the content is critical, the content of the portrait is a major factor (usually the decisive one) in identifying it across worlds.

This example illustrates the point that for objects endowed with content, in contexts where we care about that content, the content has a role in identifying the object across possible worlds. The same is true of events, which I regard equally as individuals in the semantic ontology, subject to identification across possible worlds: when they are intrinsically associated with content, we can identify them in terms of that content across worlds. This result will be employed in the next section.

## 4. BELIEF ASCRIPTIONS AND EVENTUALITIES

Returning to stative doxastic ascriptions with predicates such as *believe*, the truth conditions in (5) interpret these as bare quantified conditions on a set of doxastic alternatives, not as asserting the existence of an event or state of belief, that is, not as akin to the Davidsonian interpretation of an action sentence in (16).

This result is fully in line with Katz (2000, 2003, 2008), who argues that stative sentences in general, and stative attitude ascriptions in particular, do not describe events or states which should be semantically represented using a Davidsonian event or state variable. Katz (2000, 2003, 2008) argues that the extension of the Davidsonian analysis from action sentences to sentences with state predicates is flawed since it predicts a symmetry between eventive and stative predicates for adverbial modification, nominalization, and a host of other properties, a symmetry which Katz claims does not obtain. Katz (2000) argues that these symmetries break down quite generally. Katz (2003, 2008) argues that each class of stative predicate, and each type of VP-

modifier, must be considered in its own right, and that doing so yields a variety of more satisfactory analyses of the interpretations of stative predicates and their modifiers, undercutting the rationale for extension of the Davidsonian analysis to stative predicates.

Katz (2008) proceeds by examining arguments for the existence of stative eventuality variables given in the literature. Katz argues that temporal modifiers analyzed along the lines of ‘for-a-long-time (*e*)’ and ‘at-midnight (*e*)’ on the neo-Davidsonian approach can be analyzed just as well, if not better, as predicates of times.<sup>8</sup> Additionally, he argues that state predicate modifiers such as *completely* (e.g., in *John loves Mary completely*) or *well* (e.g., in *John knows French well*) are better analyzed as degree modifiers. Katz notes that stative predicates exhibit a high degree of lexical selectivity for particular modifiers, with variation in this selectivity even among stative predicates of the same semantic type, implicating a lexical (or distributed morphological) analysis of them. (E.g., *John knows French well* and *John loves Mary completely*, versus # *John knows French completely* and # *John loves Mary well*). Furthermore, he notes that event-denoting bare infinitive complements to perception verbs of the sort exhibited in (20) do not have state-denoting counterparts of the sort shown in (21).

(20) John saw Maria perform the song.

- (21) a. \*John saw Mary own a car.  
b. \*John saw the socks sit on the floor.

Interpreting (20) as a relation of perception between the experiencer subject of see and the event described by the bare infinitive complement *Maria perform the song*, as in (22), the lack of a corresponding interpretation of (21a,b) follows from the supposition that there is no corresponding event or state variable to serve as the denotation of the bare infinitive complements *Mary own a car* and *socks sit on the floor*.

(22)  $\exists e_1 \exists e_2 [(\text{Part-of } e_1: a_9 \text{ performs } a_{14} \wedge (\text{Part-of } e_2: a_8 \text{ performs } e_1)]$

Katz’s arguments, cited above, are convincing to the effect that temporal and aspectual modifiers do not provide good evidence of a Davidsonian variable for any predicate. His argument that manner modification of a stative cashes out as manner modification of associated events is less straightforward. For example, Katz analyzes (23) as making an

implicit generic statement about events which mark John’s behavior towards Mary, asserting that they are characterized by passion.

(23) John loves Mary passionately.

We might question whether this conflates epistemological or evidential issues concerning (23)—What would lead someone to assert it?—with issues of its semantic meaning. Of interest here is whether this would be adequate for the analysis of the contribution of this adverbial, and others like it, to the interpretation of belief ascriptions such as (24).

- (24) a. Max passionately believes that Mary murdered Bill.  
b. Max arrogantly believes that he is the greatest novelist alive.  
c. Max honestly believes that Maria is the best chess player in the world.

In order to avoid positing Davidsonian events or states in the interpretation of these ascriptions, we might say that the adverbs in (24) merely denote a property of the experiencer, Max. Then the ascriptions in (24) would have standard Davidsonian representations in (25) below.

(25)  $[[ \text{Max believes that } S_i ]]^{M,w} = 1 \text{ and passionate / arrogant / honest } (a_5)$

But these are inadequate since they don’t tie Max’s passion, arrogance, or honesty in any way to his belief. We don’t merely want to say that Max has a belief with the content  $S_i$ , and he is passionate (or arrogant, or honest, etc.). And the adverbials in (24) would not have to be used in such a way as to reflect degrees of belief, or to have behavioral correlates in associated events. Although they can be used in this way, they can, in addition, be used in ascriptions where the interpretation does not reduce to degrees or manner in associated events. Consider, for example, *Max arrogantly believes that he is the greatest novelist in the world, even though he is always humble in demeanor*. This can be used to express the judgment that Max is arrogant or presumptuous in having the belief in question. We could analyze this as saying that Max is arrogant *because* he believes he is the greatest novelist in the world, or arrogant *in that* he believes he is the greatest novelist in the world. Either of these serves to underscore the incompleteness

(at best) of the interpretation in (25). A more promising approach to the interpretation of the adverbials in (24) would be to add one of the terms ‘passionate / arrogant / honest ( $a_5, e_4$ )’, relating Max to the respective belief state, to the interpretation of each sentence.

Evidence that points more specifically toward a neo-Davidsonian variable associated with some instances of stative attitude ascriptions with predicates such as *believe* and *think* (on the stative use of *think*) is the pronominal reference in examples such as (26)–(27), where (26a) or (27a) is the utterance of a speaker, and (26b) or (27b) presents three options for a follow-up utterance, either by that speaker, or by an addressee of the (a) utterance.

- (26) a. Alex believes that Mary murdered Bill.  
 b. i. That began/started last March.  
 ii. That has lasted long enough.  
 iii. The forensic pathologist’s report will put a stop to that.
- (27) a. Alex thinks that everyone is talking about him.  
 b. i. That began/started last month.  
 ii. That has lasted a long time.  
 iii. His therapist will put a stop to that.

The predicates of initiation, persistence, and cessation which take the demonstrative *that* as their argument in (26b) and (27b) do not sensibly or comfortably apply to facts. And although we might follow Katz in taking temporal adverbials such as *at midnight* to be predicates of time intervals, it does not seem sensible to interpret (26b-iii), for example, as asserting *that* the pathologist’s report will put a stop to a time interval. It is more straightforward for that to refer to Alex’s belief or belief state in (26b) and (27b). When we use responses such as (26b) and (27b) in a context where the antecedent of *that* is to be retrieved from a sentence with an indisputably stative predicate, we obtain examples such as those in (28) and (29).

- (28) a. Mary owns the car.  
 b. i. That began last March.  
 ii. That has lasted a long time.  
 iii. My lawyer will put a stop to that.

- (29) a. The socks sit on the floor.  
 b. i. That began this morning.  
 ii. That has lasted long enough.  
 iii. Billy’s mom will put a stop to that.

The use of *that* to refer to the states described by the (a) sentences is distinctly odd in (28b-i) and (28b-ii), and likewise in (29b-i) and (29b-ii). In (28b-iii), we can readily understand that the lawyer might find a legal means to nullify Mary’s ownership of the car, or to transfer the ownership to another person, but “put a stop to that” seems at best a colorful way to put this. If we take it literally, the speaker’s lawyer is understood to be not actually stopping Mary’s ownership of the car, but something more like putting a stop to an aggressive campaign by Mary to acquire ownership of articles in which the speaker has an interest (e.g., in a messy divorce case). In (29b-iii), we understand that Billy’s mom will put a stop to events of Billy leaving socks on the floor, or Billy’s habit of leaving socks on the floor, not to a current state in which the socks sit on the floor.

So even if we accept Katz’s arguments that the bulk of stative predicates do not modify a Davidsonian state, it seems that stative attitude predicates such as *believe* and *think* can introduce an associated state, as an interpretive option. A plausible reason for this is that we can interpret these ascriptions as describing attitude states which can engage in causal interactions in examples like (26) and (27); such interactions underlie Davidson’s conception of an event. The formal concomitant for why these predicates can behave in the ways noted above, but (at least most) other stative predicates don’t is that these predicates can have an associated Davidsonian state variable in their argument structure, which makes them subject to forms of modification and anaphoric reference in exactly the way that sentences with eventive predicates are.

But here we run into a problem. Recall how Davidsonian events figure in the interpretation of an action sentence such as *Max kicked the ball*. Attempting something analogous for **S** = **Sam believes that S<sub>1</sub>**, for **S<sub>1</sub>** = **the President will resign**, using the truth conditions in (5b) to capture the role of the content of **S<sub>1</sub>**, we obtain the truth conditions in (30). (Recall that  $a_3$  is Sam.)

$$(30) \quad [[\mathbf{S}]]^{\mathbf{M},w} = 1 \text{ iff } \exists e_4 [\text{part-of } e_4: \\ \text{believe}(e_4) \wedge \text{EXP}(a_3, e_4) \wedge (\text{MOST } v: v \in \text{DA}(a_3, w) [[\mathbf{S}]]^{\mathbf{M},w} \\ = 1 ]]$$

This isn't right. A belief ascription does not characterize a physical part of  $e_4$ . The quantified condition over  $\text{DA}(a_3, w)$  is not "what is going on" in  $e_4$ . In the interpretation of an eventive belief ascription, the relationship between the eventuality  $e_4$  and the content of the interpreted clausal structure  $\mathbf{S}$  is different. The eventuality  $e_4$  should be associated with the doxastic alternative set of the experiencer somehow, but not in the way that an eventuality is associated with objects and relations among them which constitute the eventuality, as part of it.

Hacquard (2010: 101) proposes something similar to my treatment of events for belief ascriptions, but without the physical part-of relation. She proposes that the doxastic alternative set involved in the interpretation of (1) is an informational doxastic context of the experiencer subject, on which the ascription reports. The doxastic alternative set is regarded, in this light, as a function which takes the eventuality of the belief experiencer on which the speaker is reporting as an argument. On Hacquard's account, (1) introduces the eventuality  $e_4$ , the doxastic state of Sam, which is experienced by Sam and characterized by a set of possible worlds  $\text{DA}(a_3, e_4, w)$  consistent with Sam's beliefs at a given point in the discourse, and asserts that  $\mathbf{S}_1$  is true in it. Translating into the notation of this paper, and replacing Hacquard's universal quantifier with the generalized quantifier MOST in order to more accurately reflect the strength of the belief ascription, Hacquard's (2010: 101) approach would interpret (1) as in (31).

$$(31) \quad [[\mathbf{S}]]^{\mathbf{M},w} = 1 \text{ iff } \exists e_4 [\text{belief}(e_4, w) \wedge \\ \text{Exp}(a_3, e_4) \wedge (\text{MOST } v: v \in \text{DA}(a_3, e_4, w) [[\mathbf{S}]]^{\mathbf{M},w} = 1 ]]$$

A distinctive property of this interpretation is that it doesn't tie the eventuality  $e_4$  to the content of  $\mathbf{S}_1$  in any uniquely identifying way. If Sam believes ten different things, expressed by  $\mathbf{S}_i$  ( $i = 1, \dots, 10$ ), at a given point in time, these could all characterize a single eventuality  $e_4$ , according to (31). Or each  $\mathbf{S}_i$  could characterize its own eventuality  $e_i$ . More generally, there could be any number of eventualities, between 1 and 10, each characterized by some subset of  $\{\mathbf{S}_i: i = 1, \dots, 10\}$ . In this respect, Hacquard's approach is similar to the David-

sonian approach to physical events sketched in section 3.2 above. In that approach to (16), we don't necessarily pick out the smallest event in which Buck shot Ed (say, the event confined to the moment in which the trigger is squeezed). Instead, we recognize that one could use the sentence in (16) to describe an event at various levels of granularity. Some of these events are quite large and can be characterized by many different sentences, describing their different parts. Others are more minimal, more centered about the squeeze of the trigger, and are described by few sentences—possibly, in the limit, only by this sentence and its passive counterpart. As noted in section 3.2, we could go across possible worlds and get the result that all events of Buck shooting Ed have the sub-event of the trigger squeeze in common, while differing in lead-ins and consequences. Nevertheless, it seems that we could individuate the event chosen, at whatever level of granularity, even in the actual world, by its physical boundaries. If we refer to an event anaphorically after it is introduced in this way, the appropriate level of granularity will be established by context or ostension, to the degree of precision necessary for the purposes of the discourse.

It doesn't seem possible to take this approach with the eventuality associated with a belief ascription because there are no physical boundaries that would delineate the part of  $e_4$  which corresponds to belief in  $\mathbf{S}_1$ , as opposed to parts which correspond to belief in  $\mathbf{S}_2, \dots, \mathbf{S}_{10}$ . The condition in (31) does not use the truth of the complement clause (in possible worlds in the doxastic alternative set) as a criterion of individuation or identity of an eventuality within which a belief that the President will resign is realized or instantiated. As a result, in examples like (26) and (27), for the interpretation of, *Alex believes that Mary murdered Bill*, or *Alex thinks that everyone is talking about him*, (31) does not provide a unique eventuality which can serve as the antecedent of the anaphor *that* in the follow-up options (26a,b,c) and (27a,b,c). We need something which will serve to tie the actual belief in the content of  $\mathbf{S}_1$  to the eventuality introduced in (31). For intentional states such as belief, this can only be done by conditions on identity across possible worlds. Such a condition will now be formulated.

We want the ascription expressed by the whole sentence  $\mathbf{S}$  to state a quantified condition on Sam's doxastic alternatives,  $(\text{MOST } v: v \in \text{DA}(a_3, e_4, w) [[\mathbf{S}_1]]^{\mathbf{M},w} = 1$ . This condition characterizes  $e_4$  not by

specifying a part of  $e_4$ , “what goes on” in  $e_4$ , nor one content condition among others that  $e_4$  might have, but rather, it specifies an identifying condition on  $e_4$ , no matter what else might be the case. This condition is how we individuate  $e_4$ ; it is what makes  $e_4$  what it is. If we interpret a belief ascription such as (1) as introducing an eventuality  $e_4$ , the ascription tells us that the condition in (5b),  $(\text{MOST } v: v \in \text{DA}(a_3, e_4, w) \llbracket \varphi \rrbracket^{\mathbf{M},w} = 1)$ , is an identifying condition on  $e_4$ , in that it holds in any possible world in which Max experiences  $e_4$ . This is formulated in (32).

$$(32) \llbracket \text{Sam believes that } S_1 \rrbracket^{\mathbf{M},w} = 1 \text{ iff } \exists e_4 \llbracket \llbracket \text{EXP}(a_3, e_4) \rrbracket^{\mathbf{M},w} = 1 \wedge (\forall u: \llbracket \llbracket \text{EXP}(a_3, e_4) \rrbracket^{\mathbf{M},u} = 1) (\text{MOST } v: v \in \text{DA}(a_3, u)): \llbracket S_1 \rrbracket^{\mathbf{M},w} = 1 \rrbracket$$

That is, there is a state experienced by Sam, and any possible world  $u$  in which he experiences it is characterized by the essential content condition in (5b). The condition ‘believe ( $e_4$ )’ is left out since the status of  $e_4$  as a belief state is captured by the quantified condition over the doxastic alternative set, with its distinctive strength.

So at this point, I am claiming that the doxastic ascriptions in (1), (3) and (4), repeated below, with *believe*, *think*, *be sure*, *be convinced*, *suspect*, and *imagine*, can be uttered with two different interpretations.

- (1) Sam believes / thinks / expects that the President will resign.
- (3) Sam is sure / certain / convinced that the President will resign.
- (4) Sam imagines / suspects that the President will resign.

They can have the “bare” or minimal interpretations given in (5a,b,c), or they can have corresponding full or eventive interpretations along the lines given in (32). Anaphoric reference to an eventuality can be diagnostic of the full interpretation. In (26) and (27), the follow-up options in (26b) or (27b), whether uttered by the speaker of the (a) sentence or by an addressee of the (a) sentence, presuppose that the (a) sentence has the full interpretation, providing an eventuality to serve as referent of the demonstrative anaphor *that*.

The behavior of negation can be diagnostic of which interpretation is in force in a given example. In (6), (8), and (10), with the

lower interpretation of negation as in (7), (9), and (11), I propose that the un-negated counterpart *Sam believes that the President will resign* is interpreted as in (5a,b,c), and that negation converts the generalized quantifiers EVERY, MOST and Q to their respective duals, SOME, Q, and MOST, through the process of Neg-Importation with Dualization (NID), yielding the lower-Neg reading. But the simple belief ascriptions in (1), (3) and (4) should also have the full eventuality-introducing interpretations along the lines of (32), as an interpretive option, with an appropriate strength of quantifier over a doxastic alternative set. When we negate ascriptions such as (1), (3) and (4) and obtain an interpretation with wide scope negation (barring nuclear stress on a constituent within the scope of negation), this should indicate that the full interpretation is in force, even in the absence of other cues to that interpretation. This would be the case for the first sentence of (33), pronounced with nuclear stress on *not*, uttered by an aide to the Senator to deny rumors that the Senator believes that the President will resign as the result of a scandal involving one of his policies, without committing the Senator to any fixed opinion about the outcome.

- (33) The Senator does not believe that the President will resign.  
She believes that the President will decide on the right course of action, to resign or not, in due course, when all of the facts come to light.

Turning to Davidson’s argument from adverbial modification, I take Katz’s point that each form of adverbial modification should be addressed in its own right; spatial, temporal, manner, and degree modifiers should not all be interpreted identically. And eventualities should not be posited to support an account of the interpretation of a class of adverbials unless doing so provides the best account of the semantics of that class. Returning to the examples in (24), we can formulate a Davidsonian approach to each using the full interpretation of doxastic ascriptions of the form given in (32), but the fact that we can formulate them doesn’t mean that they are correct. On such an approach, the adverbial modification in (24) adds one of the conditions in (34).

- (34) passionate ( $a_3, e_4$ ) / arrogant ( $a_3, e_4$ ) / honest ( $a_3, e_4$ )

This condition would not be part of the identity condition on  $e_4$  across possible worlds, so it should be placed outside the scope of the trans-

world identity condition. This is shown in (35), for (24a) with  $S_2 =$  **Mary murdered Bill**.

$$(35) \text{ [[ Max passionately believes that } S_2 \text{ ]]}^{M,w} = 1 \text{ iff} \\ \exists e_5 [ \text{ [[ EXP } (a_5, e_5) \wedge \text{ passionate } (a_5, e_5) \text{ ]]}^{M,w} = 1 \wedge \\ (\forall u: \text{ [[ EXP } (a_5, e_5) \text{ ]]}^{M,u} = 1) (\text{MOST } v: v \in \text{DA}(a_5, u)): \text{ [[ } S_2 \\ \text{ ]]}^{M,w} = 1 ] )$$

On this approach, the presence of the adverbial requires the eventive interpretation of the rest of the sentence, of the form given in (32), as a basis to which to add the contribution of the adverbial, rather than the “bare” condition on possible worlds in the doxastic alternative set, of the sort given in (5b). This interpretation seems appropriate for (24a), where the secondary predicate *passionately* relates Max to his belief state, and the belief state is characterized by the cross-world content condition. This approach works for (24b) as well, interpreting it as asserting that arrogance is a property of Max in relation to his state of believing that he is the greatest novelist alive. The approach would interpret (24c) as asserting that there is a state of Max in which he believes that Maria is the best chess player in the world, and honesty is a property of Max in relation to that state. This may not be the only, or best, interpretation of (24c), and this illustrates the point that I am following Katz in analyzing each modifier in its own right, even as I depart from Katz in adopting a Davidsonian eventuality variable for some stative ascriptions.

Hacquard (2010) assumes that all belief ascriptions have an associated Davidsonian state of belief. This serves her account of modal interpretation, by which an epistemic modal sentence occurring as complement to a propositional attitude predicate qualifies an event or state associated with the attitude by a condition on the doxastic alternative set of the attitude experiencer; Hacquard construes this set as the epistemic modal base. In (36), for example, the epistemic modal is interpreted, according to Hacquard, as qualifying an eventive belief state of Sam.

(36) Sam believes that it must be raining.

Hacquard claims that this is parallel to the interpretation of an unembedded modal, *It must be raining*, as qualifying the event of assertion

by a condition on the doxastic alternative set of the speaker. This analysis is based on Hacquard’s proposal that the doxastic alternative set is an informational context in the sense of Stalnaker (1998), and should be identified as the epistemic modal base of the associated modal statement. Thus, in (36), there is a belief state of Sam which is characterized by Sam’s doxastic context, which serves as the epistemic base of the embedded modal; similarly, the doxastic context of the speaker of an unembedded modal statement serves as the epistemic modal base of that statement. I cannot do full justice to this proposal here. But I can note that the epistemic modal base of an unembedded modal statement has been argued to be the set of possible worlds consistent with what the speaker *knows*, not with what the speaker *believes*.<sup>9</sup> Assuming sufficient transparency, anything known by the speaker is believed, so the set of worlds consistent with what the speaker believes is a proper subset of the set of worlds consistent with what the speaker knows (since the former must be compatible with what the speaker knows, and with further propositions that the speaker believes but does not know). On the basis of these results, the epistemic modal base would be decoupled from the doxastic context of Sam in (36) (or the speaker of an unembedded modal statement). The belief event characterized by the doxastic context would then fail to serve as a grounding of the epistemic modal base, which would remove Hacquard’s rationale for positing it. I leave the discussion at that point here, simply noting that research on the nature of the epistemic modal base blunts the rationale Hacquard proposes for associating an event with each attitude ascription.

## 5. CONCLUSION

If ascriptions of belief involving a clausal complement  $S_1$  to the attitude predicate are interpreted in terms of quantification by generalized quantifiers over a set of possible worlds constituting doxastic alternatives for the experiencer of the attitude, then variation in strength across doxastic predicates can be modeled by the interpretations of the generalized quantifiers. The resulting interpretations permit Neg-Importation with Dualization, accurately predicting the strengths of ascriptions with the “lower Neg” reading traditionally associated with

Neg-Raising. But some belief ascriptions have a more complex interpretation. In some cases, the more complex interpretation may be invoked by certain types of adverbial modifiers. One kind of more complex interpretation, revealed by pronominal reference facts, is one which posits a belief state, an eventuality which is associated with the belief, identified across possible worlds in which it occurs by the quantified condition over doxastic alternatives, and serving as an essential content condition on the belief state eventuality. This view contends with Hacquard (2010) and agrees with Katz (2000, 2003, 2008) in accepting that stative attitude ascriptions are not invariably associated with a Davidsonian eventuality, but contends with Katz in arguing that we can't fully dispense with such Davidsonian eventualities in the interpretation of belief ascriptions since some ascribed beliefs are associated with an eventuality.

This provides a semantic analysis of a distinction long noted in the literature, and recently discussed by Cappelli (2007) and Simons (2007), between belief ascriptions which attribute a mental state to the experiencer subject versus those whose "main point" (in the terminology of Simons) is to comment on the truth or evidential status of the complement clause as judged by the experiencer subject, with implications for the speaker. In the latter case, Urmson (1952) characterizes the content of the main clause as "parenthetical," meaning that the entire ascription is understood to be a presentation of the content of the complement clause, evidentially qualified by the strength of the attitude predicate.

### Notes

<sup>1</sup>I am grateful to Kai von Fintel, Barbara Partee and Susan Rothstein for comments and discussion when I presented this and related work at the Sixth International Symposium of Cognition, Logic and Communication in Riga, and to Ann Mulkern and an anonymous reviewer for subsequent comments.

<sup>2</sup>This was observed by Hintikka (1969). Major steps in implementing the idea were taken by Heim (1992).

<sup>3</sup>Natural language expressions in bold-face type denote the LF syntactic structure of the expression. A cited or mentioned expression, regarded as a string of words, will be italicized. A syntactic category label in bold-face type, with or without an identifying subscript, denotes an LF tree structure dominated by a category of that label. In ordinary type-face, the label refers to the syntactic category.

<sup>4</sup>An anonymous reviewer wonders whether *should* has the force of MOST, as sug-

gested here, and whether this is consistent with its occurrence in a short discourse such as the following: "Given what we know, they should be here by now. But they're not." The discussion here does not definitely establish that *believe* has the force of MOST, and due to space limitations, cannot address the question whether *should* has the force of MOST. But if *should* does have the force of MOST, the discourse bit in question is interpreted as follows: "Given what we know, in most possible worlds they are here now. But in the actual world, they're not." We predict this to be felicitous.

<sup>5</sup>Alternatively, given sets of possible worlds A and B, whether finite or infinite, we could use the modal quantificational schemas proposed by Kratzer (1981, 1991), with (EVERY A): B interpreted as analogous to modal necessity. Essentially, if A is the modal base, then the proposition corresponding to the set of possible worlds B must be true relative to this base. Then (SOME A): B could be interpreted as analogous to modal possibility, and (MOST A): B interpreted analogously to weak necessity (the force of modal *should*).

<sup>6</sup>See citedavidson67, Higginbotham (1983, 1985, 1989, 2000), and Parsons (1990), among others.

<sup>7</sup>The existential quantifier is introduced by the Aspect node, which could aspectually qualify  $e_4$  in other ways.

<sup>8</sup>See Parsons (1990) for elaboration of neo-Davidsonian semantics, which posits thematic role predicates relating agents and experiencers, patients and themes, and other participants in an event, to the event itself.

<sup>9</sup>More precisely, the literature argues that the epistemic modal base is the set of possible worlds consistent with what is known by the speaker, or a group of which the speaker can be considered a member. See DeRose (1991) and von Fintel and Gillies (2008a, 2008b), as well as discussion of the role of an assessor by Egan (2005) and by Egan et al. (2005).

### References

- Cappelli, G. 2007. "I reckon I know how Leonardo da Vinci must have felt..." *Epistemicity, Evidentiality and English Verbs of Cognitive Attitude*. Paris: Paris Publishing.
- Carlson, G. 1998. 'Thematic roles and the individuation of events'. In S. Rothstein (ed.) 'Events and Grammar', 35–51. Dordrecht: Kluwer Academic Publishers.
- Davidson, D. 1980[1967]. 'The Logical Form of Action Sentences'. In N. Rescher (ed.) 'The Logic of Decision and Action', 81–95. Pittsburgh: University of Pittsburgh Press. Reprinted in Davidson, D., *Essays on Actions and Events*, pp. 105–122. Oxford: Oxford University Press.
- DeRose, K. 1991. 'Epistemic possibilities'. *The Philosophical Review* 100: 581–605.
- Eckhardt, R. 2005. 'Too poor to mention: Subminimal eventualities and negative polarity items'. In C. Maienborn & A. Wöllstein (eds.) 'Event Arguments: Foundations and Applications', 301–330. Tübingen: Max Niemeyer Verlag.
- . 2008. 'The lower part of event ontology'. In J. Dölling, T. Heyde-Zybatow & M. Schäfer (eds.) 'Event Structures in Linguistic Form and Interpretation', 477–491. Berlin: Walter de Gruyter.
- Egan, A. 2005. 'Epistemic modals, relativism, and assertion'. In J. Gajewski, V. Hacquard,

- B. Nickel & S. Yalcin (eds.) 'New Work on Modality, MIT Working Papers in Linguistics v.51', 35–62. MIT.
- Egan, A., Hawthorne, J. & Weatherson, B. 2005. 'Epistemic modals in context'. In G. Preyer & G. Peter (eds.) 'Contextualism in Philosophy: Knowledge, Meaning and Truth', 131–170. Oxford: Oxford University Press.
- Hacquard, V. 2006. *Aspects of Modality*. Ph.D. thesis, MIT.
- . 2010. 'On the event relativity of modal auxiliaries'. *Natural Language Semantics* 18: 79–114.
- Heim, I. 1992. 'Presupposition projection and the semantics of attitude verbs'. *Journal of Semantics* 9: 183–221.
- Heim, I. & Kratzer, A. 1998. *Semantics in Generative Grammar*. Blackwell Publishers.
- Higginbotham, J. 1983. 'The logic of perceptual reports: An extensional alternative to Situation Semantics'. *The Journal of Philosophy* 80: 100–127.
- . 1985. 'On Semantics'. *Linguistic Inquiry* 16: 547–593.
- . 1989. 'Elucidations of Meaning'. *Linguistics and Philosophy* 12: 465–517.
- . 2000. 'On events in linguistic semantics'. In J. Higginbotham, F. Pianesi & A. C. Varzi (eds.) 'Speaking of Events', 49–79. Oxford: Oxford University Press.
- Hintikka, J. 1969. 'Semantics of propositional attitudes'. In J. W. Davis, D. J. Hockney & W. K. Wilson (eds.) 'Philosophical Logic', 21–45. Dordrecht: D. Reidel.
- Horn, L. 1989. *A Natural History of Negation*. Chicago: The University of Chicago Press.
- Katz, G. 2000. 'Anti neo-Davidsonianism'. In C. Tenny & J. Pustejovsky (eds.) 'Events as Grammatical Objects: The Converging Perspectives of Lexical Semantics and Syntax', 393–414. Stanford, CA: CSLI Publications.
- . 2003. 'Event arguments, adverb selection, and the Stative Adverb Gap'. In E. Lang, C. Maienbron & C. Fabricius-Hansen (eds.) 'Modifying Adjuncts. (Interface Explorations 4)', 455–474. Berlin: Mouton de Gruyter.
- . 2008. 'Manner modification of state verbs'. In L. McNally & C. Kennedy (eds.) 'Adjective and Adverbs', 220–248. Oxford: Oxford University Press.
- Kratzer, A. 1979. 'Conditional necessity and possibility'. In R. Bäuerle, U. Egli & A. von Stechow (eds.) 'Semantics from Different Points of View', 117–147. Berlin: Springer-Verlag.
- . 1981. 'The notional category of modality'. In H. Eikmeyer & H. Rieser (eds.) 'Words, Worlds, and Contexts: New Approaches in Word Semantics', 38–74. Berlin: Walter de Gruyter.
- . 1989. 'Stage-level and individual-level predicates'. In G. N. Carlson & F. J. Pelletier (eds.) 'The Generic Book', 125–175. Chicago: Chicago University Press.
- . 1991. 'Modality'. In A. von Stechow & D. Wunderlich (eds.) 'Semantik: Ein internationales Handbuch der zeitgenössischen Forschung / Semantics: An International Handbook of Contemporary Research', 639–650. Berlin: Walter de Gruyter.
- Lewis, D. 1975. 'Adverbs of quantification'. In E. L. Keenan (ed.) 'Formal Semantics of Natural Language', 3–15. Cambridge: Cambridge University Press. Reprinted in Portner, P. & Partee, B. H. (eds.), *Formal Semantics: The Essential Readings*, pp. 178–188. Blackwell Publishers.
- . 1986. 'Events'. In 'Philosophical Papers, Volume II', 241–269. Oxford: Oxford University Press.
- Moltmann, F. 1997. *Parts and Wholes in Semantics*. Oxford: Oxford University Press.
- Parsons, T. 1990. *Events in the Semantics of English: A Study in Subatomic Semantics*.

- Cambridge, Mass.: MIT Press.
- Simons, M. 2007. 'Observations on embedding verbs, evidentiality, and presupposition'. *Lingua* 117: 1034–1056.
- Stalnaker, R. 1998. 'On the representation of context'. *Journal of Logic, Language and Information* 7: 3–19.
- Urmson, J. O. 1952. 'Parenthetical verbs'. *Mind* 61: 480–496.
- von Fintel, K. & Gillies, A. 2008a. 'An opinionated guide to epistemic modality'. In T. Sz. Gendler & J. Hawthorne (eds.) 'Oxford Studies in Epistemology 2', 32–62. Oxford: Oxford University Press.
- . 2008b. 'CIA leaks'. *The Philosophical Review* 117: 77–98.