

FORMAL PRAGMATICS

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In the 1950s, **Chomsky** and his colleagues began attempts to reduce the complexity of natural language phonology and **syntax** to a few general principles. It wasn't long before philosophers, notably John **Searle** and H. Paul **Grice**, started looking for ways to do the same for rational **communication** (Chapman 2005). In his 1967 William James Lectures, Grice presented a loose optimization system based on his **maxims of conversation**. The resulting papers (especially Grice 1975) strike a fruitful balance between intuitive exploration and formal development. Though the work is not particularly formal, it marks the birth of modern formal pragmatics.

Pragmatics is central to the theory of linguistic meaning because, to paraphrase Levinson (2000), the encoded content of the sentences we utter is only the barest sketch of what we actually communicate with those utterances. **Utterance interpretation** involves complex interactions among (i) semantic content, (ii) the **context** of utterance, and (iii) general pragmatic pressures (of which Grice's maxims are one conception). The starting point for a formal pragmatics is the observation that speakers agree to a remarkable extent on the interpretations of the utterances they hear, suggesting that there are deep regularities across speakers, utterance contexts, and sentence types in how (i)–(iii) interact.

An overarching challenge for pragmatic theory is that semantic content and the context of utterance influence each other. It is common, for instance, to find that the **meaning** of a sentence is crucially incomplete without contextual information. **Indexicals** and **demonstratives** are paradigm cases: 'I am here now' doesn't have a fully specified denotation without information about who the speaker is, when he is speaking, and where he is speaking. Similarly, modal auxiliaries like *must* admit of a wide range of interpretations. The utterance 'Sam must be in his office' can be used to make a claim based on evidence ('... I see the light on'), or a claim based on the laws of the land ('... the boss has passed a new rule'), or any number of others. Sentence-internal features provide some clues, but the intended interpretation cannot generally be resolved without information from the utterance context. Other examples of this form are easy to find. Context dependency is ubiquitous in language, which means that essentially all semantic theories rest on particular views of how to model contexts.

Kaplan's (1989) theory of indexicality is an early and influential approach to modelling how the context influences interpretation. For Kaplan, the context is modelled as a tuple of indices that identify the speaker, the time, the place, and so forth. These indices directly provide the meanings for indexical expressions like *me*, *now* and *here*. The methods are those of **semantics** (model-theoretic interpretation), but some interpretation happens in terms of these designated context tuples.

Kaplan's theoretical approach helps us to see how context helps determine semantic content. Its basic techniques have been used for a wide range of issues in context dependency. However, these theories have little to say about the reverse direction of influence, i.e. how the context is changed by the addition of new content. Dynamic theories of meaning attempt to model this aspect of context dependency as well. The earliest such systems in linguistics are those of Heim (1982) and Kamp (1981), who built on the insights of Karttunen (1976). The fundamental innovation of dynamic semantics is to ask, not what sentences mean, but rather how they affect, and are affected by, the flow of **discourse** information. For example, if I say 'A goat entered' with the force of an **assertion** then, with this utterance, I introduce a new discourse referent *d* into our context (this is the work of the indefinite), and I ascribe two properties to *d*: that of being a goat

and that of entering. My language has thus changed the context. If I follow up with ‘It looks hungry’, the subject pronoun *it* gets its meaning from the recently introduced *d*. Dynamic theories provide systematic explanations for this language–context interplay. Historically, such theories have been developed to handle **presupposition** and discourse-mediated **anaphora** (Chierchia 1995; Beaver 2001), but they can be extended to many kinds of discourse information (Asher and Lascarides 2003).

The above phenomena and theoretical approaches largely concern using pragmatic information to obtain the basic content of a sentence. This is the area of pragmatics that has received the most formal attention to date, probably because it is amenable to treatment in terms of monotonic logics of the sort that have formed the backbone of semantic theory since Montague (1974) and Lewis (1976). However, this is not quite ‘Gricean pragmatics’ in the usual sense, which is concerned primarily with pragmatic **enrichment**. For example, even if we assume that we have a complete and accurate semantics of the sentence *Sam’s work is satisfactory* (i.e. all context dependency has been resolved), we still need a theory of why some contexts invite us to infer from this that the speaker believes Sam’s work is not great (not excellent, not outstanding), whereas other contexts permit us to conclude only that this stronger statement is irrelevant (or impolite, or false).

Gazdar (1979a, 1979b) is an early extended attempt to formalize the **reasoning** behind pragmatic enrichment of the sort that Grice concentrated on. Gazdar modelled a species of presupposition as well as a range of conversational **implicatures**. The system makes precise certain assumptions about speaker **knowledge** that are inherent in Grice’s descriptions. It involves sentence/utterance comparison of the sort that runs through all of Grice’s examples, and it is an early effort to handle default interpretations. The specific formal details did not have much influence, owing perhaps to their complexity, but the work remains a touchstone for present-day approaches to presuppositions and conversational implicatures. It is noteworthy also for being arguably more ambitious in its descriptive scope than the majority of work that has been attempted since.

The most heavily-trodden area of the original Gricean landscape is that of scalar conversational implicature (Horn 1972). Recall from above that saying ‘Sam’s work is satisfactory’ is likely to have implications for alternative utterances of the form ‘Sam’s work is Adj’, where Adj is a positive adjective like *great* or *excellent*. The basic dynamic is as follows: if $\langle A_1, \dots, A_n \rangle$ is a scale of adjectives (A_1 the lowest, A_n the highest), then picking A_i will convey that using A_j is pragmatically infelicitous in the current context (for some reason or other), for all $j > i$. Gazdar’s system focused on such pragmatic **inferences**, and they have figured centrally in formal developments since then. They are of special interest for four central reasons. First, results concerning the nature of the scales are relatively accessible and broadly important (Sauerland 2004). Second, the principles governing inferences in terms of these scales are largely familiar from semantics. Third, one can identify scalar inferences without specifying their exact nature. We can study the inferences from ‘Sam’s work is satisfactory’ without necessarily saying whether they are grounded in considerations of relevance, truthfulness, **politeness**, or some combination thereof. Fourth, **scalar implicatures** have been argued to indicate that pragmatic inference cannot be deferred to the utterance level, as Grice had it, but rather that they are an integral part of the compositional semantics (Chierchia 2004; cf. Geurts 2008).

As the above indicates, much work in formal pragmatics involves extending the basic tools and techniques of semantic theory. As a result, it inherits certain biases from that tradition, chief among them an emphasis on interpretation (over production) and a tendency to try to find single

fixed solutions. Recent developments have begun to explore models that don't necessarily have these properties. The **optimality-theory pragmatics** of Blutner (1998) treats pragmatic inference as a joint effort on the part of both the speaker and the hearer. Roughly, the speaker tries to minimize his effort by using the least marked (shortest, least unusual) expressions he can, and the hearer tries to extract from it the most useful (informative, relevant) interpretation. It is an optimization system in virtue of the fact that both sides compromise in order to reach their point(s) of consensus. The basic dynamic is often credited to Horn (1984), and it echoes a fundamental information-theoretic insight of Zipf (1949).

In its emphasis on speaker and hearer working together to resolve the interpretation problem, optimality-theory pragmatics resembles the decision-theoretic and game-theoretic approaches that were developed at approximately the same time. The decision-theoretic approach regards discourse as structured and driven by abstract decision problems, with both production and interpretation guided by the discourse participants' shared desire to resolve those problems efficiently. This is strongly reminiscent of approaches that call upon abstract 'questions under discussion' to understand the dynamics of information exchange (Roberts 1996). Merin (1997) applies decision-theoretic ideas to presuppositional phenomena, Parikh (2001) uses a version of it to understand conversational implicatures and **speech acts**, and van Rooy (2003) studies the under-specification of interrogatives and declaratives in these terms.

Game-theoretic approaches are more explicit than decision-theoretic approaches about the fact that dialogue is multi-agent interaction. They seek to capitalize on the intuition that communication is a game, with its own strategies and measures of progress. The guiding idea is that the preferred pragmatic enrichments of the utterances we hear are equilibria in the game-theoretic sense. Linguists and logicians have explored a number of different solution concepts (and game structures) that might correspond to this pragmatic notion of preferences. These approaches trace to Lewis (1969), who developed signalling games and their associated solution concepts (for linguistic applications, see van Rooy 2004). Benz et al. (2005) is an influential and wide-ranging collection that opens with a useful tutorial on decision theory and game theory in linguistics.

All these more recent approaches are notable for their reliance on ideas from information theory, an extremely general mathematical framework for studying all kinds of communication and much more (Cover and Thomas 1991). Thus, they might be able to do justice to the fact that pragmatic inferences are not confined to linguistic interactions. Grice was careful to emphasize that they show up in nonlinguistic interactions as well, making them central not only in linguistics, but throughout **cognitive science** and **artificial intelligence**. This doesn't diminish the importance of pragmatics to linguistic exchanges, nor does it preclude finding phenomena that are unique to discourse, but it might suggest that these recent approaches are on the right track in their move to talking generally about agents and messages, rather than talking exclusively about people and natural language utterances.

To date, theories of formal pragmatics have been fairly limited in their descriptive scope. This can foster the incorrect, unfortunate impression that there is an interesting theoretical distinction between formal pragmatics and 'informal' pragmatics. The truth is that informal pragmaticists aspire to precision, and formal pragmaticists aspire to model as many pragmatic phenomena as possible. The strategies are different, but the communities share the common goal of understanding the methods by which utterance meanings are enhanced in virtue of their interaction with the particularities of the utterance context and the general pressures of rational communication.

See also: Anaphora, pragmatics of; artificial intelligence; assertion; competence, pragmatic; computational pragmatics; context; conventionality; conversation; conversation analysis; cooperative principle; defaults in semantics and pragmatics; definiteness; demonstratives; domain restriction; enrichment; generalized conversational implicature, theory of; Grice, H.P.; heuristic; implicature; implicature; indefiniteness; indexicals; maxims of conversation; natural and non-natural meaning; neo-Gricean pragmatics; optimality-theory pragmatics; politeness; post-Gricean pragmatics; presupposition; scalar implicature; Searle, J.; semantics-pragmatics interface; theoretical pragmatics; utterance interpretation

Suggestions for further reading:

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