

Introduction: Presuppositions in Context— Theoretical Issues and Experimental Perspectives

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Abstract A central issue in semantics and pragmatics is to understand how various different aspects of meaning contribute to the overall conveyed meaning of an utterance. Asserted content, implicatures, and presuppositions are commonly assumed to differ in terms of their source, their status, and their interaction with the context in the theoretical literature. This chapter starts with a brief introduction of this theoretical background, and then reviews the experimental literature on related phenomena in some detail, with a focus on presuppositions. In the course of this, the contributions to the present volume are situated in the context of previous work. The conclusion provides an outlook on future directions.

Keywords Presuppositions · Processing · Implicatures · Experimental pragmatics · Triggering · Presupposition projection · Acquis · Accommodation · Meaning in context

1 Introduction

The study of natural language meaning within formal linguistics has its roots in philosophy of language and logic, and this tradition sees truth-conditions at the center of the study of semantics. As Heim and Kratzer (1998) put it in the first sentence of their influential textbook: ‘To know the meaning of a sentence is to know its truth conditions.’ One of the central concerns of current semantic research then is to characterize natural language phenomena in truth-conditional terms. While most theorists might agree that truth-conditions are the core of linguistic meaning, it is also clear—and widely accepted—that there are further aspects of the overall conveyed meaning of a sentence uttered in a context that go beyond what I will refer to as the conventionally encoded (or literal) *at-issue* content. The latter is directly contributed by the lexical entries of the expressions involved and constitutes the central message the speaker wishes to convey (see also Roberts’s (1996) notion of

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proffered content). The additional layers of meaning come in various sorts. They can be a part of the conventionally encoded meaning for a given lexical item but not contribute to the *at-issue* meaning. Alternatively, they can result from general reasoning about communicative situations (and be *at-issue* or not). Finally, they can arise through an interaction of conventional content and general reasoning. In characterizing these phenomena in these terms, it is common to divide up the work in one way or another between related but distinct components of the language comprehension system, namely semantics and pragmatics, where the former crucially involves conventionally encoded content, whereas the latter depends (at least in large part) on information from the context of utterance. The lines between the two are by no means agreed upon, and for many phenomena, key arguments in the literature are precisely about the way in which a given expression gives rise to contributions to the overall meaning as well as the nature of that contribution.

The ‘overall conveyed meaning’ of a given sentence uttered in context can then be seen as a conglomerate of inferences. For naive speakers, there is no simple way of divvying up those inference in terms of what their source or status is. It is the job of the theorist to come up with criteria for differentiating what inferences are introduced in what way, and to identify the corresponding properties of the relevant aspects of meaning. Providing theoretical arguments for differentiating between distinct aspects of meaning and identifying their key properties—both on their own and in contrast with other aspects—has always been a central concern in the field. However, until very recently, the empirical scope of these investigations has been limited in a number of ways, and few efforts were undertaken to study the relevant questions systematically with tools from experimental psycholinguistics. Similarly, much of the research has focused on English (and a couple of other languages), without much of a perspective on cross-linguistic comparisons. But over the course of the last decade or so, a shift has started to take place, with more and more researchers bringing together experimental approaches and theoretical questions about linguistic meaning, as well as exploring details of semantic phenomena across a wider set of languages.

A large share of experimental work on meaning from a linguistic perspective indeed has focused on comparing different aspects of meaning.¹ The primary focus has been on implicatures (and amongst those, primarily scalar implicatures) in the sense of Grice (1975) (see discussion below). But other aspects of meaning lend themselves to similar investigations, and ultimately we will want to inform our theoretical considerations using empirical and experimental investigations that explore the relevant phenomena to the fullest extent possible. The present volume presents recent work that extends experimental approaches to another central aspect of meaning, namely that of presuppositions, and it is—to the best of my knowledge—the first to focus on that topic specifically. While by now there is a small but growing body of experimental work on presuppositions, the hope is that a focused presentation of

¹ For surveys of psycholinguistic work on semantics more generally, see Frazier (2012) and Pytkäinen and McElree (2006).

current results within one volume will help to galvanize efforts in this area further, both by serving as a point of reference on the current state of research and as a starting point for future investigations.

This introductory chapter is intended to situate the overall endeavor that the later chapters contribute to in a broader context by providing a brief overview of the basic theoretical background and reviewing existing experimental work from the literature and related theoretical issues. I conclude by taking stock of the current state of research and reflecting on future directions.

2 Background: Ingredients of Meaning

Early work in the tradition of philosophy of language from a logical perspective regarded natural language as deficient and messy, as many aspects of the way it conveys meaning did not squarely fit into simple logical analyses. However, at least since the middle of the twentieth century, the *prima facie* non-logical aspects of language have been taken to be the subject of rigorous formal analysis themselves. One of the earliest relevant discussions involved the analysis of definite descriptions. One line of thought, originating with Frege (1892) and later taken up by Strawson (1950), argued that definite descriptions come with an existence and uniqueness requirement. If either requirement was not met (as in *The king of France is bald.*), the sentence would not receive a truth-value. In other words, these requirements were taken to be a type of pre-condition, or presupposition, for truth-evaluable sentences that could felicitously be uttered in a given context. In contrast, Russell (1905) argued them to simply be part of the literal at-issue content, so that failure to meet them would result in simple falsity.

While subsequent debates about definite descriptions continue to this day, it soon became clear that there is a wide range of expressions that systematically exhibit properties similar to those found with definites. In particular, presuppositions are commonly assumed to have two key characteristics (Karttunen 1973; Stalnaker 1973, 1974). First, they (at least typically) do not convey any new information, but rather consist of backgrounded information that the interlocutors take for granted (at least for purposes of the conversation). Secondly, they remain present at the level of the overall sentence even when introduced under embedding operators that (loosely speaking) cancel the literal *at-issue* content. Consider the example in (1), where the verb *stop* introduces the *presupposition* that whatever activity is expressed by the verb phrase is something that has gone on prior to some contextually salient time in the past (introduced by the past tense), and the *assertion* that this activity was not going on after the relevant point in time.

(1) John stopped smoking.

Presupposed and asserted content behave very differently in so-called family-of-sentences environments (Chierchia and McConnell-Ginet 1990), which include variations such as the following:

- (2) a. John didn't stop smoking.
 b. If John stopped smoking, then he should be healthier now.
 c. John might have stopped smoking.
 d. Did John stop smoking?

None of the sentences in (2) convey what's asserted in (1)—that John's smoking did not go on after a salient point in time. They either convey the opposite (in the case of negation), or remain neutral in that regard. However, the presupposition—that prior to the relevant point in time John was smoking—remains constant across all variations. This global presence of the relevant inference, also referred to as 'presupposition projection', is a hallmark of presupposed content (But note that projection does not always result in the global presence of inferences; see Sect. 4.3).

Another important aspect of meaning is that of conversational implicatures (Grice 1975). A prototypical example is that of the scalar implicature associated with the quantifier *some*, illustrated in (3):

- (3) John ate some of the cookies.
 a. John ate some, and possibly all, of the cookies.
 b. John did not eat all of the cookies.

Although naive speakers might commonly take (3) to entail (3b), it turns out that the literal meaning of *some* is best characterized as (3a), e.g., because it can be cancelled without any sense of contradiction (3i), in contrast to literal meaning (3ii):²

- (3') i. ... In fact, he ate all of them.
 ii. ... # In fact, he ate none of them.

So how does the standard interpretation of (3) as implying (3b) come about? Grice (1975) proposed that it is based on the hearer's reasoning about the speaker's role as a rational, cooperative interlocutor that adheres to certain conversational maxims. In the present case, the maxim of Quantity requires speakers to be as informative as necessary, and the maxim of Quality requires them to speak truthfully. Based on this, a hearer can then reason as follows: the speaker did not make the logically stronger claim that John ate all of the cookies, despite being required to be as informative as possible. Assuming she is cooperative, there must have been something else that kept her from asserting the universal claim. The maxim of Quality is a prime candidate—she must have not been in a position to make the stronger claim while also observing this maxim. Thus, the hearer concludes that the stronger claim is not true.³

Yet another class of inferences distinct from the literal, truth-conditional content is that of conventional implicatures, a term also introduced by Grice (1975) (See Potts (2005), for an influential recent perspective). Conventional implicatures share some properties with presuppositions and some with implicatures, as can be illustrated with the examples in (4).

² Also see Destruel et al. (2014) for further discussion of cancellation tests.

³ The actual reasoning is more involved than that, and as I hinted at, other maxims (such as Relevance) could come into play as well.

- (4) a. Sue, a pianist, teaches music lessons on the weekends.
 b. The damn cat knocked over a glass of water.

The notion that Sue is a pianist introduced by the appositive in (4a) is by no means something that had to be established prior to the utterance, but at the same time, it does not contribute to the main point of the assertion (in denying (4a), for example, one would not deny that Sue is a pianist). Rather, it seems to introduce a side-comment of sorts. At the same time, this information is clearly conventionally encoded, and not inferred via general reasoning. In a way similar to presuppositions, the relevant inference remains constant under various types of embeddings. In fact, conventional implicatures have been argued to (almost) always be present at a global level, unlike presuppositions. Similar considerations apply to the expressive *damn* in (4b).

While the presentation of the three aspects of overall meaning above more or less represents a traditional perspective, note that the boundaries between them are by no means clear. As will be seen both below and throughout several of the contributions to this volume, there are many cases of expressions where theorists have argued about the precise nature of certain related inferences. Furthermore, it is not even clear that the distinctions made here are exactly at the right level. A more fine-grained classification may ultimately be required. Tonhauser et al. (2013), for example, propose a view based on an overall class of projective content (i.e., content that remains unaffected in certain embedding environments) that would encompass both presuppositions and conventional implicatures, with more fine-grained distinctions amongst different sub-classes. The overview articles by Beaver and Geurts (2012) and Potts (to appear) also suggest a likely need for more fine-grained classifications. That being said, the distinctions laid out above clearly serve as the general starting point in the literature and provide a useful basis for further investigations.

There are, of course, numerous further ways in which linguistic utterances can give rise to inferences beyond what is literally expressed, e.g., through metaphor and irony. While these also merit more in-depth investigation, we will restrict our focus here on phenomena that are more closely related to the literal meanings of linguistic expressions and which have been explored extensively in formal terms.

3 Issues in Presupposition Theory

To set the stage in theoretical terms, I now provide a brief sketch of the central approaches to presuppositions, both traditional and current (for a comprehensive recent survey, see Beaver and Geurts (2012)). The next section discusses more specific issues in connection with the relevant experimental work, both in the existing literature and in this volume, with the aim of situating the results from the chapters to come in their broader context. Theoretical approaches to presuppositions can be divided along various fault-lines. For purposes of presentation, I will draw the main line between dynamic views of semantics, which see sentential meanings as intimately interwoven with their impact on the context, and static ones, which take a purely truth-conditional approach that does not incorporate effects on the context in the

semantics proper. I begin with the dynamic tradition, as it has long occupied the perhaps most prominent place in linguistics. The main focus in the latter category will be on recent developments of so-called modular accounts, which maintain a non-dynamic semantics but incorporate the incremental unfolding of discourse at another level.

3.1 *Dynamic Approaches*

Starting with the seminal work by Robert Stalnaker (Stalnaker 1970, 1973, 1974, 1978), presuppositions have commonly been seen as imposing requirements on possible contexts of utterance. For Stalnaker, this is a fundamentally pragmatic notion. His approach is based on a notion of contexts of utterance in terms of the Common Ground—the set of worlds compatible with what is mutually supposed for purposes of communication. Assertions serve to add information to the Common Ground, thereby reducing the corresponding set of worlds. Presuppositions, on the other hand, correspond to what is already entailed by the Common Ground. This view encodes the notion that presuppositions are an aspect of meaning that is taken for granted by the discourse participants. An utterance that comes with a presupposition requires that the Common Ground entail that presupposition in order to be felicitous. On Stalnaker's pragmatic perspective, it is speakers that presuppose, and the connection between certain expressions and speakers' general tendency to presuppose a corresponding presupposition has to be spelled out further. It's possible to combine a conventional encoding with this pragmatic view (see, for example, von Stechow's (2004) notion of 'Stalnaker's bridge'), though Stalnaker himself remains relatively non-committal in this regard.

Crucially, the dynamics of interpreting a given phrase in relation to the context extends to the intra-sentential context. This is at the heart of the Stalnakerian approach to presupposition projection. To illustrate with the simplest example, presupposition triggers introduced in the second clause of a conjunction are evaluated relative to a context that already includes the first conjunct. This provides an explanation for the specific projection patterns we find with conjunction: Based on the choice of the first conjunct, the entire sentence either does (5a-i) or does not (5a-ii) presuppose that John has a wife:

- (5) a. i. John has the week off . . .
 ii. John is married. . .
 b. . . . and he's on a trip with his wife.

The fact that the first conjunct in (5a-ii) (plus the assumption of traditional marriage laws!) establishes that he has a wife suffices to satisfy the presupposition introduced by the possessive description *his wife*. In contrast, variations of the sentence where the first conjunct does not entail that John has a wife, such as (5a-i) will presupposing that he has one. This general dynamic approach to projection provided the starting point for much following work.

The dynamic semantic proposal of Heim (1982, 1983) adopts Stalnaker's idea of capturing projection in terms of incremental context update, but it builds this dynamic aspect directly into the semantics. Instead of the traditional truth-conditional notion of sentence meanings, it takes sentence meanings to encode the sentence's potential to change any given context when uttered—its context change potential. Since contexts still are construed as sets of worlds, at least in their basic form,⁴ the truth-conditional contribution of a sentence can easily be reconstructed from the context change potential. But this approach also makes it possible to directly encode presuppositions as introducing requirements on contexts by utilizing partial context update functions, i.e., functions that would only be able to update contexts with certain properties (namely ones that entail the relevant presupposed proposition). What was truly novel in Heim's approach was that presupposition projection phenomena could now be characterized in terms of the context change potentials of the relevant operators, including conjunction and conditionals, leading to a unified semantic representation of entailed and presupposed content. To illustrate, the context update procedure for the conjunction of p and q would be as follows:

$$(6) \quad c + p \text{ and } q = (c+p) + q$$

The update of context c with sentence meaning p (i.e., $c + p$) amounts to set intersection. The potential partiality of p and q encodes the requirements introduced by the corresponding presuppositions: a context c can only be updated with p if it entails the presupposition(s) of p . Crucially, the context for q is the result of updating the original c with p , so that any presuppositions of q need not necessarily be entailed by c , but only by the combination of c and p . Parallel definitions can be given for other operators in such a way that they generally capture projection data successfully.⁵

Another prominent proposal in the dynamic rubric is that of discourse representation theory (DRT; Kamp 1981). It was developed independently of Heim's proposal, and largely aimed to capture the same anaphoric phenomena that Heim (1982) addressed. Later work by van der Sandt and Geurts (van der Sandt and Geurts 1991; van der Sandt 1992; Geurts 1999) developed an explicit theory of presuppositions in this framework, which fundamentally sees them as a form of anaphora. The basic idea is that there is a representational level that keeps track of the discourse as it develops, in the form of variables that represent discourse referents and conditions that the referents have to meet. Operators such as negation and conditionals introduce hierarchical embeddings within this discourse structure, and both anaphora and presupposition resolution involve searching for an antecedent along a pre-defined search path. For a presupposition introduced in the second conjunct of a conjunction, this search would first check in the first conjunct, and then in the discourse context to find a suitable antecedent. By and large, the predictions are quite similar to those of Heim's (1982)

⁴ The full system of Heim (1982), which provides an analysis of anaphoric interpretations of definites, extends this basic view of contexts to include assignment functions.

⁵ Note that both the extent of this success and the explanatory adequacy of the proposal have been questioned in the subsequent literature (see below).

approach, though there are some crucial differences, some of which we will turn to below (see Sect. 4.3).

3.2 *Static Approaches*

While dynamic accounts enjoyed a relatively dominant position in the literature throughout the 1980s and 1990s, there also are alternative approaches that capture the special status of presupposed information in different ways, namely via adding a third truth-value to the logic they work with (using systems based on Kleene 1952), or by assuming a supervaluation-based framework (van Fraassen 1968, 1971). The initial proposals pre-dated the dynamic ones, of course, and were attempts to formalize Strawson's observation that sentences whose presuppositions are not met are neither true nor false. Recent years have seen various revivals of variations of these approaches, and the differences in predictions between them and the dynamic ones turn out to be more subtle than it might initially seem (see Beaver and Krahmer 2001; Fox 2008; George 2008a, b among others, and Schwarz (2014b) for some further discussion in this volume).

One of the most influential recent developments in this area has emerged from work by Philippe Schlenker (Schlenker 2008a, b, c, 2009, 2010a, b). In its latest form, this line of work has become a compromise of sorts of the types of accounts considered so far, by proposing a non-dynamic recasting of a theory that is very much in the spirit of Stalnaker and Heim. This theory makes do with a semantics that is classical (i.e., without a third truth-value) and static. It represents both presupposed and asserted content in these classical terms, but assumes presupposed content to introduce additional pragmatic requirements. In particular, such content has to be entailed by its local context. In its simplest form, a local context roughly consists of the pre-utterance context and all parts of the sentence that precede the presuppositional expression. Formally, the evaluation of a presupposition involves consideration of all possible continuations of the sentence. This captures the incremental effects of presupposition interpretation, in the same spirit as the original Stalnakerian approach.

However, an important aspect of this type of theory is that it opens up the possibility of considering the basic nature of presuppositional requirements (of being established in the discourse context), on the one hand, and the role of the incremental unfolding of spoken language, on the other hand, as separate components. While the basic version of local contexts in Schlenker (2009) requires any possible continuation of the sentence to be felicitous, the incremental aspect can be weakened by demoting it to a processing preference. This makes it possible, in principle, for presuppositions to be supported by expressions that follow it, though that is dispreferred, because of the preference for incremental interpretation. The resulting type of modular account along these lines is investigated experimentally by Chemla and Schlenker (2012). They argue their data to support the modular approach, in that introducing support

for a presupposition after the trigger, thus violating incrementality, seems to be preferred over having no support for the presupposition in the context at all (see also Sect. 4.3 and Schwarz 2014b).

On the theoretical level, Schlenker's theory of 'Local Contexts' arguably improves on previous dynamic approaches in several ways. First, it avoids a problem of explanatory adequacy that had been acknowledged in the literature for some time. In short, the formal setup of context change semantics does not require the context change potential for conjunction discussed above (parallel concerns arise with other connectives). Based on the formalism, an alternative entry for *and* would be just as possible that reverses the update procedure. Schlenker's approach avoids this issue by basing the incremental effects (yielding asymmetries between the first and second conjunct) on the left-to-right linearization of linguistic structure. This derives (almost entirely) the same results as Heim's theory, but without having to stipulate anything further about the lexical entries for connectives (which are understood as in classical logic). Secondly, unlike Stalnaker's original approach, Schlenker's theory is versatile enough to apply the notion of local context to non-propositional nodes, which allows him to capture presupposition projection with quantifiers.

3.3 *Key Questions about Presuppositions*

To conclude our initial overview of theoretical approaches to presuppositions, it is generally accepted that presuppositions crucially relate to the context, but theories differ in terms of the level at which context comes into play. Stepping back from specific theoretical proposals and reflecting on the general questions that are crucial in investigating presuppositions, there are three key issues that are central in the theoretical literature. First, there's the question of the source of presupposed content, commonly called the triggering problem: Where do presuppositions come from? Are they specified in the lexical entry of a given expression, or are they derived in purely pragmatic terms? Furthermore, if they are lexically encoded, how do the corresponding pragmatic effects come about? Secondly, we need to account for the interaction of presuppositions with their linguistic context, specifically a host of embedding environments that give rise to projection phenomena. Finally, there is the issue of what status presuppositions have relative to other aspects of meaning, and what effects arise when presuppositions occur in contexts that do not support them. Different triggers may require different answers to these questions, which adds another potential layer of complexity. Theoretical issues and empirical questions related to these questions will be considered in more detail in the next section, in direct connection with corresponding experimental investigations.

4 Experimental Investigations of Presuppositions

In turning to experimental investigations of presuppositional phenomena and their relation to theoretical proposals, it is prudent to start out by acknowledging that presupposition theories put forward within philosophy and formal semantics do not generally commit themselves to making any specific claims about the actual cognitive processes involved in interpreting presuppositions (though there are some exceptions, perhaps most notably DRT). Nonetheless, it seems clear that everybody's shared ultimate goal is to advance our understanding of how the minds of human beings deal with language. But we have to be careful that in doing so, we do not mistake abstract, theoretical characterizations as making immediate claims about mental processes. When the evaluation of predictions about contextual acceptability or the presence or absence of certain inferences is concerned, this may not seem to be an issue at first sight. After all, even the most abstract theories in this area claim to model actual people's understanding of the linguistic expressions they analyze. However, even at that level, it is clear that judgment data need not correspond directly to the theoretical constructs that the theory in question make predictions about. Take an example from syntax: as has been evident right from the start of modern linguistics, not all structures that most accounts would want to see as grammatically legitimate are judged as acceptable (the classical example of course are multiple center-embedded clauses), and there are examples of the reverse case as well (e.g. Gibson and Thomas 1999). In the realm of presuppositions, a parallel point has been made by von Stechow (2004), who argues that speakers' judgments about truth-values (or lack thereof) for sentences containing non-referring definites should not be expected to be in a one-to-one correspondence with our theoretical notions of truth-values and infelicity. In short, even in simple judgment tasks, people may be influenced by a variety of considerations that are not directly related to the theoretical dimensions of the experimental manipulation. Obviously, parallel considerations apply *a fortiori* to investigations of aspects of cognitive processes that do not directly involve conscious decisions by subjects, such as timing measures for processes involved in linguistic comprehension.

While these considerations are important to keep in mind, they should not hold us back from setting out to pursue experimental tests of predictions from non-cognitive theories. We will generally need some linking assumptions about how the theory could possibly be amended so as to make specific predictions for experimental settings. But in many cases, these may be fairly straightforward and simple, at least at the outset of the enterprise. In the absence of other, more cognitively real, explanations of the same type of phenomena, theoretical proposals constitute the starting place for asking questions about the actual cognitive processes involved. As actual results are evaluated and interpreted, it needs to be clear that what is tested is the combination of the theoretical claims and the linking assumptions, which in turn means that any evidence against a specific proposal could be due to either one of them being wrong. But that is the nature of experimental investigations, and no particular issues arise

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