

9. Context in Dynamic Interpretation

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1 Context, Semantics, and Pragmatics

The linguistic subfields of semantics and pragmatics are both concerned with the study of meaning. Semantics studies what Grice (1967) called the TIMELESS MEANING of a linguistic expression ϕ – the basic meanings of the words in ϕ composed as a function of the syntactic structure of ϕ . Formal semantics, especially since Montague (1973), attempts to develop an empirically adequate theory of semantics for a given language by developing rules that are clear and unambiguous in their application and effect, thereby making clear predictions about the possible meanings for a given expression. Semanticists assume that words do have basic meanings, and that a given syntactic structure corresponds with a determinate way of composing the meanings of its subparts.¹ Pragmatics, on the other hand, studies utterances of expressions like ϕ , attempting to explain what someone meant by saying ϕ on a particular occasion. The timeless meaning of ϕ often differs from what someone means by uttering ϕ on a given occasion. This difference arises because of the way that the context of utterance influences interpretation. We complain if someone quotes what we say out of context because this may distort our intended meaning. But what is a context of utterance, and how does it influence interpretation?

The problem of understanding contextual influences on interpretation is often stated in terms of the role of discourse context in interpretation. There are three general senses in which the notion of context is understood. The first is as the actual discourse event, a verbal exchange (or a monologue). This is associated with a very concrete situation including the speaker and addressee(s), the actual sound waves, a physical locale, and things pointed out (cf. Barwise and Perry 1983). The second sense is as the linguistic content of the verbal exchange – what's actually said. This may be characterized as a linguistic string under a syntactic analysis, with associated syntactic and prosodic structures, but more often it is represented as simple text (L. Carlson 1983, van Dijk 1985). The third sense is as a more abstract semantic notion – the structure of the information that is presupposed and/or conveyed by the interlocutors in an exchange. These three ways of characterizing discourse context – as an event of verbal exchange, the linguistic content of that exchange, or the structure of the information involved – are not mutually exclusive; there is no verbal exchange without linguistic content, and the linguistic content itself is one aspect of the abstract information structure of the exchange. Researchers approaching the problem from different directions, however, tend to focus on one of these to the exclusion of the others. Those interested in semantics from a truth–conditional perspective tend to regard the meaning of an utterance as the information it conveys about the world. In this case, it is convenient to characterize the context in which an utterance is made in terms of information structured in conventionally given ways and to study how that information structure interacts with the information contributed by the utterance itself to efficiently convey the intended meaning.

For example, Lewis (1979) uses the metaphor of a baseball scoreboard to characterize how context interacts with the content of an utterance in “a language game.” There are different facets of the

conversational score, and the different kinds of information shared by interlocutors have different functions in the game. Lewis differentiates, for example, among the set of presupposed propositions at a point in the conversation, the current ranking of relative degrees of salience of entities under discussion, and the current plans of the interlocutors. While the propositional information would play a clear role in satisfying, say, factive presuppositions, the ranked salient entities might serve to resolve anaphoric reference, and an interlocutor's global plans might reveal her local intention to perform a certain type of speech act. Organizing information in this rather abstract way makes it possible to say more clearly exactly what kind of information plays a particular role in interpretation. If we include in the score information about the actual situation of utterance and (at least temporarily) the form and sequence of the utterances, then context so conceived includes information about the two other notions of context. With this in mind, we will focus here on context as an abstract, structured object.

But what kinds of information does a context include, and how are these organized? In addressing this question I will adopt the strategy suggested for semantics by Lewis (1972): In order to say what a context of utterance IS, we will first ask what a context DOES in the course of semantic interpretation, and then find something that does that in a way that comports with our semantic theory. A pragmatic theory that approaches the rigor and predictive power of formal semantics would presuppose a theory of the linguistic structures (syntactic, morphological, prosodic) of an utterance. And it would include both a well-defined notion of linguistic context and a specification of how structure and context interact with semantic rules to yield the felicity of and interpretations for particular utterances. Such a theory would be capable of making clear predictions about the meanings conveyed by utterances in particular contexts.

In the following section, we will consider how context interacts with semantic interpretation. In section 3, we will consider the influential development within formal semantics of theories of dynamic interpretation, which involve a more sophisticated view of context and its role in interpretation than that found in earlier work. In section 4, we will consider the extension of such theories to account for a wider range of pragmatic phenomena. Section 5 presents some general conclusions.

2 What Context Does: Felicity and Context Update

Context interacts with the semantic content of an utterance in two fundamental ways: It is crucial in determining the proposition (or question, command, etc.) that a speaker intended to express by a particular utterance, and it is in turn updated with the information conveyed by each successive utterance. The first role – the context-dependence of interpretation – is most obvious when phenomena like anaphora, ellipsis, and deixis are involved. When these occur in an utterance, its semantic interpretation is essentially incomplete, and the intended truth conditions can only be determined on the basis of contextual clues.

The phenomenon of context dependence can be conceived more broadly in terms of felicity. The aptness of an utterance depends on its expressing a proposition that one could take to be reasonable and relevant given the context. We thus have to look at the context to determine what was expressed, either because the utterance was incomplete, as with anaphora or ellipsis, or because its prima facie interpretation would appear to be irrelevant or otherwise infelicitous. For example, knowledge of the context of utterance is crucial in figuring out which speech act a speaker intends to perform by the utterance of an imperative like *Hand me the rope*. Only by considering the relative status of the interlocutors and the information they share about where the rope is, whether the speaker needs or wants it, and what's to be done with it, can we form a hypothesis about whether this constitutes a request, a command, permission, or advice to the hearer. Otherwise, we cannot say what type of obligation the speaker urges the hearer to undertake, and, hence, we cannot understand the sense of the imperative.

Another reflex of felicity is the determination of intended reference, including anaphora resolution and deixis. Reference problems tied to context are often subtler than these paradigmatic reference problems, however, and may be encountered in non-pronominals as well.

(1). Please hand me some lilacs.

If (1) is uttered in a florist shop, *some lilacs* will likely refer to the reproductive organs of plants cut for decorative use. But if the addressee is standing near some silk flowers with no organic flowers in view, the reference will generally be extended to include artificial lilacs. These two kinds of referential problems – anaphora and contextual suitability of reference – are often combined in definite descriptions, as pointed out by Nunberg (1977, this volume). We see this in the following discourse inspired by his examples:

- (2). A: Where's the ham sandwich?
B: He's sitting at table 20.

A definite description generally presupposes existence of some entity that is unique in satisfying the NP's descriptive content, and it has been argued that this entity is presupposed to be familiar to the interlocutors.² Carrying a presupposition puts a requirement on the context in which the relevant NP can be felicitously uttered. As in other cases involving definite descriptions, (2A) will only express a felicitous question when the context entails that there is a unique ham sandwich in the situation under discussion, which is familiar to the interlocutors.³ If A is uttered in a kitchen, five minutes after one of the interlocutors has prepared an actual ham sandwich in full view of the other, *the ham sandwich* will be taken to refer to the one recently prepared. When uttered by a waitress standing at the kitchen door holding a ham sandwich and scanning the house, *the ham sandwich* will more likely be shifted to refer to the (unique) person who ordered the sandwich she's holding. In this context, someone might answer A with B. Since ham sandwiches don't generally take masculine pronouns, the familiarity presupposition associated with *he* will fail unless the meaning of the definite description has been shifted from the more literal denotation to the associated male customer. This leads the cooperative hearer to make the shift, guaranteeing the felicity of the utterance.

Beyond reference and anaphora, interlocutors look to the context for the resolution of any presuppositions conventionally triggered by lexical items or constructions in an utterance.⁴ Like pronominal anaphora, other sorts of presuppositions are often radically indeterminate, as we see with *too*:

- (3). [_{Foc} I] ordered a ham sandwich, too.

The presupposition associated with *too* is the adjoined proposition with a variable substituted for the focus of *too* that must be satisfied in the context. (3) presupposes *x ordered a ham sandwich*, where *x* is someone other than the speaker of (3). In the restaurant context, this could be satisfied if the fellow at table 20 ordered a ham sandwich, an eventuality implied by the discourse in (2). Other types of presuppositions, e.g. factives, are more like definite descriptions in having a fairly rich descriptive content. That is, they are explicit enough that if they initially fail in the context of utterance, what is presupposed can often be reconstructed and hence, if the interlocutor is cooperative, accommodated (Lewis 1979, Atlas this volume). But when interlocutors cannot resolve such context-dependent elements of an utterance, as an out-of-the-blue utterance of (3), it is impossible to determine the proposition that the speaker intended to express.⁵ Thus in the general case, presupposition failure – the inability to resolve the speaker's intended presupposition – results in a lack of truth value for the utterance.

Besides felicity, the other way that an utterance interacts with its context during interpretation is by inducing an update of that context. The fact of each utterance in a discourse and the content of the utterance itself is added to the information contextually available to the interlocutors. Cooperative interlocutors generally attempt to address current utterances. After the utterance of (1), unless the addressee rejects the speaker's implicit claim on her cooperation, she will be committed to handing him some of the relevant lilacs. Similarly, unless (2A) is rejected, saying something that doesn't address it would generally be taken as infelicitous or rude until the question has been answered. And in (2B) or (3), if the identity of the intended presupposition is contextually resolved, and the addressees (implicitly) accept its truth, then that proposition is added to their common information. In this way, requests or commands, questions, and assertions can contribute toward satisfying the presuppositions of subsequent utterances, hence making them felicitous.

I conjecture that all pragmatic phenomena pertain to these two ways of interacting with context: contextual felicity or context update. If so, any phenomena that hinge on felicity would place requirements on the types of information that context should provide to determine felicity. For example, deixis involves resolving the presuppositions of the deictic linguistic element; checking for felicitous use requires that the context provide information about the perceived environment of utterance, in particular, about what is being indicated by the speaker at the time of utterance. If we assume that resolution of deixis is one aspect of contextual felicity, then we must assume that the context of interpretation contains not only information conveyed by the linguistic text of the discourse, but also information about the physical situation of utterance (Roberts 2002). Another central problem in pragmatic analysis is Gricean conversational implicature. Several authors have argued that such implicatures may be explained as contextual entailments (McCafferty 1987, Thomason 1990, Welker 1994, Roberts 1996b). For example, if an utterance is *prima facie* irrelevant, then a metapresupposition of relevance and reasonable assumptions about the speaker's goals and intentions would lead us to infer that she meant more than she said. Felicity then drives the update of the context with the intended meaning beyond the proposition literally expressed. For this type of account to work, context must reflect that the interlocutors are committed to something like the Gricean maxims as well as containing information about the interlocutors' goals and intentions.

Grice's maxims can be seen as instances of a larger set of conventions – or metapresuppositions – governing the flow of information exchange in discourse. Just as one's utterances should be clear, unambiguous, and relevant to the topic under discussion and should contain the appropriate amount of information for the purposes of the interlocutors' current goals, in the interests of an orderly exchange we observe various conversational turn-taking conventions.

These can also be regarded as metapresuppositions about the well-formedness of the unfolding discourse. If someone fails to yield the floor at the appropriate point or overlaps with the current speaker, their contribution is as much in violation of the rules of discourse as a failed presupposition. The motivations for these different types of conventions and the consequences of their violation are different in character. The failure to resolve a presupposition leaves the interlocutors without an understanding of the proposition expressed, whereas overlapping with the speaker is more likely to irritate than to confuse. In both cases, however, the problem lies in a failure to make one's contributions accord with the evolving structure of the discourse context in a maximally cooperative way, as defined by the various conventions governing linguistic discourse. To capture these constraints on felicity, context must encode the rules of conversational turn-taking.

Another set of issues in pragmatics concerns matters of prominence and salience in discourse. Topic and Focus are argued to revolve around presuppositions about what was under discussion in the previous discourse, so the same notion of felicity can be argued to underlie the acceptability of, say, focus placement in the standard question/answer paradigm⁶ or topicalization.⁷ We would expect, then, that context would tell us what was under discussion in the relevant respects so that we could use that knowledge to determine whether a particular Focus or Topic is felicitous. Similarly, Centering Theory attempts to capture what makes certain potential pronominal antecedents more salient than others in a given discourse; again, it might be said that pronouns carry a presupposition of the salience of their antecedents, with salience taken to be a property of the context of utterance (Walker et al. 1998.) It seems clear, then, that the context must contain information about what is salient at any given point in the discourse.

Summarizing, a context stores various kinds of information shared in discourse. This information is used to determine discourse felicity, and is updated with the contributions of succeeding utterances. Several types of information have been mentioned here: propositional information, relevant for factive presuppositions and the like, information about the issues or questions under discussion, the entities under discussion, and the relative salience of these questions and entities all relevant for presupposition, Focus, Topic, and anaphora resolution. The context also encodes in some form various metaprinciples governing cooperative interchange, including Gricean maxims and the principles of conversational turn-taking. But there is one more constraint on context that has been the subject of considerable interest among semanticists over the past two decades: The information in the discourse context should be encoded so as to capture all the logical constraints on interpretation that have been explored in formal semantics, including entailments, the scope of

operators and their potential for binding free pronominals and other variable-like elements, and a requirement on overall logical consistency. It is from the wedding of these logical constraints with the types of pragmatic factors just discussed that theories of dynamic interpretation were born.

3 Dynamic Theories of Interpretation

Context in the theories of Montague semanticists was captured as a set of indices, or contextual parameters, attached to the interpretive apparatus for a given sentence. These were pointers to specified sorts of contextual information, used to feed the relevant information into the process of compositional interpretation that yielded the proposition expressed by the sentence in the specified context. This limited set of indices typically included the world and time of utterance (for capturing facts about utterance situation and for interpreting tenses and utterances of words like *now*), the speaker and sometimes the addressee (for *I, we, you*, etc.), the location of the utterance (for *here, local*, etc.), and a function assigning values to free variables (the logical form counterparts of pro-forms). Additional indices were sometimes posited for elements like indicated objects (for deixis accompanying *this, that*), or even the relative status of the interlocutors (for Japanese honorifics, French *tu* vs. *vous*, etc.) and the level of formality of the discourse. However, it isn't clear that one could in principle specify a finite set of indices of this type that would be adequate for all the types of information relevant for capturing pragmatic influences on interpretation. Moreover, in the interpretation of a given utterance the values given by these indices were arbitrarily selected, without any mechanism for keeping track across the larger discourse of what was being talked about and how this might bear on the interpretation of utterances in that discourse. Finally, the notion of context in such theories was static, leaving no provision for capturing how interpretation of the first part of an utterance might influence interpretation of the rest.

Particular problems in anaphora resolution and the interpretation of tenses inspired the early work on what is now called DYNAMIC INTERPRETATION. Heim (1982) and Kamp (1981) focused on the so-called donkey sentences of Geach (1967), illustrated by the following:

- (4). If a farmer owns a donkey, he always uses it to plow his fields.
- (5). Most farmers that own a donkey use it to plow their fields.

Deceptively simple, these examples are semantically interesting because they show that the way we keep track of information across discourse, including possible anaphoric referents, must be sensitive to the presence of quantificational operators, here *always* and *most*, and that context must be updated sentence-internally. To see this, first note that the indefinite NP antecedent of *it* in both sentences occurs within a subordinate clause that restricts the domain of the quantificational operator. For example, in (4) we are not making a claim about just any kind of situation, but only those in which there is a farmer and a donkey he owns, and in (5), we're making a claim about the proportion of individuals involved in plowing their fields, but the class of individuals involved doesn't include all farmers, only those who own a donkey. But if we replace *a donkey* with a clearly quantificational NP like *every donkey*, the pronoun *it* becomes infelicitous, showing that the anaphoric relation in question isn't binding, and must instead be anaphora to some salient entity in prior discourse. But the antecedent in these examples, the indefinite *a donkey*, occurs in the same sentence, showing that if pronouns presuppose a familiar entity from prior discourse context as antecedent, discourse context must be updated even in the course of interpreting a single utterance. Moreover, although these examples show that the indefinite can serve as antecedent of a pronoun under the scope of the operator, it ceases to be accessible to pronouns in subsequent discourse. So, neither (4) nor (5) can be felicitously followed by (6):

- (6). It had to be fed extra grain during plowing season last spring.

The central feature of the theories proposed to account for such examples is that utterances are not interpreted in isolation. Instead, the meaning of an utterance is treated as a function from contexts (possible contexts of utterance) to contexts (those resulting from updating the context of utterance with the content of the utterance). Heim called this the utterance's CONTEXT CHANGE POTENTIAL. This notion of meaning is dynamic in that it changes continuously during interpretation. For example, the

interpretation of utterances like (4) and (5) takes place in stages, corresponding in some respects to the two-sentence discourse in (7):

- (7)a. A farmer owns a donkey.
 (b). He uses it to plow his fields.

Interpreting (7) in a context C, we first update C with the information contributed by the utterance of (7a), as in (8):

- (8). Input context C:
 Propositional information shared by the interlocutors, including the proposition that a speaker S is speaking.
 A set of familiar entities, the discourse referents.
 Output context C+(7a):
 The propositional information in C plus the proposition that S uttered (7a) in C and (assuming no one questions S's trustworthiness) the information that there is a farmer who owns a donkey.
 The set of discourse referents in C plus one for the farmer and one for the donkey.

We do much the same in the first stage of interpretation of (4) and (5), updating the initial context with the information in the subordinate adverbial clause or subject NP with its relative clause. We interpret (7b) taking the context of utterance to be C+(7a), the update of C with the information conveyed by (7a); after considering the gender of the pronouns we reasonably take the salient farmer to be the antecedent of *he* and the salient donkey owned by the farmer to be the antecedent of *it*. Similarly, in the remainder of (4) and (5), we use the entities made salient by the first part to resolve the anaphora. But there is a difference: We can follow (7) with (6), i.e. the update of C with (7a) (and (7b) subsequently) is a permanent update, but in (4) and (5), because of the operators, the update pertaining to the donkey is only temporary. Though there is a permanent effect – ruling out the existence of farmers who own a donkey but don't use it to plow – there is no particular salient donkey after interpretation because the indefinite was used under the scope of an operator to allude to the properties of any arbitrary donkey standing in the requisite relation to a farmer.

Hence, theories of dynamic interpretation treat meanings as functions on context and utilize techniques developed in formal semantics to capture logical constraints on interpretation, including quantifier scoping and entailment. Contexts are considered by some theorists to be representations of the contextual information in question, as in Discourse Representation Theories (Kamp and Reyle 1993), and by others to be more abstract structured information, as in Context Change Semantics (Heim 1982, 1992) and Dynamic Montague Grammar (Groenendijk and Stokhof 1989).⁸ Dynamic Montague Grammar puts greater emphasis on the retention of compositionality as a methodological principle in interpretation, whereas Discourse Representation Theory tends to dismiss compositionality as uninteresting for natural language. There are significant differences as well in the proposed treatments of anaphora in these theories (cf. Chierchia 1995, Roberts to appear), but the general dynamic approach to the treatment of anaphora and several other types of pragmatic phenomena in discourse is now firmly established in the formal semantics tradition.

This approach offers a new dimension to earlier characterizations of an utterance as an ordered pair of a sentence and a context. On the dynamic view of interpretation, we might consider an utterance to be a pair consisting of a sentence under a linguistic analysis, e.g. its logical form, and an input context, the context just prior to utterance. Given that the logical form is conventionally correlated with a context change potential, this implies as well an output context, i.e. the value of the context change potential given the input context as argument. For example, (the logical form of) (7a) in the context C is an utterance, which results in the updated context C+(7a) given in (8).

What kinds of information are in the context in a dynamic theory? Heim takes context to be an elaboration of Stalnaker's common ground (CG), including not only the set of propositions that the interlocutors hold in common to be true (each proposition a set of possible worlds), but also a set of DISCOURSE REFERENTS, abstract entities-under-discussion. Such an entity may not actually exist – we can

talk about hypothetical entities, even non-existent ones – but we nonetheless keep track of the information about each such entity across discourse. Heim characterizes a discourse referent informally as a file card; technically, it is an index, corresponding to the referential index on the NPs used to refer to this entity in the discourse. Keeping track of discourse referents permits a theory of the interpretation of pronouns and definite NPs like *the ham sandwich* in which such an NP carries a presupposition of familiarity; i.e. its utterance presupposes that there is a corresponding discourse referent in the input context of interpretation. Indefinites like *a donkey* are said to carry novelty presuppositions, requiring that in a context of interpretation there be no pre-existing corresponding discourse referent. Heim's context, then, is an abstract notion, a set with two kinds of information. Representations in Discourse Representation Theory contain variable-like elements that are analogous to Heim's discourse referents, as well as formulae that play much the same role as Heim's propositional component of CG, the representations contain similar semantic content by virtue of a model-theoretic interpretation. Differences aside, in both of these theories, as well as in other subsequent work on dynamic interpretation, most contextual information, apart from discourse referents, can be characterized directly or indirectly in propositional terms, where propositions are sets of possible worlds or situations.

Dynamic theories offer a number of advantages over the earlier index-based theories of context. Since most contextual information is basically propositional in the dynamic theories, information need no longer be characterized as a set of indices, with all the awkwardness of attempting to determine just how many indices, and of what character, are required. With no loss of theoretical elegance, there may be any number of different types of proposition in the context, influencing the interpretation of an utterance in as many different ways. Moreover, the context can contain information about both prior and current discourse, information that plays a central role in constraining the interpretation of anaphoric or deictic elements. Heim treats such elements as presuppositional, and in Heim (1983b) proposes an important extension of Context Change Semantics that includes a full theory of utterance presuppositions and of presuppositional felicity in context. In this extension, an utterance presupposition is taken to be a constraint on contexts of utterance. Technically, the context change potential corresponding to the utterance's logical form is undefined for any context of utterance that does not satisfy the presupposition in question. For example, in (3), we saw that the adverbial *too* in conjunction with the prosody of the utterance conventionally triggers the presupposition that someone other than the speaker has ordered a ham sandwich. The utterance is felicitous in the restaurant setting because this context resolves the utterance's presupposition; it entails that the fellow at table 20, who is not the speaker, ordered a ham sandwich. In dynamic terms, we say that the utterance meaning, a function over contexts, is defined in this particular context of utterance: we can update this context with (3) to yield a new context. This is what it means to be felicitous in such a theory. In another context C' that did not entail that someone else had ordered a ham sandwich, the same presupposition would fail, yielding infelicity – context update would be undefined for an utterance of (3) in C' .⁹ Thus, dynamic theories of interpretation avoid the arbitrariness and disconnectedness of the earlier index-based theories; each utterance looks to the preceding context to resolve its presuppositions, and in turn updates that input context with the information contained in the utterance.

Such a theory realizes some facets of Lewis's (1979) discourse scoreboard. The score has two elements: a set of propositions and a set of familiar entities, i.e. discourse referents, and this information is updated dynamically, with each utterance corresponding to a move in the game. But will such a simple scoreboard suffice? The propositional content of this notion of context is well suited to help capture logical relations among utterances, including entailments associated with operators and constraints on operator scope of the sort noted in (4) and (5) above. But an unordered set of propositions fails to yield any insight into the notion of relevance so central in interpretation (Sperber and Wilson 1986a); relevance requires us to differentiate from among propositions in a discourse those that are more and less relevant to the purposes of the interlocutors at any given time. And although discourse referents are helpful in developing a theory of anaphora resolution, they fail to capture salience and so fall short of a full theory of anaphora. Given all that contexts do, it appears that we need more types of information and/or more structure in our dynamic scoreboard.

4 Intentions in Interpretation

Recently, several authors have begun to explore how to extend the notion of context developed in theories of dynamic interpretation to characterize a wider range of pragmatic phenomena. What would such a theory of context have to include to permit us to address all the issues mentioned in section 2? In keeping with the strategy of the earlier indexical theories, we could simply start adding additional sets to the two we already have, propositions in CG and discourse referents. For example, we could add a distinguished subset of the propositions, the topics under discussion; a subset of the discourse referents, the set of salient entities; another set of propositions characterizing Gricean maxims and other metapinciples guiding discourse. But this seems rather arbitrary, and no more illuminating than the old set of indices. We want to know what is in these distinguished sets, how they are related to each other, and how they get updated. In addition, the theory we have sketched so far deals only with indicative mood, and so only with a very narrow range of speech act types. We need a more general theory, designed to deal as well with interrogatives, imperatives, and the full range of speech acts. Only then can we hope to have a basic framework within which to conduct pragmatic analysis incorporating the results of a formal semantic theory.

Perhaps the place to start in developing a more adequate theory of this type is with consideration of the interlocutors' intentions, following the general view of Grice (1957, 1989). Grice argued that our understanding of what it is for an agent to mean something depends on the prior recognition of certain types of intentions. Roughly, we take a speaker to mean Φ only if we take her to intend that we recognize that she means to convey Φ and to do so on the basis of her utterance. If this seems obvious, so much the better. Contrast this view of meaning something with the notion of spilling the beans: We cannot inadvertently mean Φ , but we can certainly inadvertently spill the beans with the same informative outcome. This intentional theory of communication is supported by recent work in experimental psychology and psycholinguistics, strongly suggesting that recognition and tracking of interlocutors' intentions is crucial to how babies learn the meanings of their first words (Bloom 2000).¹⁰ Grice's notion of mutually recognized intention depends on the assumption that interlocutors keep track of each other's intentions and assumptions. As briefly illustrated below, assuming that relations over intentions are the central organizing features of discourse gives us a conceptually simple and cohesive notion of context, which effectively facilitates interpretation and characterizes infelicity in discourse.

Many theorists argue that recognizing the role of goals and intentions must be central in the development of a theory of pragmatics.¹¹ Following Stalnaker (1978), I assume that the primary goal of discourse is communal inquiry – the intention to discover with other interlocutors “the way things are,” to share information about our world. Drawing on Stalnaker's notion of COMMON GROUND and the related CONTEXT SET (i.e. the set of worlds in which all the propositions in CG are true), we can say that our goal is to reduce the context set to a singleton, the actual world. The linguistic counterpart of an inquiry is a question. Thus, we might take questions to be the formal objects that reflect interlocutors' intentions in conducting discourse. In that vein, Ginzburg (1996b) and Roberts (1996a) propose that interlocutors' discourse goals and intentions be encoded as the set of QUESTIONS UNDER DISCUSSION (QUDS) in the discourse, expanding the information in the discourse context to include a partially ordered set of such questions, as well as the propositions in the interlocutors' CG.

To understand how goals and intentions fit into the context of discourse, let us pursue Lewis's metaphor of the discourse context as a scoreboard and consider the character of the corresponding language game (cf. Carlson 1983, Roberts 1996a). The principal elements of a game are its goal(s), the rules that players follow, the moves they may make toward the goal(s), and the strategies they may pursue in making their moves, the last generally constrained by the first three and, above all, by rational considerations. The goal of discourse is to conduct inquiry by answering the QUDs. There are two types of RULES in the language game, both viewed as constraints on the interlocutors' linguistic behavior: conventional rules (syntactic, compositional, semantic, etc.) and conversational rules (e.g. Grice's maxims). The latter are not properly linguistic, but are given by rational considerations in view of the goal of the game. For example, the Cooperative Principle follows from the fact that playing the language game is a coordination problem, à la Lewis (1969); the Maxim of Quality from the fact that truth is the ultimate goal; and the first part of the Maxim of Quantity from the desire to maximize the payoff of a move (cf. the discussion in Sperber and Wilson 1986a of the Maxim of Relation and the second Maxim of Quantity).¹² There are two types of MOVES that players may make – linguistic behaviors that fall under the kinds of acceptable behavior defined by the rules and that are classified

on the basis of their relationship to the goals of the game: what Carlson (1983) calls SET-UP MOVES, i.e. questions, and PAYOFF MOVES, i.e. assertions providing the answers to questions.¹³ Moves here are not speech acts, but rather the semantic objects expressed in speech acts: A speech act is the act of proffering a move. I will return to discuss strategies of inquiry below.

I assume that there are two aspects to the interpretation of any given move, its PRESUPPOSED CONTENT and its PROFFERED CONTENT, which correspond to the two ways that context enters into interpretation. The presupposed content of an utterance constrains the types of context in which it may be felicitously uttered. The term PROFFERED is a cover term for what is asserted in an assertion and for the non-presupposed content of questions and commands; hence, this is that part of the content of an utterance that determines how the context of utterance will be updated. Lewis (1969) treats questions as a type of imperative: a question, if accepted, dictates that the interlocutors choose among the alternatives that it proffers.

Most contemporary semantic analyses regard a question as denoting or determining the set of propositions that are the possible answers (in some theories, the correct answers) to that question; these are the proffered alternatives. The acceptance of a question by the interlocutors commits them to a common goal: finding the answer. When interlocutors accept a question, they form an intention to answer it that is entered into CG.¹⁴ A cooperative interlocutor who knows of this intention is committed to it. This is a particularly strong type of commitment, one that persists until the goal is satisfied or is shown to be unsatisfiable. Relevance, an organizing principle of discourse that supports coherence and hence facilitates the processing and storage of information, will lead her to attempt to answer it as soon as possible after it is asked. Grice's first maxim of Quantity, in view of the goals of discourse, makes a complete answer preferable to a partial one, all other things being equal.

Assertions are choices among alternatives, as for Stalnaker. If accepted, they are added to CG, thereby reducing the context set. For discourse to be coherent (i.e. adhere to Relevance), it must be clear which alternatives (corresponding to cells in a partition on the context set) a given assertion selects among. The relevant alternatives are those proffered by the question or topic under discussion. That's the sense in which assertions are payoff moves: they choose among the alternatives proffered by a set-up move/question, and thus further the goals of the game. Non sequiturs are assertions that don't bear on the QUD; even if they are informative, they reflect poor strategy and a lack of commitment to the immediate goals of the discourse, i.e. a lack of cooperation. Non sequiturs also fail to maximize payoff; good strategists make assertions that optimize the number of relevant inferences they will trigger, and it seems reasonable to assume that such inferences are facilitated by the discourse segmentation induced by the plan structure of the discourse (Grosz and Sidner 1986, Sperber and Wilson 1986a).

STRATEGIES OF INQUIRY are sequences of moves designed to (at least partially) satisfy the aims of the game while obeying its constraints. A reasonable strategy for answering the QUDs, which may themselves be quite difficult, will proceed by approaching subgoals (addressing subquestions) that are easier to achieve and that are logically related to each other in a way that facilitates achieving the main goal. We can define an entailment relation on questions, following Groenendijk and Stokhof (1984: 16): One interrogative Q_1 entails another Q_2 iff every proposition that answers Q_1 answers Q_2 as well. (This presupposes that we're talking about complete answers; otherwise the entailments can actually go the other way around.) For example, "What do you like?" entails "What food do you like?" We might call Q_1 in such a relation the SUPERQUESTION, and any Q_2 that it entails a SUBQUESTION. If we can answer enough sub-questions, we have the answer to the superquestion. Answering a particular question may involve several steps: there may be better or worse ways of presenting information to maximize its inferential potential for our interlocutors, and determining the most effective of these is part of strategy development. Given the ultimate aim of discourse and the rationality of the participants, these types of relations are the principal factors that structure our moves.

Besides the discourse goal of inquiry in its most general sense, we usually have separate goals in the real world, our DOMAIN GOALS, and these goals, in the form of deontic priorities, generally direct the type of conversational inquiry that we conduct. We are, naturally, most likely to inquire first about those matters that directly concern the achievement of our domain goals. Once we've committed ourselves to a given question, we pursue it until either it is answered or it becomes clear that it isn't

presently answerable. But the interlocutors' strategy in this pursuit may include the decision to pursue answers to subquestions; a series of related questions may realize a strategy to get at the answer to the most general, logically strongest question among them.

Thus, a strategy of inquiry will have a hierarchical structure based on a set of questions partially ordered by entailment. Relative to each such question in the resulting partial order, we pursue some rhetorical strategy to address that question. Things are actually more complex than this, as questions in an actual strategy may be logically related only in view of certain contextual entailments. But this is the basic nature of strategies, and in what follows I will assume that they have this idealized logical structure, relativized to context.

To get a general feeling for the character of strategies of inquiry, consider the following example from Asher and Lascarides (1998a):

(9)

- a. A: I need to catch the 1:20 to Philadelphia.
- b. Where's it leaving from?
- c. B: Platform 7.
- d. A: Where do I get a ticket?
- e. B: From the booth at the far right end of the hall.

Informally, (10) gives the update dynamics of the discourse context in (9). At each stage, the context is a four-tuple, consisting of the set of discourse referents known by the interlocutors, the set of recognized domain goals, the set of QUDs, i.e. the accepted discourse goals, and the interlocutors' CG, a set of propositions. Propositions and questions are represented in italics; recall that these are abstract informational entities – sets of possible situations and sets of sets of possible situations, respectively – and not sentences of English or representations of such.

(2) The Givenness Hierarchy (Gundel et al. 1993)

in
uniquely
type
focus > activated > familiar > identifiable > referential > identifiable

At the outset, the interlocutors share little relevant information. A's utterance of (9a) is an assertion, and unless B objects, it is added to CG; the train itself becomes a familiar and salient discourse referent. It is also clear from the content of (9a) (via the meaning of *need*) that it expresses a goal for A, and unless B objects or is otherwise unhelpful, cooperative principles lead to the addition of that goal to the set of domain goals of the interlocutors. Henceforth, to be Relevant to the established domain goal, subsequent discourse must attempt to further it, directly or indirectly; this is reflected in the addition to the set of QUDs of the question of how to catch the train. (9b) poses a question that is Relevant in that it seeks information required to catch the train and hence represents a discourse goal that is part of a strategy to achieve the established domain goal. Given world knowledge about how to catch a train, this new question is a subquestion of the one already on the QUD stack, since knowing how to catch the train entails knowing where to get it. Again, unless B objects, the question is added to the QUD stack. B's reply in (9c) counts as a complete answer to the question at the top of the QUD stack, and so that question is removed from the stack when the answer is added to CG, along with the discourse referent for platform 7. A then initiates the next phase of his overall strategy to achieve the domain goal, introducing the discourse goal corresponding to the question in (9d). The treatment of this question/answer pair is parallel to that in (9b, c). In the end, the information in CG entails knowing how to catch the train, so the first question is also removed from the QUD stack, and the issues under discussion are resolved.

Not all discourses involve explicit QUDs, but all can be shown to address implicit questions, capturing the intuitive notion of topics under discussion. For example, consider examples (11)–(14) from Mann

and Thompson (1986), illustrating various types of rhetorical relations that can generally be seen as types of strategies for pursuing goals in discourse:

- (11)a. I'm hungry.
- (b). Let' s go to the Fuji Gardens.
- (12)a. We don't want orange juice.
- (b). We want apple juice.
- (13)a. I love to collect classic automobiles.
- (b). My favorite car is my 1899 Duryea.
- (14)a. Go jogging with me this afternoon.
- (b). You'll be full of energy.

The assertion in (11a) pertains to a particularly important human imperative, and hence suggests a domain goal: satisfying the speaker's hunger. As usual, suggesting a domain goal raises a corresponding topic for conversation – how to satisfy that goal. (11b) suggests an answer to that implicit question, going to eat at a particular restaurant. Mann and Thompson give this as an example of the rhetorical relation of SOLUTIONHOOD, since the second utterance proposes a solution to the problem posed by the first. This characterization is perfectly compatible with the intentional analysis just suggested.

(12) exemplifies the rhetorical relation Mann and Thompson call CONTRAST. This contrast would be reflected in the utterance of this discourse by placing narrow prosodic Focus on the direct object of *want* in each clause. Roberts (1996a) proposes a general theory of Focus interpretation in which the focal structure of an utterance presupposes the type of question it may address.¹⁵ Here, the narrow focus on each utterance would presuppose that they both address the question of what the speaker and other individual(s) referred to by *we* want, contrasting two possible answers. If that (probably implicit) question weren't Relevant in the preceding discourse, then utterance of (12) would be infelicitous. While it seems correct to characterize this pair of utterances as standing in contrast, by itself this fails to predict the kinds of contexts in which they would be felicitously uttered. By looking at the discourse fragment while considering the presupposed QUD, however, we capture both the contrast and the felicity.

(13) illustrates the rhetorical relation Mann and Thompson call ELABORATION/SET-MEMBER. Again, there is no explicit QUD in this discourse fragment, but (13a) would be a relevant answer, to an implicit or explicit question like “What are your hobbies?” The elaboration in (13b) would be warranted on the assumption by the speaker that the question was part of a larger strategy to find out what the speaker is like, what he likes and dislikes, etc., and, in this case, would actually be more helpful than the direct answer in (13a) alone. A cooperative interlocutor attempts to address what the query is really after rather than offering only the information literally requested.

(14) is of interest because the first utterance is an imperative rather than a question or assertion. Imperatives propose a domain goal to the addressee of making true the proposition expressed by the corresponding indicative with the addressee as subject. So (14a) proposes that the addressee make it true that she jogs with the speaker on the afternoon in question. Whether the addressee accepts the proposed goal corresponding to an imperative depends on many things, including the relative power of speaker and addressee, degree of cooperativeness, reasonableness of the request, etc. When the speaker has little power to force adoption of the goal, she may attempt to motivate the addressee to accept it by addressing the potential response “Why should I?”: (14b) is relevant to (14a) by virtue of addressing this question. This understanding is triggered by the need both to determine the Relevance of (14b) and to resolve the presupposition of a reference time for interpretation of the future tense: If the addressee does accept the proposal and go jogging, “after you do, you'll be full of energy.” This account in terms of Relevance and QUDs is compatible with Mann and Thompson's characterization of this discourse fragment as illustrating the Rhetorical relation of MOTIVATION.

Hence, Relevance, Focus, and other presuppositions can be used to retrieve implicit QUDs. This illustrates a prevalent feature of the language game plan, modeled more abstractly in Planning Theory

via Plan Inferencing Rules that permit one to infer interlocutors' plans from other information in CG plus what is actually said. Similarly, sometimes answers that are obviously entailed in a given context are not explicitly uttered, but are nonetheless entered into CG. These cases involve accommodation in the sense of Lewis (1979) and are quite normal in discourse: If it is clear that an interlocutor presupposes a question or assertion ϕ which is not yet commonly agreed upon, then if the interlocutors have no objection, they behave as if CG contained ϕ all along (see Atlas, this volume). The notion of a move in a discourse game is essentially semantic. A question is not necessarily realized by a speech act, but is only a question-denotation in the technical sense, a set of relevant alternatives that the interlocutors commit themselves to addressing. It indicates what the discourse is about at that particular point and, if we look at the strategy of questions in which it participates, where the discourse is going.

Let us summarize the picture of context and its role in the dynamic interpretation of a language game that we have developed to this point. I assume that a LINGUISTIC STRUCTURE is an ordered pair of a syntactic structure (with associated lexical items) and a prosodic structure. The interpretation of such a structure is its context-change potential, a function from contexts (potential contexts of utterance) to contexts (updated contexts resulting from their utterance). An UTTERANCE is then an ordered pair of a linguistic structure and a context of utterance. A context is a scoreboard, a way of keeping track of the various types of information being shared in discourse. Like a scoreboard, it is ideally public, but it isn't always the case that everyone has a clear view of the scoreboard. The types of information and the way in which they get updated by the proffering of various types of linguistic structure are constrained by the rules of the language game. Here are the facets of the score we have alluded to so far:¹⁶

(15). Context in Dynamic Interpretation

At a given point in a discourse, the discourse context is an ordered n-tuple, with at least the following elements:

- a set of Discourse Referents, intuitively the set of entities under discussion;
- a set of sets of Domain Goals:
 - a set for each interlocutor, what that person is taken to be resolved to achieve, including goals suggested by imperative moves addressed to that person and subsequently accepted, and
 - a common set that the interlocutors are (at least ostensibly) committed to achieving together;
- the set of Moves made up to that point in the discourse, with a total order on them corresponding to the order in which they were proffered;
- the set of Questions under Discussion (QUDs) in the discourse: those interrogative moves that have been accepted by the interlocutors and have not yet been satisfactorily answered;¹⁷
- the set of propositions reflecting the interlocutors' Common Ground (CG).¹⁸

The rules of the language game constrain how different types of linguistic structures update the discourse context, with the following principal effects:¹⁹

(16). Pragmatics of Questions

- (a) If a question is accepted by the interlocutors in a discourse, then it is added to the set of QUDs.
- (b). A member of the set of QUDs in a discourse is removed from that set iff its answer is entailed by CG or it is determined to be unanswerable.

(17). Pragmatics of Requests

If a request is accepted by an addressee *i* in a discourse, the set of *i*'s goals is updated with the information expressed by the corresponding indicative, with *i* taken as the denotation of the subject.

(18). Pragmatics of Assertion (following Stalnaker 1978)

If an assertion is accepted by the interlocutors in a discourse, it is added to CG.

The acceptance of a move of any type in the language game depends on its felicity in the context of utterance. If all of the move's presuppositions (in the extended sense suggested in section 2) are

satisfactorily resolved and the move is accepted by the interlocutors, the context will be updated specific to that type of move. We can then capture Gricean maxims, rules of turn-taking, and other global constraints on well-formed discourse as metapresuppositions required to be satisfied for every move. For example, consider the following characterization of Relevance:²⁰

(19). A move *m* in a discourse game is RELEVANT to the question under discussion *q* iff *m* either introduces a partial answer to *q* (*m* is an assertion) or is part of a strategy to answer *q* (*m* is a question subordinate to *q* or an imperative whose realization would plausibly help to answer *q*).

Given that discourse is structured by intentions and the questions expressing them, we must guarantee that all the assertions in a discourse are at least partial answers to accepted questions, and that in fact each is a (partial) answer to the question under discussion at the time of utterance. This follows from the way that Relevance is defined in (19); cf. Grice's relativization of the maxims (1989: 26) to "the current purposes of the talk exchange." Without something like Relevance, it is hard to see how to predict that a given structure would be infelicitous in a given context. And without intentions and goals, it is hard to see how to define Relevance in a way that makes sense for dynamic interpretation. Adding a set of QUDs to the characterization of context gives us a way of capturing Relevance in a linguistically relevant way.

The above suggests that some notion of the intentions of interlocutors in discourse is crucial to capturing Relevance, and hence to adequately addressing several features of discourse context, felicity, and context update. There are various ways this approach might be extended to handle other types of pragmatic phenomena. For example, one can use the intentional structure represented by the QUDs to characterize the set of salient entities at that point in the discourse, as suggested in Grosz and Sidner 1986.²¹ This would involve adding an ordered subset of the set of discourse referents, the SALIENT ENTITIES, to the types of information in (16), and modifying the context update rules to manage what was in the set of salient entities at a given time in discourse. One would also certainly want to implement some tactics for plan inferencing, in order to infer speech acts (Perrault 1990) and ultimately to draw conversational implicatures.

In addition to exploring such extensions, we might want to explore other ways of characterizing the intentions of interlocutors in discourse and the relationship of these intentions to questions and other sorts of speech act. In a series of recent papers, Asher and Lascarides (1994, 1998a, b) have discussed various facets of an ambitious project to model discourse processes within a version of Discourse Representation Theory. While their theory makes prominent use of information about interlocutors' intentions, it also makes crucial and extensive use of rhetorical relations, taken as primitives of the theory. And their theory does not make the types of connections between intentions and questions and between rhetorical relations and strategies of inquiry discussed above. Asher and Lascarides also go well beyond this discussion to propose certain principles for plan inferencing and to explore their interaction with the process of interpretation. A careful comparison of the two types of theory is beyond the scope of this chapter. However, such a comparison should ultimately prove useful in determining the extent to which the various structures and principles in discourse are independent of each other.

5 Conclusions

Developing an adequate characterization of the notion of discourse context is at the heart of a fully adequate, integrated theory of pragmatics. Other notions, including presuppositional relations, rhetorical relations, and other facets of discourse coherence (Halliday and Hasan 1976, Kehler, this volume) and felicity, can arguably best be captured in terms of an appropriately modeled relation between a linguistic expression and its context of utterance. In order to do so, however, it is crucial that we include among the types of information tracked in context information about the intentions of the interlocutors and general constraints on how these intentions are related to each other in felicitous discourse. Under these assumptions, the resulting model of context, appropriate rules for the semantic interpretation of particular structures and lexical items (drawing on contextually available information), and a suitable inference engine to generate contextual entailments will

together yield a satisfactory theoretical account of how context influences interpretation.

Of course, in actual discourse interlocutors have to do a lot of guesswork to maintain control of a speaker's assumptions about context and, hence, about how particular utterances will be interpreted. In the theory of Hobbs et al. (1993) (cf. Hobbs, this volume), the fact that we must guess at the assumed context is captured by characterizing actual on-line interpretation in terms of abduction, a process whereby one figures out what the speaker must have assumed the context to be in order for her utterance to denote a true proposition.²² Hobbs's theory is perfectly compatible with the claim made here that in the ideal discourse pragmatic enrichments of the timeless meaning of an utterance are, like presuppositions, contextual entailments. The basic theoretical task is to predict the particular interpretations that would be given to particular utterances by ideal hearers who had a complete and mutually consistent understanding of the context. The often incomplete and inconsistent character of actual interlocutors' information about contexts of utterance and the strategies they adopt to compensate for lack of omniscience in this respect – including redundancy²³ and abductive inference – are of considerable theoretical interest, but this should not obscure the basic abstract character of discourse context.

One interesting facet of contemporary work on dynamic interpretation and context dependence is its interdisciplinary character. Some of the best work in this area is being carried out within computational linguistics and artificial intelligence.²⁴ The domain of pragmatics includes phenomena at the edge of linguistics proper, the outcome of the interaction between purely linguistic structures (syntactic, phonological, etc.) and more general cognitive capacities and attitudes (inference, perception, belief, intentions, etc.). We cannot adequately characterize such interaction without taking into account this interaction and all the factors that play into it. Purely linguistic study of pragmatics will never yield as much insight as study that takes into account non-linguistic factors as well.

1 While there are fascinating difficulties in maintaining these methodological assumptions, they have proven an excellent point of departure in theory building and make it possible to understand the productive character of our semantic competence. See Dowty (1979) and Partee (1984a).

2 The exact character of the presupposition associated with definite descriptions is disputed. See Russell (1905), Heim (1982), Kadmon (1990), Neale (1990), and Roberts (to appear) for a range of suggestions, and Abbott (this volume) for general discussion.

3 See Karttunen (1973), Stalnaker (1974), and Beaver (1997) for extensive discussion of presupposition satisfaction.

4 Kasper et al. (1999) provides an extended discussion of this idea and a sketch of its computational implementation within the framework for pragmatic analysis proposed in Roberts (1996a).

5 Kripke is said to have made this observation about *too* at a workshop on anaphora at Princeton University in 1990.

6 This approach goes back to Jackendoff 1972 in the generative literature and is explored (under a variety of theoretical assumptions) in more recent literature; e.g. Vallduví (1992), Roberts (1996a), Schwarzschild (1999), Gundel and Fretheim, this volume.

7 See Ward (1988).

8 There is a lot of variation even within one general approach. For an accessible introduction to File Change Semantics (Heim 1982) and Discourse Representation Theory (Kamp 1981, Kamp and Reyle 1993) and a comparison of the two theories, see Kadmon (2000). For a fairly accessible introduction to a theory close to the Dynamic Montague Grammar of Groenendijk and Stokhof (1990), see Chierchia (1995).

9 Of course, interlocutors might accommodate the failed presupposition, adding it to C' , but then the accommodated context wouldn't be C' , but its update as accommodated.

10 Note that this notion is compatible with the assumption of an innate Language Acquisition Device for phonology and syntax. Even with such an innate ability to acquire linguistic structures when exposed to particular languages, there remains the problem of grasping intended reference and comprehending the conventional extensions of kind-denoting expressions, etc.

11 See also Grosz and Sidner (1986), Pollack (1986), Litman and Allen (1990), and Thomason (1990).

12 Here and below, I capitalize the Gricean notion of Relation (Relevance) and the related formal notion to distinguish them from the ordinary English terms.

13 As we will see below, imperatives also establish goals, although of a different type than those established by accepted questions.

14 This is in distinction to Carlson's epistemic desideratum of a question, which has to do with increasing the knowledge of the questioner, and with the related views of Ginzburg (1996a). In my account, it is the CG, not the speaker, that is "informed", and it is mutual-belief-behavior, and not knowledge, that is sought. This permits a generalization over rhetorical questions, quiz questions, etc., which are problems for more solipsistic views of information in discourse.

15 See Roberts (1998b) for application of the theory to the comparative analysis of Hungarian and English, and Kadmon (2000) for comparison of this general approach to Focus with others in the contemporary literature.

16 See Roberts 1996a for a detailed formal proposal.

17 Questions ideally remain in the QUD until either answered or abandoned as practically unanswerable, at which time they are removed. So the QUD is non-monotonic, in the sense that information added to it at one point may be removed later.

18 Unlike the QUD, CG is ideally monotonic, so that once added, information does not get removed. Of course, sometimes interlocutors discover that they were wrong, and then CG must be corrected accordingly. However, this often involves a difficult repair strategy, and is not the normal way of updating CG.

19 There will typically be additional effects. For example, if a question is asked, the fact that it is asked is entered into the CG, whether or not it is accepted, by virtue of the fact that the asking is a speech act performed in full knowledge of all the interlocutors and that such (non-linguistic) shared information is also represented in CG. If the question is accepted, then the interpretation of the question and the fact that it was added to the set of questions under discussion at that point also becomes part of CG, by virtue of the way that the character of the changing context is continuously reflected in CG.

20 A detailed comparison with Sperber and Wilson's (1986a) notion of Relevance is not possible here, but I will note two significant differences between their notion and that given in (19). First, Sperber and Wilson's Relevance reflects their reductionist program, since it is apparently intended to play the role of all of the original Gricean conversational maxims. (19) is not reductionist; e.g. it is not intended to account for Quantity implicatures. Second, Sperber and Wilson do not relativize their notion to the interlocutors' immediate intentions or goals (and in fact, they deny the very possibility of a common ground), so that the maximization of informativeness while minimizing processing cost is calculated absolutely. But the Relevance defined in (19) is crucially relativized by the interlocutors to the QUD, and, hence, given the pragmatic function of questions in information structure, to the interlocutors' goals.

21 Roberts (1998a) sketches how this might work in a version of Discourse Representation Theory.

22 I would add that the proposition must not only be true, but also Relevant.

23 See M. Walker (1993) for extended discussion of the frequency and function of redundancy in discourse.

24 In addition to work already cited, see the work by Johanna Moore, Richmond Thomason, Karen Lochbaum, and their associates, including Lochbaum (1993), Moore (1995), Thomason and Moore (1995), Moser and Moore (1996), and Thomason et al. (1996). Grosz (1997) presents a useful overview of the field, with extensive references. Thomason has an excellent bibliography on context available on his website: <http://www.eecs.umich.edu/~rthomaso/bibs/context.bib.txt>

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