The dimensions of quotation*

Christopher Potts
UMass, Amherst
potts@linguist.umass.edu

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1 Direct compositionality beyond the sentence level

This paper is geared towards compiling and motivating the objects and principles we need for a semantic analysis of subclausal quotations like (1), in which the quoted expressions pick out linguistic objects but also have the usual semantics of their quotation-free counterparts (here, *apricot*).

(1) a. When in Santa Cruz, Peter orders "[eɪ]pricots" at the local market.
 b. When in Amherst, Peter orders "[æ]pricots" at the local market.

The danger lurking around these examples is that we'll derive a meaning that has Peter ordering up linguistic objects. We must avoid this pitfall, but we must also preserve the meaning difference: (1a) is true in a different class of situations than (1b). It won't do to strip off the quotation marks and gesture at a 'metalinguistic' theory to explain why speakers easily find situations in which *Peter orders*

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"[eɪ]pricots" is semantically distinct from *Peter orders "[æ]pricots".* The two sentences have clearly contrasting entailments. This is therefore clearly a semantic issue.

My analysis capitalizes on the insight that *"[eɪ]pricots"* and *"[æ]pricots"* (with their quotation marks) have a dual semantics: they are natural language objects as well as properties. The sentences containing them in turn express two distinct propositions: in the case of (1a), we have at least the following:

(2) a. *Regular meaning*: Peter orders apricots at the local market when in Santa Cruz

b. *Speech-report meaning*: Peter utters [eɪ]*pricots* while in Santa Cruz

Two propositions, one sentence (Bach 1999).

But it would be a mistake to launch directly into an analysis of these difficult subclausal quotations. I first address the somewhat simpler class of *clausal quotations*, (3).

(3) a. Lisa said "Maggie shot Burns".

b. Lisa said "Burns was shot by Maggie".

Here again, we must capture the intuition that these examples have different truth conditions. Both examples denote, in part, the proposition that Lisa said Maggie shot Burns. But they differ with regard to what they say about the natural language objects to which Lisa stands in the utterance relation; *Maggie shot Burns* and *Burns was shot by Maggie* are different sentences. They might have the same semantic representations, but Lisa could rightly object if we inferred from the fact that (3a) obtained to the fact that (3b) obtained also. Our semantics should block this inference.

It sounds at first as though this talk of representations threatens the basic tenets of the directly-compositional semantics that Jacobson (1999, 2000) defined. But this is not so. The discussion is entirely about model-theoretic objects. The only inaudibilia it countenances are type-shifting functions, which are part of the stock and trade of this approach. So my hope is that this paper will have a liberating effect: adopting a directly-compositional semantics does not mean that we must eschew all talk of linguistic representations. Once it is recognized that linguistic objects have the same status as individuals like you and me, nothing principled is stopping us from appealing to their properties. See sections 4 and 6 for additional details and examples.

Before beginning the analysis, it is worth briefly mapping out one of the roads that this paper does not take from examples (1) and (3), namely, the road that leads to a reanalysis of opacity in propositional attitude contexts. The paper does provide something like a framework for developing an analysis in which speech-reports play a role in determining the truth of old chestnuts like *Jan believes that Mohammed Ali is Cassius Clay* (Davidson 1968). But I do not endorse such quotational theories, and in section 5 I distinguish propositional attitude *say* from quotation-taking *say* by making only the latter sensitive to utterances. For evidence against quotational theories of propositional attitudes (evidence against extending the present proposal into that domain), I refer to Partee 1973.

2 The utterance relation

We shouldn't tackle even clausal quotation head on. It seems best to approach from the point suggested by (4), where we see the utterance relation at work in its most basic form.

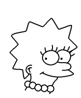
(4) a. Lisa: Homer is bald.

b. Lisa entered into the utterance relation with the sentence *Homer is bald.*

c. We were unsure whether Homer still had a few hairs on his head, but Lisa was confident in her assessment of the situation: "Homer is bald".

In (4a), the colon indicates who is responsible for uttering the sentence *Homer is bald.* Example (4b) is a somewhat ponderous statement with the same content. The colon appears again with an utterance-based semantics in (4c), though its contribution is more oblique there.

Most semantic theories are limited in their ability to describe systematically even simple cases of this form. Typically, we capture the notions of utterer and utterance as part of the interpretation procedure. For (4), we could fix Lisa as the speaker index on the interpretation function, either as an element in a context tuple (Kaplan 1989) or as a lone parameter, as in (5).

(5) $[\![\mathbf{dead}(\mathbf{burns})]\!]$ 

We could regard this speaker index not only as determining the meaning of first-person pronouns but also as an indication that interpretation is relative to Lisa's belief state. On this approach, *say* and *utter* have a much different sort of semantics. Whereas *say* denotes a function in our model, *utter* (and the colons in (4a, c)) has a more abstract, metalogical meaning, one that is wired into the interpretation brackets and our notion of which models count as admissible.

The difference is suspicious. One would expect to find the denotations of both *say* and *utter in* the models for the semantic theory. More importantly, the treatment of *utter* is not flexible enough to provide the basis for a theory of quotation. Indeed, we lack the means even to capture the semantics of sentences like (6).

(6) a. When Lisa said "Burns is dead", Maggie was nowhere to be found.

b. There is a past time $\mathbf{t}$ such that Lisa uttered the sentence *Burns is dead* at $\mathbf{t}$ and Maggie was nowhere to be found at $\mathbf{t}$.

In order to describe such examples in anything like the above terms, we would need a highly flexible theory of the interpretation function. We would need a way to shift the speaker index in mid-discourse (for quotation), and we would need some way to keep track of the interpretations themselves, so that we could refer back to them later. In short, we would need a logic — that is, a grammar — of the interpretation brackets. In many ways, this is where the present paper heads.

3 Natural language expressions and their names

If we are going to discuss natural language objects, we need a precise view of what such objects are like. This is the question to which all of linguistics is addressed, so I won't try to settle the issue. I simply offer a small grammar, in figure 1, which generates triples $\langle \Pi \, ; \, \Sigma \, ; \, \alpha : \sigma \rangle$, in which Π is a phonological representation, Σ is a syntactic representation, and α is a semantic representation of type σ. I call this grammar $\mathcal{G}_1$. It is preliminary; the appendix provides the complete grammar for this paper, which develops from $\mathcal{G}_1$ as the paper proceeds and which has $\mathcal{G}_1$ as a subgrammar.

Clauses (i)–(iv) generate objects that are typical of the categorial grammar perspective on natural language grammars (Bach and Wheeler 1981; Oehrle et al. 1988). Jacobson (1999, 2000) introduced the helpful subscripted slashes.

The rules in (iv) are given as parsetree admissibility conditions. But we could as easily regard them as inference rules in a proof system. I opt for the look

The grammar $\mathcal{G}_1$ is defined as follows:

i. $\langle$ [bɑrt] ; NP ; $\mathbf{bart} : e$ $\rangle$
$\langle$ [lisɑ] ; NP ; $\mathbf{lisa} : e$ $\rangle$
$\langle$ [mægi] ; NP ; $\mathbf{maggie} : e$ $\rangle$
$\langle$ [bərnz] ; NP ; $\mathbf{burns} : e$ $\rangle$

ii. $\langle$ [wɛrwʊlf] ; $\mathrm{S}/_{\mathrm{L}}\mathrm{NP}$; $\mathbf{werewolf} : \langle e, t \rangle$ $\rangle$
$\langle$ [dəd] ; $\mathrm{S}/_{\mathrm{L}}\mathrm{NP}$; $\mathbf{dead} : \langle e, t \rangle$ $\rangle$
$\langle$ [bɑld] ; $\mathrm{S}/_{\mathrm{L}}\mathrm{NP}$; $\mathbf{bald} : \langle e, t \rangle$ $\rangle$

iii. $\langle$ [it] ; $(\mathrm{S}/_{\mathrm{L}}\mathrm{NP})/_{\mathrm{R}}\mathrm{NP}$; $\mathbf{eat} : \langle e, \langle e, t \rangle\rangle$ $\rangle$
$\langle$ [si] ; $(\mathrm{S}/_{\mathrm{L}}\mathrm{NP})/_{\mathrm{R}}\mathrm{NP}$; $\mathbf{see} : \langle e, \langle e, t \rangle\rangle$ $\rangle$
$\langle$ [skær] ; $(\mathrm{S}/_{\mathrm{L}}\mathrm{NP})/_{\mathrm{R}}\mathrm{NP}$; $\mathbf{scare} : \langle e, \langle e, t \rangle\rangle$ $\rangle$

iv.

$$\left\langle \begin{array}{c} [\Pi\ \Phi] \\ \mathrm{A} \\ (\alpha(\beta)) : \tau \end{array} \right\rangle \text{ from } \left\langle \begin{array}{c} \Pi \\ \mathrm{A}/_{\mathrm{R}}\mathrm{B} \\ \alpha : \langle \sigma, \tau \rangle \end{array} \right\rangle \quad \left\langle \begin{array}{c} \Phi \\ \mathrm{B} \\ \beta : \sigma \end{array} \right\rangle$$

$$\left\langle \begin{array}{c} [\Phi\ \Pi] \\ \mathrm{A} \\ (\alpha(\beta)) : \tau \end{array} \right\rangle \text{ from } \left\langle \begin{array}{c} \Phi \\ \mathrm{B} \\ \beta : \sigma \end{array} \right\rangle \quad \left\langle \begin{array}{c} \Pi \\ \mathrm{A}/_{\mathrm{L}}\mathrm{B} \\ \alpha : \langle \sigma, \tau \rangle \end{array} \right\rangle$$

v. If $\mathcal{P} = \big\langle \Pi \,;\, \Sigma \,;\, \alpha : \sigma \big\rangle$ is well-formed, then $\big\langle \Pi \,;\, \Sigma \,;\, \ulcorner\big\langle \Pi \,;\, \Sigma \,;\, \alpha : \sigma \big\rangle\urcorner : u \big\rangle$ is well-formed.

Figure 1: THE GRAMMAR $\mathcal{G}_1$

of parsetrees because these are familiar to the broadest range of linguists. On this proof-theoretic conception of natural language composition, the proofs might simply verify the well-formedness of the triple decorating the root node of the proof (as in Jacobson's work), or we might elevate them to the status of first-class objects of the theory and state linguistic generalizations in terms of their (normalized) forms (as in Glue semantics; Dalrymple 2001; Asudeh and Crouch 2002; Asudeh 2004a). Either view is compatible with the results of this paper, since the root node stores all the presently relevant information about the proof itself.

We can summarize the action of the proof rules as follows:

(7) a. *Phonology*: concatenation (an oversimplification, but my focus is not on the phonology)

b. *Syntax*: directional application

c. *Semantics*: functional application, represented in a lambda calculus like that of Carpenter 1997:§2

The twist in this grammar is its final clause, (v), which we can regard as a semantic quotation function. It takes any well-formed expression of the grammar and turns it into an object of type u, the type of linguistic expressions themselves. The output is itself a well-formed expression, so it too can be quoted. The definition leaves room for the addition of quoted expressions that do not correspond to well-formed phrases: the mock machine-gun barrage of Partee 1973 and the groans and gestures of Postal 2004, for example.

The raised corner brackets are conceptually just a particular typographic implementation of the common practice of distinguishing natural language objects when we wish to talk about them rather than use them. Most publications use italics or quotation marks. In this paper, I use raised corner brackets and, when I am being careful, display much more information about the object than the standard orthography is capable of expressing.

In many respects, the quotation function is like the nominalizing function of Chierchia (1982, 1984) and Chierchia and Turner (1988), which takes functional expressions to their entity-level correlates. Here, we take complex natural language expressions and turn them into entity-level expressions.

The idea is simply this: just as we can talk about entities and propositions and the like, we can also talk about linguistic objects. We can, for instance, say things like (8).

(8) a. The sentence *Bart burped* is annoyingly alliterative.

b. Ali's favorite word is *salmagundi*.

c. [æ]*pricot* begins with a low-front vowel.

d. George W. Bush uttered the sentence *I don't think our troops are to be used for what's called nation building.*[1]

The final clause of the definition for $\mathcal{G}_1$ provides us with a way to turn the expressions of $\mathcal{G}_1$ into objects that we can talk about using $\mathcal{G}_1$.

In (9), I specify the objects that support the model-theoretic interpretation of the semantic representations for $\mathcal{G}_1$.

[1]From Bush's second debate with Al Gore, Winston-Salem, North Carolina, October 11, 2000.

(9) a. D_e is the domain of nonlinguistic entities. D_e is the domain of type e.

b. $D_t = \wp(W)$, the power set of the set W of possible worlds. D_t is the domain of type t.

c. D_u is the domain of well-formed linguistic entities. $D_u \cap D_e = \emptyset$. D_u is the domain of type u.

d. For any types σ and τ, $D_{\langle\sigma,\tau\rangle}$ is the set of all functions from D_σ into D_τ. $D_{\langle\sigma,\tau\rangle}$ is the domain of type $\langle\sigma,\tau\rangle$.

I use $[\![\cdot]\!]$ to interpret semantic representations. This function is constrained so that if α is of type σ, then $[\![\alpha]\!] \in D_\sigma$. It works just as one would expect. For instance $[\![$**homer**$]\!]$ is the individual Homer, and $[\![$**bald**$]\!]$ is the property of baldness. Here is the action of the interpretation function $[\![\cdot]\!]$ on a type-u expression of $\mathcal{L}$:

(10) $[\![\ulcorner \big\langle$[hoʊmər ɪz bɔld] ; S ; **bald**(**homer**) : $t\big\rangle \urcorner]\!] =$
$\big\langle$[hoʊmər ɪz bɔld] ; S ; **bald**(**homer**) : $t\big\rangle$

In general, $[\![\ulcorner \langle \Pi \, ; \Sigma \, ; \alpha : \sigma \rangle \urcorner]\!] = \langle \Pi \, ; \Sigma \, ; \alpha : \sigma \rangle$. The type-$u$ terms are presently quite cumbersome. I thus adopt the abbreviatory convention of giving these terms in the form of the usual orthographic representation of their phonology, with raised corner brackets. For example:

(11) $\ulcorner$Homer is bald$\urcorner$ abbreviates
$\ulcorner\big\langle$[hoʊmər ɪz bɔld] ; NP ; **bald**(**homer**) : $t\big\rangle\urcorner$

It seems to me that one can usefully think of $\ulcorner$Homer is bald$\urcorner$ as the name of the sentence in (10). One might worry, though, that this constitutes a philosophical blunder; Searle (1969) warns against such glosses:

(12) "It is generally claimed by philosophers and logicians that in a case like 2 [= *"Socrates" has eight letters*] the word "Socrates" does not occur at all, rather a completely new word occurs, the proper name of that word. [...] I find this account absurd." (Searle 1969:74)

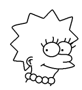
This seems to be an injunction against just the sort of interpretation procedure that $\mathcal{G}_1$ provides. The view that Searle recommends in its place is described in (13).

(13) "But how shall we characterize the utterance of the first word in 2? The answer is quite simple: a word is here uttered but not in its normal use.

> The word itself is *presented* and then talked about, and that it is to be taken as presented rather than used conventionally to refer is indicated by the quotes [. . .]" (Searle 1969:74–75)

I believe that we can accept this view without changing the grammar; we can regard ⌜Homer is bald⌝ as the presentation of the sentence in (10). If there are differences between naming and presentation in this area, then the logic is not sensitive to them.

So, to take stock: we have structures that contain entities like you, me, and Homer, as well as linguistic objects like phrases and sentences. Thus, we can form ordered pairs like

$\Big\langle$  , ⟨[hoʊmər ɪz bɔld] ; S ; **bald**(**homer**) : t⟩ $\Big\rangle$.

Let's say that the collection of all such pairs at a world w is the utterance relation at w. It will prove useful to have a handle on this two-place relation, so I define a term in (14).

(14) a. **utter** : $\langle u, \langle e, t\rangle\rangle$

b. ⟦**utter**(⌜S⌝)(**b**)⟧ = the set of worlds in which ⟦**b**⟧ utters ⟦⌜S⌝⟧

This meaning provides the basis for an analysis of examples such as those in (4). In (15b), I offer a semantic parsetree for (4a). If we regard **utter** as the translation of the colon in examples like (4a), then this structure is appropriate for that example as well.

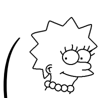
(15) a. Lisa uttered (the sentence) *Homer is bald.*

b. **utter**(⌜Homer is bald⌝)(**lisa**) : t

lisa : e **utter**(⌜Homer is bald⌝) : $\langle e, t\rangle$

utter : $\langle u, \langle e, t\rangle\rangle$ ⌜Homer is bald⌝ : u

c. ⟦**utter**(⌜Homer is bald⌝)(**lisa**)⟧ =

⟦**utter**⟧ $\Big($ ⟨[hoʊmər ɪz bɔld] ; S ; **bald**(**homer**) : t⟩ $\Big)\Big($  $\Big)$

I stress that this is not a variant of the performative verb hypothesis (Ross 1970; Krifka 1999, 2001; Geurts and Maier 2003). The utterance relation is different from, and in a sense more basic than, the usual contribution of a speech-act operator. First, the utterance relation tells us nothing about the communicative intentions of the speaker. Second, the utterance relation is inherently linguistic: it contains only pairs $\langle d, \mathcal{S}\rangle$ where d is an individual and $\mathcal{S}$ is a natural language object. In contrast, as Searle (1969) and others have stressed, illocutionary force is not inherently linguisic. One can assert things in many nonlinguistic ways: by pointing, gesturing, and even by consciously remaining silent (Foer 2002).

4 Properties of linguistic objects

The presence of the type u and its associated domain D_u greatly increases the descriptive coverage of the usual type theory based in the entity and proposition types; the range of expressions in English for talking about expressions in English (and other languages) is truly enormous. Since we can define properties of linguistic objects (type $\langle u, t\rangle$) and modifiers of such expressions (type $\langle\langle u, t\rangle, \langle u, t\rangle\rangle$), among others, we have the means for talking about the compositional semantics of this realm.

We also have the ability to capture some subtle contrasts. Consider, for instance, the example in (16b), and its quotation-free counterpart (16a).

(16) a. The answer is yes.

b. The answer is "yes".

These seem to manifest contrasting kinds of copular clause. The first appears to be a predicational copular clause, equivalent to *The answer is affirmative* or something of that nature. In this case, we can assume that the semantics involves predicating **yes**, or **affirmative**, of the subject **the**(**answer**).

The second is of more interest. It appears to be a specificational copular clause, in particular the sort that predicates a property-denoting definite description in pre-copular position of some kind of proper name in post-copular position (Higgins 1973; Mikkelsen 2004). We find many parallels between this example and things like *The winner is Susan*. In the present theory, the parallel is nearly exact. Compare the following derivations, which are modelled on the proposal of Mikkelsen (2002, 2004):

(17) a. $\textbf{yes}\big(\textbf{the}(\textbf{answer})\big) : t$

$\textbf{the}(\textbf{answer}) : e \quad \textbf{yes} : \langle e, t\rangle$

b. $\textbf{the}(\textbf{answer})\big(\ulcorner\text{yes}\urcorner\big) : t$

$\textbf{the}(\textbf{answer}) : \langle e, t\rangle \quad \ulcorner\text{yes}\urcorner : u$

In many cases, these do not differ in truth conditions. But they can part company. Suppose, for instance, that we are taking a yes–no test. Suppose the correct answer to question 7 is *yes.* Then we would use (16b). In contrast, we use (16a) when we wish to answer a question positively. For instance, if someone asks me whether I am called Chris, I would reply with (16a). I sense that (16b) would actually be false in this situation.

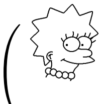
5 Clausal quotation

The above analysis is a useful abstraction, perhaps appropriate for the somewhat artificial examples we saw in (4): *Lisa uttered the sentence Burns is dead* and the like. It is not, though, a complete semantics for sentences like (18).

(18) Lisa said "Homer is bald".

Direct quotation is effective in argumentation and in reporting because it tells about us the relevant individual's words *and* ascribes to him the content of those words. Missing from (15a) as a translation of *Lisa said "Homer is bald"* is the fact that a sentence like this also conveys that Lisa said that Homer is bald (no quotation). We require something like (19).

(19) Lisa said "Homer is bald".

a. $w \in [\![\textbf{utter}]\!]\Big(\big\langle[\text{hoʊmər ɪz bɔld}] ; \text{S} ; \textbf{bald}(\textbf{homer}) : t\big\rangle\Big)\Big($  $\Big)$

b. the set of worlds in which all of Lisa's utterance worlds w are such that Homer is bald in w

The first is the speech-report contribution. The second gets us to the content: it is what we would give as a semantics for *Lisa says Homer is bald* (no quotation marks). This is the sense in which quotative utterances are multidimensional.

Let's call (19b) the *attitude dimension* of *Lisa said "Homer is bald"*. This dimension is, as noted, equivalent to the quotation-free counterpart, so we need a semantics for the propositional attitude verb *say*. I provide a standard view of that function in (20) (modelled on the propositional attitude operators of Hintikka 1971).

(20) a. **say** : $\langle t, \langle e, t \rangle \rangle$

b. $[\![\textbf{say}(\textbf{p})(\textbf{b})]\!]$ = the set of world w in which every utterance world w' for $[\![\textbf{b}]\!]$ in w is such that $w' \in [\![\textbf{p}]\!]$

This meaning will have to be, in a sense, embedded in the semantics we provide for the the quotation-taking realization of *say*. The first step towards such a meaning is a tool for accessing the semantic representations in the triples that we take to reconstruct linguistic objects. I use SEM for this function. It is defined as in (21).

(21) $SEM\left(\left\langle \Pi \ ; \mathrm{A} \ ; \alpha : \sigma \right\rangle\right) = \alpha$

So SEM takes an interpreted type u expression as its argument to return a semantic representation. This means that we can apply the interpretation function to the output as well. For example:

(22) a. $SEM\left([\![\ulcorner\text{Homer is bald}\urcorner]\!]\right) = \textbf{bald}(\textbf{homer})$

b. $[\![\textbf{bald}(\textbf{homer})]\!]$ = the set of worlds in which Homer is bald

c. $\left[\!\!\left[SEM\left([\![\ulcorner\text{Homer is bald}\urcorner]\!]\right) \right]\!\!\right]$ = the set of worlds in which Homer is bald

We now have the tools needed for specifying the meaning of the quotation-taking meaning for *say* that is employed in (18). I translate this *say* as $\textbf{say}_q$, to distinguish it from the propositional attitude operator **say** defined in (20).

(23) a. $\textbf{say}_q : \langle u, \langle e, t \times t \rangle \rangle$

b. $$[\![\textbf{say}_q(\ulcorner\text{S}\urcorner)(\textbf{b})]\!] = \left\langle \begin{array}{c} [\![\textbf{utter}(\ulcorner\text{S}\urcorner)(\textbf{b})]\!] \\ , \\ [\![\textbf{say}]\!]\left([\![SEM([\![\ulcorner\text{S}\urcorner]\!])]\!]\right)\left([\![\textbf{b}]\!]\right) \end{array} \right\rangle$$

The type $t{\times}t$ that is the output of $\textbf{say}_q$ is an addition to the type system presented in (9). It is a *product type*. The type constructor for product types is $\times$; their syntax and domains are as follows:

(24) a. If σ and τ are types, then $\sigma{\times}\tau$ is a type.

b. The domain of $\sigma{\times}\tau$ is $D_{\sigma\times\tau} = D_\sigma \times D_\tau$, the cartesian product of D_σ and D_τ.

I often represent terms with product types by placing a centered dot between the two terms. That is, $\alpha \cdot \beta$ is a well-formed semantic representation of type $\sigma{\times}\tau$ if α is a well-formed expression of type σ and β is a well-formed expression of type τ.

It should be noted that (23) must represent only one of a handful of realizations of *say* when it takes a quotative complement. In examples like (25), the second dimension of meaning would be undefined if we used the meaning in (23).

(25) a. Lisa said "Is Homer bald?".

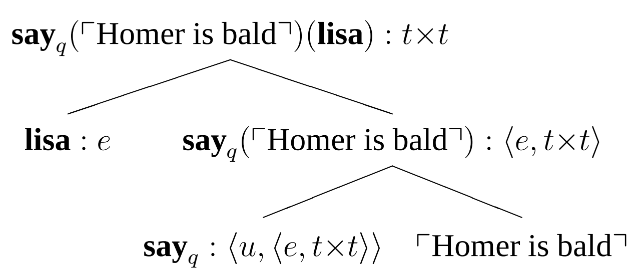
b. Lisa said "Read this book!".

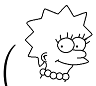
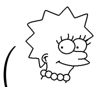
The difficulty is that $SEM([\![\ulcorner\text{Is Homer bald}\urcorner]\!])$ is a representation that denotes a question meaning, not a proposition. Similarly, $SEM([\![\ulcorner\text{Read this book}\urcorner]\!])$ is a command, not a proposition, and hence cannot be the argument to the propositional attitude operator **say**. Thus, we must tolerate a degree of ambiguity: the operator in the second dimension of $\textbf{say}_q$ can be **ask**, **command**, and so forth, depending on the nature of the semantic representation in the quotative complement. I see no way to avoid this ambiguity; question denotations differ from declarative denotations, and this difference has to be retained, at some level, by their indirect quotative realizations. (My thanks to Chris Barker for bringing this issue to my attention.)

In (26), I provide the parsetree for (18), along with the interpretation of its root node in (26c).

(26) a. Lisa said "Homer is bald".

b.



c. $\Big\langle$ $[\![\textbf{utter}]\!]\Big([\![\ulcorner\text{Homer is bald}\urcorner]\!]\Big)\Big($  $\Big)$, $[\![\textbf{say}]\!]\Big([\![\textbf{bald}(\textbf{homer})]\!]\Big)\Big($  $\Big)$ $\Big\rangle$

This parsetree brings to the fore two important issues. The first is largely a technical matter concerning the way proofs in this system conclude. To ground the discussion, I provide in (27) a fuller picture of the final node in the proof suggested by (26c).

(27) $\big\langle$[lisɑ səz hoʊmər ɪz bɔld] ; S ; $\textbf{say}_q(\ulcorner\text{Homer is bald}\urcorner)(\textbf{lisa}) : t{\times}t\big\rangle$

It is typical, in approaches like the one represented by $\mathcal{G}_1$ and my extensions of it, to assume that the syntactic category S appears with all and only the type t (i.e., propositional) meanings. The object in (27) represents a departure from this view, because the category is S but the meaning is a pair of propositions.

I would like to suggest that this is not so much a departure from the standard view as a generalization of it. We can regard the standard view as associating the category S with 1-tuples of propositions. I merely generalize this: the category S associates with n-tuples of propositions.

We could of course mark the categories: S_1, S_2, and the like. But a change in the syntactic category leads one to expect that we will find distributional differences among the S_is. The expectation is not, as far as I know, born out; for the most part, the multidimensional content explored in Bach 1999 and Potts 2004 yields sentences with the same distribution as those that terminate with a propositional denotation. So I opt for a minor deviation between category and type. I refer to Asudeh 2004b for evidence that such departures are attested elsewhere.

The second issue raised by (26) is more directly factual: How do these product-type meanings interact with higher scope-sensitive operators. What happens when we embed examples like (26), as in (28)?

(28) a. Bart believes that Lisa said "Homer is bald".

b. Everyone in Springfield thinks that Lisa said "Homer is bald".

In these examples, the semantic judgments seem clear: both propositions in the final meaning for *Lisa said "Homer is bald"* are in the scope of the higher quantificational element (the attitude verb or the quantifier *everyone in Springfield*).

Thus, for example, (28a) says that Bart believes both that Lisa uttered the sentence "Homer is bald" and that all of Lisa's utterance worlds are worlds in which Homer is bald. How should we ensure this result?

My answer is that we must generalize the meanings for attitude verbs and nominal quantifiers so that they can take product-type arguments. Since quotations can be embedded within other quotations, and since there is extensive evidence from other realms that clauses can have multidimensional content (Bach 1999; Potts 2004:§6), we should have general enough meanings to allow any finite n-tuple of meanings to form the arguments to these elements. To illustrate, I provide the semantics we need for *believe*:

(29) a. **believe** : $\langle\langle t \times t \times \cdots \times t\rangle, \langle e, t\rangle\rangle$

b. $[\![\mathbf{believe}\big([\mathbf{p}_1 \cdot \ldots \cdot \mathbf{p}_n]\rangle\big)(\mathbf{a})]\!] =$
$$\left\{ w \;\middle|\; [\![\mathbf{a}]\!] \text{ believes } [\![\mathbf{p}_i]\!] \text{ in } w \text{, for all } 1 \leqslant i \leqslant n \right\}$$

This semantics for *believe* takes any finite tuple of propositions as its first argument to return a regular property — a function from entities into the set of worlds in which the entity argument believes the conjunction of all the input propositions. The semantics for *every* and other nominal quantifiers should work in roughly this fashion, except with tuples of properties as their nuclear scope arguments. We will see below, in section 8, that negation works somewhat differently, in that the members of product-typed arguments are kept separate.

One might be initially suspicious of the decision to treat *say* as ambiguous between a propositional attitude verb and a quotation-taking verb. But there is a genuine lexical ambiguity between *say* when it has a clausal complement and *say* when it has a quotative complement. The differences show up clearly when one looks at inversion. With quotation, inversion is possible, as seen in (30a); with indirect quotation, it is impossible, as seen in (30b).

(30) a. "Ed fled", said Jed.

b. *(That) Ed fled said Jed.

The lexical ambiguity claim is further supported by the many languages that employ different morphemes for the two kinds of construction. (My thanks to Judith Aissen for discussion of this point, May 30, 2003.)

I'll close this section by addressing a contrast from Walker 1990, which was brought to my attention by Christine Gunlogson:

(31) Q: When the officer asked him how much he had to drink, what did he say?

A: Nothing

B: "Nothing."

In the A reply, we apparently have a claim that the officer's subject of interrogation made no reply in response to the question about his drinking. It is quite probable that he made no reply because he had in fact been drinking. In the second example, the subject of interrogation enters into the utterance relation with the word $[\![\ulcorner\text{Nothing}\urcorner]\!]$. Our semantics for *say* with a quotative complement reaches into the meaning of this expression and pulls out its semantic representation, which in this case seems to be something denoting the proposition that the speaker had had nothing to drink. Thus, the theory associates the two replies with different denotations. This would presumably be a useful point if one were called to testify as to the importance of knowing the nature of the reaction to the officer's query.

6 Engaging the theory of direct compositionality

The fact that we can talk about natural language objects has potential ramifications for a directly-compositional theory of ellipsis. Jacobson (1992b,a, 2003) observes that some deletion theories of ellipsis have much to recommend them. Furthermore, a deletion operation is easy enough to define in a framework like the one suggests by $\mathcal{G}_1$ above:

(32)

$$\Big\langle\ \ ; \text{S}/_{\text{L}}\text{NP} ; \textbf{delete}(\alpha) : \langle e,t\rangle \Big\rangle$$

$$\Big\langle\ \ ; (\text{S}/_{\text{L}}\text{NP})/_{\text{R}}(\text{S}/_{\text{L}}\text{NP}) ; \textbf{delete} : \langle\langle e,t\rangle,\langle e,t\rangle\rangle \Big\rangle \quad \Big\langle \Pi ; \text{S}/_{\text{L}}\text{NP} ; \alpha : \langle e,t\rangle \Big\rangle$$

But we can't allow this operation to apply freely, because verb-phrase ellipsis is subject to contextual restrictions. Broadly speaking, the elided material must find some antecedent in the discourse. As Jacobson (2003) observes, this "is not a local property of the syntax/semantics" of the phrase in question. It is one determinable only "by looking globally at the discourse context".

Jacobson proposes to solve this problem by treating elided verb phrases in the same manner in which deictic pronouns are treated: just as a sentence like (33a) denotes a property in virtue of its free pronoun, a sentence like (33b) denotes a function from properties to truth values (a property of properties) in virtue of its missing VP.

(33) a. She giggled. $\rightsquigarrow \lambda x.\, \textbf{giggle}(x)$

b. Ellen did. $\rightsquigarrow \lambda f.\, f(\textbf{ellen})$

Both expressions are then subject to the condition that we can find an appropriate argument for them somewhere in the discourse.

This analysis is in conflict with Hankamer and Sag's (1976) distinction between deep and surface anaphora. Deep anaphors require an antecedent somewhere in the discourse. It need not be an antecedent that that rose to salience via a linguistic event. These anaphors can be, in their terms, pragmatically controlled. Regular pronouns like *she* in (33a) are deep anaphors.

Surface anaphors are subject to the stricter condition that they have an antecedent in the discourse that rose to salience in virtue of some linguistic event. Thus, whereas *she giggled* can be felicitous if a female entity is salient (perhaps she has made a grand entrance at a party), Hankamer and Sag claim that (33b) is felicitous only if the context includes some act of someone uttering a verb phrase that can fill out its meaning.

So far, the direct-compositionality commmunity, led by Jacobson, has responded to this tension by denying that the distinction between deep and surface anaphora is real, at least for verb-phrase ellipsis. There is evidence of this; I refer to Pullum (2000) for a useful summary and assessment of the known arguments for and against the classification of verb-phrase ellipsis as surface anaphoric.

But we needn't sacrifice the surface-anaphora classification of verb-phrase ellipsis, which seems very real for some speakers, for the sake of a directly-compositional theory. The preceding sections of this paper show that the language has devices for talking about and referring anaphorically to utterance events. A statement enforcing surface anaphora is within reach of the resulting proposal, which is entirely model-theoretic. To be more specific, nothing prevents us from defining the requisite deletion operator as follows:

(34) a. $[\![\textbf{delete}(\alpha)]\!]$ is defined only if α is of type $\langle e,t\rangle$ and the context world w is such that $w \in [\![\textbf{utter}]\!]\big(\ulcorner \mathrm{A} \urcorner\big)\big(d\big)$ for some $d \in D_e$ and some $\ulcorner \mathrm{A} \urcorner$ such that $SEM\big(\ulcorner \mathrm{A} \urcorner\big) = \alpha$

b. Where defined, $[\![\textbf{delete}(\alpha)]\!] = \alpha$

This defines $\textbf{delete}(\alpha)$ as a surface anaphor in the sense of Hankamer and Sag 1976. Deep anaphoric verb-phrase pronouns might impose the weaker restriction that their referents merely be entailed by some element that precedes them in the discourse context (Schwarzschild 1999). But in terms of Jacobson's theory, the distinction can be made simply as follows: expressions containing deep anaphors are functional expressions that are felicitous only in contexts that contain suitable arguments for them; surface anphors like **delete**(α) in (34) are felicitous only in contexts that contain suitable arguments for them *that have been mentioned linguistically*.

7 Subclausal quotation

The theory of clausal quotation developed in section 5 centers around the meaning for *say* when it takes a quotative complement. The functor is called $\textbf{say}_q$. It has a dual semantics, in the sense that its output is a pair of propositions.

Not all instances of quotation involve full clauses, however. I opened this paper with example (1), repeated in (35), and I now offer the slightly different example (36) (from Potts 2003).

(35) a. When in Santa Cruz, Peter orders "[eɪ]pricots" at the local market.

b. When in Amherst, Peter orders "[æ]pricots" at the local market.

(36) a. Ellen: *The Godfather II* is a total snooze.

b. Frank: Well, Pauline Kael said that this "total snooze" is a defining moment in America cinema.

These examples both make use of linguistic features of the items inside quotation marks, but at the same time those items have their usual semantics. Example (35b) involves the natural language object

$$\Big\langle \text{[eɪprɛkɔts]} \; ; \text{NP} \; ; \textbf{apricots} : e \Big\rangle$$

but we will also clearly need access to the semantic representation **apricots**. So far, this is quite like what our theory of clausal quotation, where we used the linguistic object and its semantics. The function SEM is designed to reach into natural language expressions and pull out their semantic representations.

Similarly, (36b) makes use of

$$\Big\langle \text{[toʊtl snuz]} \; ; \text{N} \; ; \textbf{total-snooze} : e \Big\rangle$$

but it combines with **that** to pick out the movie *Godfather II*. This example is useful because it is so clear that the phrase *total snooze* is quotative. One could not easily argue that the quotation marks were, for instance, merely a device for signalling that the phrase is evaluated at a particular, sentence-internal intensional index. Nothing external to the quotation gives us any reason to think that the intensional index associated with, say, Ellen's belief worlds is a part of the composition. Rather, we really do need a theory of quotation to understand how *"total snooze"* works.

Perhaps the most important feature of these examples is that they are anaphoric, in the sense that we need to find an entity in the discourse to whom we can attribute the quotation. Thus, for example, (36b) imposes the requirement that, in our context world w, we can find some contextually salient entity $d \in D_e$ such that

$$w \in [\![\textbf{utter}]\!]\big(\big\langle[\text{toʊtl snuz}]\ ;\ \text{N}\ ;\ \textbf{total-snooze} : e\big\rangle\big)\big(d\big)$$

The requirement is rarely merely existential, though. In general, we attribute such quotations to specific individuals. For instance, it is overwhelmingly likely that Ellen is the source of *"total snooze"* in (36b).

The projection properties of these subclausal quotations are different from those of the complements to *say* (in its $\textbf{say}_q$ manifestation). Whereas both dimensions of those quotative complements seem to form the argument to higher operators, the speech-report dimension of subclausal quotations seems much freer in its scope-taking properties. This is useful additional evidence that the regular and speech-report meanings can be independent of one another, but it does place an additional burden on the compositional semantics, which must provide a mechanism for this variable scope behavior.

A look at the multidimensional denotations that these subclausal quotations have suggests an explanation for this point of contrast with direct clausal quotation. For instance, here is a reasonable first approximation of the meaning for *"apricots"* in (35b).

(37) $$\left\langle \begin{array}{c} \text{the } x \text{ such that } x = [\![\textbf{apricots}]\!] \text{ in all of Peter's utterance worlds} \\ , \\ [\![\textbf{utter}(\ulcorner[\text{æ}]\text{pricots}\urcorner)(\textbf{peter})]\!] \end{array} \right\rangle$$

The second meaning in the pair is a proposition, whereas the first is a plural entity. Only this plural entity is truly suited to the semantic environment it is in — that is, only it can be the argument to $[\![\textbf{order}]\!]$. The proposition-denoting second member is ill-suited as a denotation for something in the object position of this transitive verb. Presumably, it must be passed along, either to become the argument to a higher predicate or to be interpreted at the root level.

Thus, we require a version of the projection function of Karttunen and Peters 1979, which regulates how what they call 'conventional implicatures' are inherited upwards in a semantic parsetree. I accomplish this with the addition of the term **project**, as in (38) (which we can assume has no phonological or syntactic effects).

(38) a. **project** : $\langle \sigma, \langle \tau \times t, \rho \times t \rangle \rangle$

b. $[\![\textbf{project}(\alpha)(\beta \cdot \mathbf{p})]\!] =$

$$\Big\langle [\![\alpha(\beta)]\!], [\![\mathbf{p}]\!] \Big\rangle$$

or

$$\Big\langle [\![\beta(\alpha)]\!], [\![\mathbf{p}]\!] \Big\rangle$$

whichever is well formed

The type is complex, but the action of **project** is easy to describe: it takes an expression α and a product expression $\beta \cdot \mathbf{p}$ as its arguments. It applies α to the first member of the product, or the reverse, depending on which is the functor. It outputs the result of that application paired with the second member of the product, which remains untouched (just along for the ride).

With these additions to the theory, we can now interpret subclausal quotation with the function in (39).

(39) a. **quote-shift** : $\langle u, \langle e, \sigma \times t \rangle \rangle$

b. $[\![\textbf{quote-shift}]\!](\mathcal{P})(d) =$

$$\left\langle \begin{array}{c} \text{the } X \text{ such that } \textbf{say}\big([\![X]\!] = [\![SEM(\mathcal{P})]\!]\big)(d) \\ , \\ [\![\textbf{utter}]\!](\mathcal{P})(d) \end{array} \right\rangle$$

for any $\mathcal{P} \in D_u$ and $d \in D_e$

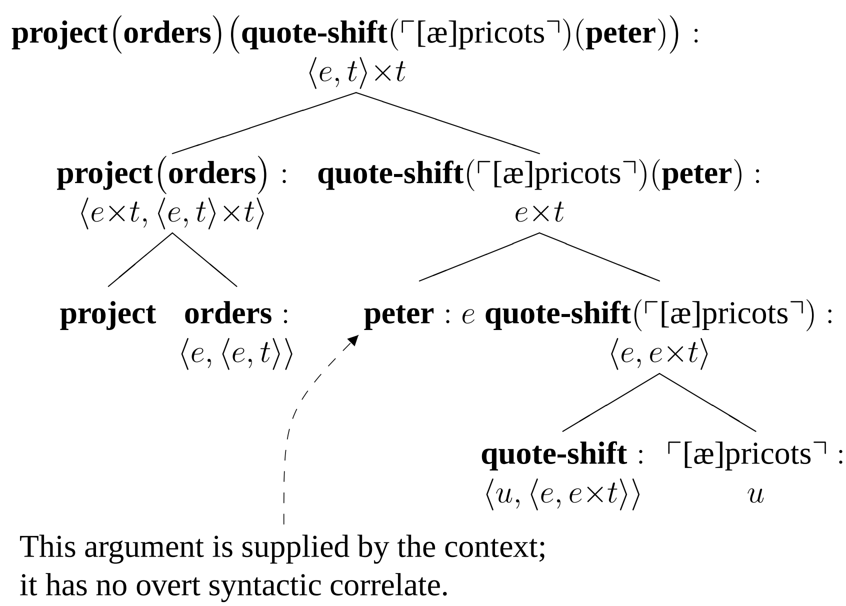
Notice that the regular denotation, the first element in the tuple, is relativized to the utterance worlds of the entity argument. This is essential to the description of examples like (36), in which the speaker, Frank, uses *"total snooze"* to pick out the *Godfather II*, despite the fact that he clear does not endorse this as a description of that movie. The scenario strongly suggests that none of Frank's utterance worlds

w is such that $w \in$ ⟦**total-snooze**(**godfather-II**)⟧. But reference to the movie goes through because the entity argument to *"total snooze"* can be Ellen.

Once we have fed **quote-shift** a natural language phrase, we are left with a function from entities into pairs of propositions. If there is no entity salient in the discourse to whom we can apply the function, then the example is infelicitous due to the fact that its final meaning components are not propositional; the reasoning here is the same as that of section 6, which is due to Jacobson (1999:§2.2.2).

In (40), I outline the composition for the phrase *orders "*[æ]*pricots"*.

(40)



As noted above, subclausal quotation is essentially anaphoric. I've represented this by supplying it with the entity argument **peter**. In a framework like that of Jacobson (1999), this argument could be deferred until the final step in the computation, in exactly the way that pronouns and relational nouns are treated. This involves additional type shifting functions, to pass on this argument slot unsaturated. Rather than complicate the semantics with these details, I've just supplied an argument as part of the well-formedness proof. In treatments that employ variables, this argument could be filled by a free variable, which would then be 'discourse bound' in the sense that the context would supply an appropriate assignment function for it.

8 Metalinguistic negation

As noted above, in section 4, we can define properties of sentences that reference their phonology, their syntax, or their semantics. Here are some examples

(41) a. **stress-initial** : $\langle u, t\rangle$ (a property of words and sentences)

b. **composed-of-open-syllables** : $\langle u, t\rangle$ (a property of words and sentences)

c. **deems-inappropriately-blunt** : $\langle u, \langle e, t\rangle\rangle$ (a function from sentences to functions from entities to truth values)

Predicates like these are helpful in formalizing and understanding existing observations about the way that so-called 'metalinguistic' negation works. Consider, for instance the following example, from Horn (1989:371).

(42) He didn't call the POlice, he called the poLICE.

The small capitals illustrate the stressed syllable. In the case at hand, we are dealing with the following two lexical items:

(43) a. $[\![\ulcorner\text{POlice}\urcorner]\!] = \big\langle$['po.lis] ; NP ; **police** : $\langle e, t\rangle\big\rangle$

b. $[\![\ulcorner\text{poLICE}\urcorner]\!] = \big\langle$[po.'lis] ; NP ; **police** : $\langle e, t\rangle\big\rangle$

The first of these has the property defined by the meaning of **stress-initial**. The second does not.

The semantics explored in section 7 derives a pair of propositions for each of these sentences. For the sake of simplicty, let's factor the negation out of each of these pairs, as in (44)–(45).

(44) a. **call**(**the**(**police**))(**charlie**)

b. **utter**($\ulcorner$POlice$\urcorner$)(**the-speaker**)

(45) a. **call**(**the**(**police**))(**charlie**)

b. **utter**($\ulcorner$poLICE$\urcorner$)(**the-speaker**)

These examples differ in their truth conditions in virtue of having contrasting second dimensions of meaning.

How does negation act on such pairs? The continuation in (42) indicates that it can operate solely on the utterance dimension. On this reading, the first sentence in the example entails that Charlie called the police and that the speaker doesn't say PO*lice*.

Natural language negation can of course operate in a way that is insensitive to pronunciation. For instance, *He didn't call the police*, without any special intonation, says that Charlie did not call the police.

The most important observation is that there seems not to be a reading of (42) on which it is equivalent to either of the paraphrases in (46).

(46) a. It is false that Charlie called the police, and it is false that the speaker uses the pronunciation PO*lice*. $[\neg p \wedge \neg q]$

b. It is false that Charlie called the police and that the speaker uses the PO*lice*. $[\neg(p \wedge q)]$

The generalization is that the negation can target one dimension of meaning but not both of them. This should resonate with people who work on categorial grammar and other *resource sensitive* logics for natural language. In such theories, it would be highly unnatural to have to derive readings like (46a), in which we seem to use the negation twice.

The fact that we lack readings like (46b) is additional support for the idea that the theory of quotation should be multidimensional: when we have quotation, we generally have two independent propositions expressed, one contributed more or less directly by the quotation and the other contributed by the main clause content around it. The negation operator we need in order to describe these facts is given in (47).

(47) a. $\mathbf{not}_i : \langle t{\times}t, t{\times}t\rangle$ where $1 \leqslant i \leqslant 2$

b. $[\![\mathbf{not}_1(\mathbf{p} \cdot \mathbf{q})]\!] =$
$$\Big\langle \{w \mid w \notin [\![\mathbf{p}]\!]\}, [\![\mathbf{q}]\!] \Big\rangle$$

c. $[\![\mathbf{not}_2(\mathbf{p} \cdot \mathbf{q})]\!] =$
$$\Big\langle [\![\mathbf{p}]\!], \{w \mid w \notin [\![\mathbf{q}]\!]\} \Big\rangle$$

If we choose the first interpretation, we obtain a regular propositional negation; the speech-act dimension remains untouched. If we choose the second meaning, we negate the speech-act dimension but leave the first untouched. This corresponds to the 'metalinguistic negation'. I suspect that this is as close as it is possible to come to a negation that can cover both regular and 'metalinguistic' uses. The two denotations are naturally related, in that each is the usual sort of propositional negation (a set complementation operator) plus the addition of an identity function on propositions. The difference is just which of the argument's projections each of dimensions acts on.

9 How many layers? Just one, now

It is worth pausing to note, and briefly describe, the substantial impact of Maria Bittner's commentary on the version of this work that I presented at the Brown Workshop on Direct Compositionality in June 2003. That paper was called 'A layered semantics for utterance modifiers'; it centered around an analysis of *utterance modifiers* like *frankly* and *confidentially* as used in (48).

(48) a. Frankly, Ed has lost his mind.

b. Confidentially, Ed is a werewolf.

I analyzed these expressions in terms of a layered logic that sharply distinguished linguistic objects from worldly objects like you and me. It tightly controlled how the two realms could interact. Having described sentences like (48), I realized that quotation could be analyzed in the same terms. I now seriously doubt that there is a genuine connection between (48) and the facts discussed in the present paper. Since the quotation examples seem richer and more intricate, I decided to focus attention on them in this revision.

Maria uncovered a fundamental design flaw in the layered approach that I originally advocated: it would apparently require an infinite hierarchy of logics to be involved in the grammars for natural languages. Simple examples like (49) highlight this difficulty:

(49) Jim said "Jorge said "Pigs fly" ".

This is the report of an utterance that was itself in part an utterance report. My layered approach could do fine with the subconstituent *Jorge said "Pigs fly"*. But this object lacked a linguistic counterpart — it couldn't be quotative. To manage that, the logic would have had to add a third layer. But now this is just playing catch-up: there is no finite upperbound on the number of quotations that can appear inside other quotations.

So, guided by this predicament, I overhauled the theory and rezoned the factual domain so that only (certain kinds of) quotations were on its turf. The present approach has no trouble at all with examples like (49): any expression can be treated as a model-theoretic object in its own right, and the argument to the matrix verb's meaning in (49) is simply a pair of propositions

The present approach also does without many of the technical distinctions that the original approach employed. Many of these disappeared naturally as I came closer to getting examples like (49), and I dropped others in light of Maria's commentary, which showed me rather directly how to begin paring down the description language.

Maria is of course not accountable for any of the modifications that resulted from my thinking about her commentary. I am indebted to her for helping me to understand my original proposal better.

10 Conclusion

Bart Geurts has done some of the most important and detailed work on quotation to date (Geurts 1998, 2001). It is thus somewhat surprising to read in Geurts 2001 the claim that "Quotation may not be a hugely important matter, but it is still of some interest". It seems clear to me that quotation *is* a hugely important matter for linguistic theory. It forces us to enrich our stock of basic entities, as we saw in section 3, and this in turn sheds new light on what it means to refer to and manipulate representations (section 6). What's more, quotation provides additional evidence for the thesis of Bach (1999) and Potts (2004) that individual sentences can express multiple independent propositions; in the realm of quotation, we see this particularly clearly when we inspect the interactions between quotation and negation.

Moreover, this paper addresses only a handful of the types of quotation discussed by Jespersen (1992[1924]:§21) and Fillmore 1974, and I have not attempted to foster connections between this realm and that of free indirect discourse (Jespersen 1992[1924]:§21; Schlenker, to appear; Sharvit 2003). It seems clear also that a complete theory of quotation will reference specific intonation contours as the auditory equivalent of quotation marks (Partee 1973), making this a potentially important area for researchers on information structuring. And these new directions are likely to lead to additional ties with the rest of linguistic theory. My hope for the present paper is merely that it reveals a directly-compositional semantics to be a fruitful setting in which to explore this class of meanings.

A The full grammar $\mathcal{G}$

The grammar $\mathcal{G}$ is defined as follows:

A.1 Types

i. e, t, and u are types

ii. If σ and τ are types, then $\langle \sigma, \tau \rangle$ is a type.

iii. If σ and τ are types, then $\sigma \times \tau$ is a type.

iv. Nothing else is a type.

A.2 Terms

i. $\langle$ [bɑrt] ; NP ; **bart** : e $\rangle$
$\langle$ [lisɑ] ; NP ; **lisa** : e $\rangle$
$\langle$ [mægi] ; NP ; **maggie** : e $\rangle$
$\langle$ [bərnz] ; NP ; **burns** : e $\rangle$

ii. $\langle$ [wɛrwʊlf] ; $\mathrm{S}/_{\mathrm{L}}\mathrm{NP}$; **werewolf** : $\langle e, t \rangle$ $\rangle$
$\langle$ [dəd] ; $\mathrm{S}/_{\mathrm{L}}\mathrm{NP}$; **dead** : $\langle e, t \rangle$ $\rangle$
$\langle$ [bɑld] ; $\mathrm{S}/_{\mathrm{L}}\mathrm{NP}$; **bald** : $\langle e, t \rangle$ $\rangle$
$\langle$ [jəs] ; $\mathrm{S}/_{\mathrm{L}}\mathrm{NP}$; **yes** : $\langle e, t \rangle$ $\rangle$

iii. $\langle$ [it] ; $(\mathrm{S}/_{\mathrm{L}}\mathrm{NP})/_{\mathrm{R}}\mathrm{NP}$; **eat** : $\langle e, \langle e, t \rangle\rangle$ $\rangle$
$\langle$ [si] ; $(\mathrm{S}/_{\mathrm{L}}\mathrm{NP})/_{\mathrm{R}}\mathrm{NP}$; **see** : $\langle e, \langle e, t \rangle\rangle$ $\rangle$
$\langle$ [skær] ; $(\mathrm{S}/_{\mathrm{L}}\mathrm{NP})/_{\mathrm{R}}\mathrm{NP}$; **scare** : $\langle e, \langle e, t \rangle\rangle$ $\rangle$

iv. $\langle$ [sey] ; $(\mathrm{S}/_{\mathrm{L}}\mathrm{NP})/_{\mathrm{R}}\mathrm{S}$; **say** : $\langle t, \langle e, t \rangle\rangle$ $\rangle$
$\langle$ [biliv] ; $(\mathrm{S}/_{\mathrm{L}}\mathrm{NP})/_{\mathrm{R}}\mathrm{S}$; **believe** : $\langle\langle t \times t \times \cdots \times t\rangle, \langle e, t \rangle\rangle$ $\rangle$
$\langle$ [ʌtər] ; $(\mathrm{S}/_{\mathrm{L}}\mathrm{NP})/_{\mathrm{R}}\mathrm{NP}$; **utter** : $\langle u, \langle e, t \rangle\rangle$ $\rangle$
$\langle$ [seɪ] ; $(\mathrm{S}/_{\mathrm{L}}\mathrm{NP})/_{\mathrm{R}}\mathrm{NP}$; $\textbf{say}_q$: $\langle u, \langle e, t \times t \rangle\rangle$

v. $\langle$ [nɑt] ; $S/_{\mathrm{R}}S$; $\textbf{not}_i$: $\langle t \times t, t \times t \rangle$ $\rangle$ where $1 \leqslant i \leqslant 2$

vi. $\langle$; $(\mathrm{S}/_{\mathrm{L}}\mathrm{NP})/_{\mathrm{R}}(\mathrm{S}/_{\mathrm{L}}\mathrm{NP})$; **delete** : $\langle\langle e, t \rangle, \langle e, t \rangle\rangle$ $\rangle$
$\langle$; $(\mathrm{S}/_{\mathrm{L}}\mathrm{NP})/_{\mathrm{R}}(\mathrm{S}/_{\mathrm{L}}\mathrm{NP})$; **project** : $\langle \sigma, \langle \tau \times t, \rho \times t \rangle\rangle$ $\rangle$
$\langle$; $(\mathrm{S}/_{\mathrm{L}}\mathrm{NP})/_{\mathrm{R}}(\mathrm{S}/_{\mathrm{L}}\mathrm{NP})$; **quote-shift** : $\langle u, \langle e, \sigma \times t \rangle\rangle$ $\rangle$

vii.

$$\left\langle \begin{array}{c} [\Pi\ \Phi] \\ \mathrm{A} \\ (\alpha(\beta)) : \tau \end{array} \right\rangle \quad\Rightarrow\quad \left\langle \begin{array}{c} \Pi \\ \mathrm{A}/_{\mathrm{R}}\mathrm{B} \\ \alpha : \langle \sigma, \tau \rangle \end{array} \right\rangle \quad \left\langle \begin{array}{c} \Phi \\ \mathrm{B} \\ \beta : \sigma \end{array} \right\rangle$$

$$\left\langle \begin{array}{c} [\Phi\ \Pi] \\ \mathrm{A} \\ (\alpha(\beta)) : \tau \end{array} \right\rangle \quad\Rightarrow\quad \left\langle \begin{array}{c} \Phi \\ \mathrm{B} \\ \beta : \sigma \end{array} \right\rangle \quad \left\langle \begin{array}{c} \Pi \\ \mathrm{A}/_{\mathrm{L}}\mathrm{B} \\ \alpha : \langle \sigma, \tau \rangle \end{array} \right\rangle$$

viii. If $\mathcal{P} = \langle \Pi \mathrel{;} \Sigma \mathrel{;} \alpha : \sigma \rangle$ is well-formed, then $\langle \Pi \mathrel{;} \Sigma \mathrel{;} \ulcorner \langle \Pi \mathrel{;} \Sigma \mathrel{;} \alpha : \sigma \rangle \urcorner : u \rangle$ is well-formed.

A.3 Domains

i. D_e is the domain of nonlinguistic entities. D_e is the domain of type e.

ii. The domain of type t is $D_t = \wp(W)$, the power set of the set W of possible worlds.

iii. The domain of type t is D_u, the domain of well-formed linguistic entities. $D_u \cap D_e = \emptyset$.

iv. The domain of type $\langle \sigma, \tau \rangle$ is $D_{\langle \sigma, \tau \rangle}$, the set of all functions from D_σ into D_τ.

v. The domain of type $\sigma \times \tau$ is $D_{\sigma \times \tau} = D_\sigma \times D_\tau$, the cartesian product of D_σ and D_τ.

A.4 Interpretation

$[\![\cdot]\!]$ is the interpretation function, taking semantic representations of $\mathcal{G}$ to elements in the set of domains specified in section A.3. It is constrained so that if α is of type σ, then $[\![\alpha]\!] \in D_\sigma$. Below, I provide the interpretations for the most important terms discussed in the paper. The terms that go unmentioned work as one would expect (e.g., $[\![$**homer**$]\!]$ is the individual Homer, and $[\![$**bald**$]\!]$ is the property of baldness).

i. $[\![$**utter**$(\ulcorner \mathrm{S} \urcorner)($**b**$)]\!]$ = the set of worlds in which $[\![$**b**$]\!]$ utters $[\![\ulcorner \mathrm{S} \urcorner]\!]$

ii. $[\![$**say**$($**p**$)($**b**$)]\!]$ = the set of world w in which every utterance world w' for $[\![$**b**$]\!]$ is such that $w' \in [\![$**p**$]\!]$

iii. $SEM\Big(\big\langle \Pi \; ; \; \mathrm{A} \; ; \; \alpha : \sigma \big\rangle\Big) = \alpha$

iv. $[\![\textbf{say}_q(\ulcorner \mathrm{S} \urcorner)(\textbf{b})]\!] = \left\langle \begin{array}{c} \big\{w \mid w \in [\![\textbf{utter}(\ulcorner \mathrm{S} \urcorner)(\textbf{b})]\!]\big\} \\ , \\ \big\{w \mid w \in [\![\textbf{say}]\!]\big([\![SEM([\![\ulcorner \mathrm{S} \urcorner]\!])\big)\big([\![\textbf{b}]\!]\big)\big\} \end{array} \right\rangle$

v. $[\![\textbf{believe}\big([\textbf{p}_1 \cdot \ldots \cdot \textbf{p}_n]\rangle\big)(\textbf{a})]\!] =$
$\left\{ w \;\middle|\; [\![\textbf{a}]\!] \text{ believes } [\![\textbf{p}_i]\!] \text{ in } w \text{, for all } 1 \leqslant i \leqslant n \right\}$

vi. $[\![\textbf{delete}(\alpha)]\!]$ is defined only if α is of type $\langle e, t\rangle$ and the context world w is such that $w \in [\![\textbf{utter}]\!]\big(\ulcorner \mathrm{A} \urcorner\big)\big(d\big)$ for some $d \in D_e$ and some $\ulcorner \mathrm{A} \urcorner$ such that $SEM\big(\ulcorner \mathrm{A} \urcorner\big) = \alpha$

Where defined, $[\![\textbf{delete}(\alpha)]\!] = \alpha$

vii. $[\![\textbf{project}\big(\alpha\big)\big(\beta \cdot \textbf{p}\big)]\!] =$

$$\Big\langle [\![\alpha(\beta)]\!], [\![\textbf{p}]\!] \Big\rangle$$

or

$$\Big\langle [\![\beta(\alpha)]\!], [\![\textbf{p}]\!] \Big\rangle$$

whichever is well formed

viii. $[\![\textbf{quote-shift}]\!]\big(\mathcal{P}\big)\big(d\big) =$

$$\left\langle \begin{array}{c} \text{the } X \text{ such that } \textbf{say}\big([\![X]\!] = [\![SEM(\mathcal{P})]\!]\big)\big(d\big) \\ , \\ [\![\textbf{utter}]\!](\mathcal{P})(d) \end{array} \right\rangle$$

for any $\mathcal{P} \in D_u$ and $d \in D_e$

ix. $[\![\textbf{not}_1(\textbf{p} \cdot \textbf{q})]\!] =$

$$\Big\langle \big\{w \mid w \notin [\![\textbf{p}]\!]\big\}, [\![\textbf{q}]\!] \Big\rangle$$

x. $[\![\textbf{not}_2(\textbf{p} \cdot \textbf{q})]\!] =$

$$\Big\langle [\![\textbf{p}]\!], \big\{w \mid w \notin [\![\textbf{q}]\!]\big\} \Big\rangle$$

References

Asudeh, Ash. 2004a. *Resumption as Resource Management*. Ph.D. thesis, Stanford University.

Asudeh, Ash. 2004b. The resumptive puzzle of relational nouns. URL `http://semanticsarchive.net/Archive/WY0ODgxN/`, Ms., Stanford University.

Asudeh, Ash and Richard Crouch. 2002. Derivational parallelism and ellipsis parallelism. In Line Mikkelsen and Christopher Potts, eds., *Proceedings of WCCFL 21*, 1–14. Somerville, MA: Cascadilla Press.

Bach, Emmon and Deirdre Wheeler. 1981. Montague phonology: A first approximation. In Wynn Chao and Deirdre Wheeler, eds., *University of Massachusetts Occasional Papers*, 27–45. Amherst, MA: GLSA.

Bach, Kent. 1999. The myth of conventional implicature. *Linguistics and Philosophy* 22(4):367–421.

Carpenter, Bob. 1997. *Type-Logical Semantics*. Cambridge, MA: MIT Press.

Chierchia, Gennaro. 1982. Nominalization and Montague grammar: A semantics without types for natural languages. *Linguistics and Philosophy* 5(3):303–354.

Chierchia, Gennaro. 1984. *Topics in the Syntax and Semantics of Infinitives and Gerunds*. Ph.D. thesis, University of Massachusetts, Amherst. [Distributed by GLSA].

Chierchia, Gennaro and Raymond Turner. 1988. Semantics and property theory. *Linguistics and Philosophy* 11(3):261–302.

Dalrymple, Mary, ed. 2001. *Semantics and Syntax in Lexical Functional Grammar*. Cambridge, MA: MIT Press.

Davidson, Donald. 1968. On saying that. *Synthese* 19:130–146.

Fillmore, Charles. 1974. Pragmatics and the description of discourse. In Charles J. Fillmore, George Lakoff, and Robin Lakoff, eds., *Berkeley Studies in Syntax and Semantics*, Volume 1, V.1–21. Department of Linguistics, University of California, Berkeley: Institute of Human Learning.

Foer, Jonathan Safran. 2002. A primer for the punctuation of heart disease. *The New Yorker* June 10:82–85.

Geurts, Bart. 1998. The mechanisms of denial. *Language* 74(2):274–307.

Geurts, Bart. 2001. The pragmatics of quotation. URL `http://www.kun.nl/phil/tfl/bart/talks/quottrans.pdf`, Ms., University of Nijmengen.

Geurts, Bart and Emar Maier. 2003. Layered DRT. URL `http://www.kun.nl/phil/tfl/bart/papers/ldrt.pdf`, Ms., University of Nijmegen.

Hankamer, Jorge and Ivan A. Sag. 1976. Deep and surface anaphora. *Linguistic Inquiry* 7(3):391–426.

Higgins, Roger Francis. 1973. *The Pseudo-Cleft Construction in English*. Ph.D. thesis, MIT. [Published by Garland, 1979].

Hintikka, Jaakko. 1971. Semantics for propositional attitudes. In Leonard Linsky, ed., *Reference and Modality*, 145–167. Oxford: Oxford University Press.

Horn, Laurence R. 1989. *A Natural History of Negation*. Chicago: University of Chicago Press. Reissued 2001 by CSLI.

Jacobson, Pauline. 1992a. Antecedent contained deletion in a variable free semantics. In Chris Barker and David Dowty, eds., *Proceedings of SALT II*, OSU Working Papers in Linguistics, 193–213. Columbus, OH: Ohio State University.

Jacobson, Pauline. 1992b. Flexible categorial grammars: Questions and prospects. In Robert Levine, ed., *Formal Grammar: Theory and Implementation*, 129–67. New York: Oxford University Press.

Jacobson, Pauline. 1999. Towards a variable-free semantics. *Linguistics and Philosophy* 22(2):117–184.

Jacobson, Pauline. 2000. Paycheck pronouns, Bach-Peters sentences, and variable-free semantics. *Natural Language Semantics* 8(2):77–155.

Jacobson, Pauline. 2003. Direct compositionality and ellipsis, Paper presented at the UCSC Workshop on Ellipsis, January 18.

Jespersen, Otto. 1992[1924]. *The Philosophy of Grammar*. Chicago: University of Chicago Press. With a new introduction and index by James D. McCawley.

Kaplan, David. 1989. Demonstratives: An essay on the semantics, logic, metaphysics, and epistemology of demonstratives and other indexicals. In Joseph Almog, John Perry, and Howard Wettstein, eds., *Themes from Kaplan*, 481–614. New York: Oxford University Press. [Versions of this paper began circulating in 1971].

Karttunen, Lauri and Stanley Peters. 1979. Conventional implicature. In Choon-Kyu Oh and David A. Dinneen, eds., *Syntax and Semantics*, Volume 11: Presupposition, 1–56. New York: Academic Press.

Krifka, Manfred. 1999. At least some determiners aren't determiners. In K. Turner, ed., *The Semantics/Pragmatics Interface from Different Points of View*, Volume 1 of *Current Research in the Semantics/Pragmatics Interface*, 257–291. Oxford: Elsevier Science.

Krifka, Manfred. 2001. Quantifying into question acts. *Natural Language Semantics* 9(1):1–40.

Mikkelsen, Line. 2002. Two types of definite description subjects. In Malvina Nissim, ed., *Proceedings of The Student Session at ESSLLI 14*, 141–153. Trento, Italy.

Mikkelsen, Line. 2004. *Specifying Who: The Structure, Meaning, and Use of Specificational Clauses*. Ph.D. thesis, UC Santa Cruz.

Oehrle, Richard T., Emmon Bach, and Deirdre Wheeler, eds. 1988. *Categorial Grammars and Natural Language Structures*. Dordrecht: D. Reidel.

Partee, Barbara H. 1973. The syntax and semantics of quotation. In Stephen R. Anderson and Paul Kiparsky, eds., *A Festschrift for Morris Hallle*, 410–418. New York: Holt, Reinhart and Winston, Inc.

Postal, Paul M. 2004. The openness of natural language. In *Skeptical Linguistic Essays*, 173–201. Oxford: Oxford University Press.

Potts, Christopher. 2003. Expressive content as conventional implicature. In Makoto Kadowaki and Shigeto Kawahara, eds., *Proceedings of the North East Linguistics Society 33*. Amherst, MA: GLSA.

Potts, Christopher. 2004. *The Logic of Conventional Implicatures*. Oxford Studies in Theoretical Linguistics. Oxford: Oxford University Press.

Pullum, Geoffrey K. 2000. Hankamer does! URL `http://ling.ucsc.edu//Jorge/index.html`, Jorge Hankamer's WebFest.

Ross, John Robert. 1970. On declarative sentences. In Roderick Jacobs and Peter Rosenbaum, eds., *Readings in English Transformational Grammar*, 222–272. Waltham, MA: Ginn and Company.

Schlenker, Philippe. To appear. Context of thought and context of utterance (a note on free indirect discourse and the historical present. *Mind and Cognition* .

Schwarzschild, Roger. 1999. GIVENness, AvoidF and other constraints on the placement of accent. *Natural Language Semantics* 7(2):141–177.

Searle, John. 1969. *Speech Acts: An Essay in the Philosophy of Language*. Cambridge: Cambridge University Press.

Sharvit, Yael. 2003. Issues in the syntax and semantics of free indirect discourse, Talk presented at UMass Amherst, November, and University of Connecticut, December.

Walker, Anne Graffam. 1990. Language at work in the law: The customs, conventions, and appellate consequences of court reporting. In Judith N. Levi and Anne Graffam Walker, eds., *Language in the Judicial Process*, 203–245. New York: Plenum Press.