Pronouns and Conventional Implicature

Abstract:

Falling in the shadow of the better known category of conversational implicatures, Grice's underused category of *conventional implicature* has been viewed with unjustified suspicion. Kent Bach (1999) goes so far as to denounce this category of implicature as nothing more than a myth. However, Bach's arguments against conventional implicatures do not survive close scrutiny: specifically, his IQ Test does not generate the results he claims for it. Moreover, the theoretical category of conventional implicature may be put to good use.

The historical roots of conventional implicatures can be traced to Frege's comments concerning tone. More recently, Christopher Potts (2005) has placed the theory of conventional implicature on solid foundations with his *Logic of Conventional Implicatures* and a related series of linguistic tests. The theory has been successfully applied to pejoratives, honorifics and appositive phrases. This paper extends the application of the theory to the semantic import of gender and number of English third-person pronouns.

Pronouns and Conventional Implicature

Falling in the shadow of the better known category of conversational implicatures, Grice's underused category of *conventional implicature* (1967, pp.25-26) has been viewed with unjustified suspicion. The arguments against it do not survive scrutiny and contrary to much current opinion the notion can be put to good theoretical use. The category of conventional implicature is a well-defined and linguistically tractable level of meaning, as is demonstrated by a series of tests arising from a range of linguistic entities. Isolating the peculiar features of conventional implicatures allows for the extension of the theory to the communicative content of the gender and number of pronouns in English.

1. Classic Cases and Further Examples

The conventional implicatures of an utterance are certain aspects of the conventional meaning of the sentence uttered that go beyond its truth conditions or 'what is said'. Grice's "model case" (1967, p. 46) of conventional implicature is displayed in the distinction between 'and' and 'but'[1].

1) She's poor but honest.
2) She's poor and honest.

Grice claims that (1) and (2) have the same truth conditions, but that a speaker who utters (2) conventionally implies that there is some salient contrast between the poverty and honesty of the woman in question. The phrases 'truth conditional content'[2] and 'conventionally implied content' (or simply 'implied content') will be used to refer respectively to the basic level of meaning common to all lexical items and the further content associated with a purported conventional implicature. 'And' and 'but' therefore, on Grice's account, share their truth conditional content; however, 'but' has an implied content that 'and' lacks.

Grice did not say much about the mechanism of conventional implicature other than providing a couple of examples: he introduces the phenomenon in order to

---

[1] This non-truth-conditional difference in meaning between 'and' and 'but' was first observed by Frege (1879). He called it 'Beleuchtung' ('illumination') or 'Fäbung' ('colouring'), English translations of his works use 'tone'. An alternative account of 'but' is provided by Blakemore (1987), there is not room here to discuss her theory.

[2] Potts (2003a, forthcoming) uses the term 'at issue content' for my 'truth conditional content' partly because he does not want to prejudice issues concerning the interaction of implied conventional implicatures with the truth conditions of complex sentences. However, he argues strongly against any such interaction.

set it aside and focus on conversational implicature instead[3]. Grice did not provide anything approaching a theory of conventional implicature and wrote:

> "the nature of conventional implicature needs to be examined before any free use of it, for explanatory purposes, can be indulged in." (1967, p.49).

Lauri Karttunen and Stanley Peters (1979) went some way towards extending Grice's notion in a formal setting. More recently, Christopher Potts (2003a, 2005, forthcoming) has produced an insightful defence of the notion of conventional implicature and put this notion to good theoretical use. Potts distils a list of four central properties of conventional implicatures from Grice's brief remarks.

> "a. CIs [Conventional Implicatures] are part of the conventional (lexical) meaning of words
> b. CIs are commitments, and thus give rise to entailments
> c. These commitments are made by *the speaker of the utterance* 'by virtue of the meaning of' the words he chooses
> d. CIs are logically and compositionally independent of what is "said (in the favoured sense)", i.e. the *at-issue entailments*[4] (2005, p.11)"

These properties give us some grip on the notion of conventional implicature (henceforth CI)[5].

The apparatus of conventional implicature can be extended to cover a wide variety of further cases. Indeed, before Grice introduced the label 'conventional implicature', Frege observed that words like 'dog' and 'cur' contribute the same thing to the truth conditions of utterances containing them (1879, p. 7). The latter merely implies a negative connotation when predicated of a particular animal. A general theory of pejoratives may reasonably be developed along these lines[6].

3) He is Boche.
4) He is German.

The negative connotations of (3) do not create a difference in truth conditions from (4) and are a conventional implicature of the use of the word 'Boche'.

---

[3] Grice's first discussion of conventional implicature is in (1961, pp. 127-129). The label 'conventional implicature' is introduced in (1967, p. 26). The only further discussion is concerned with distinguishing conventional implicatures from what is said and is found at (1967, pp. 119-122) and (1987, pp. 260-368).
[4] Potts uses 'at issue entailments' for entailments from the truth conditional content of a sentence.
[5] One consequence of property (a) is that CIs are properties of sentence types rather than tokens. In what follows, I shall hence be less rigorous than is possible in specifying truth conditions and implicatures as properties of sentence types or of tokens/utterances.
[6] See Williamson (2003), Potts (2003b), Kaplan (2004) amongst others for such an approach.

Adopting this approach to pejoratives naturally enough leads one to treat honorifics in the same way[7]. (5) and (6) hence have the same truth conditional content, but (6) encodes an implication of the relative status of the person addressed, given in (7), that differs from any implications encoded in (8).

5) Tu es Napoléon.
6) Vous êtes Napoléon.
7) You are socially superior to (or socially distant from) me, the speaker

To suppose that the truth conditions of (7) are included in those of (6) is to suppose that the truth-conditions of (6) are equivalent to (8). That this supposition is false can be seen from the fact that the negation of (6) is not equivalent to the negation of (8)[8].

8) You are Napoléon and you are socially superior to (or socially distant from) me, the speaker.
9) Vous n'êtes pas Napoléon.
10) It is not the case that [you are Napoléon and you are socially superior to (or socially distant from) me, the speaker].

The purported implicature also passes the detachability and non-cancellability tests. A formal treatment of pejoratives and honorifics as devices introducing conventional implicatures is given by Potts (2003a, 2003b).

Many authors treat words like 'even' and 'manage' occurring in (11) and (12) as carrying the conventional implicatures indicated[9].

11) Even John came to the party
    CI: Of the people who came to the party, John was the least likely to come.
12) Susan managed to swim the channel.
    CI: Swimming the channel was difficult for Susan.

A formal treatment of 'even' and 'manage' along these lines has been given by Karttunen and Peters (1979). Potts (2003a, 2005) extends the theory of conventional implicature to include nominal appositives like (13) which conventionally implies (14)[10].

---

[7] See Levinson (1983, pp.89-96) and Potts (2003b).
[8] It might be argued that the negation in (9) is of some special kind only operating on the content of the first conjunct in (8), and that (6) and (8) nevertheless share the same truth conditional content. The possibility of such complexities in negation in natural language should not be ruled out without good grounds, but without further support it is wise to favour approaches that do not introduce such complications. Furthermore, French speakers typically do not respond to utterances like (9) in situations where the social conventions for the use of 'Vous' are not met with 'C'est faux' if the content of the assertion is otherwise correct.
[9] See for example Kempson (1975), Karttunen and Peters (1979) and Levinson (1983).
[10] Neale (1999) also presents the outline of a semantic theory of appositives in which an utterance containing an appositive phrase expresses more than one proposition. Although he doesn't specifically

13) Lance, a Texan, has won the Tour de France
14) Lance is a Texan.

Though the above examples demonstrate that the category of conventional implicature may be put to good theoretical use, in general, conventional implicature has not received much attention in the literature. Since they sit awkwardly on the semantics/pragmatics divide, some authors have viewed conventional implicatures with considerable distrust. This suspicion has grown to a level at which it deserves scrutiny.

2. Are Conventional Implicatures a Myth?

Kent Bach has recently written:

"[T]here is no such thing as conventional implicature and… the phenomena that have been described as such are really instances of something else" (Bach, 1999, p. 327).

Echoing Boër and Lycan's (1976) criticism of semantic presupposition, Bach condemns conventional implicatures as nothing more than a myth. He sets out several spurious arguments to the effect that the implied content in many classic cases of conventional implicatures is really part of what is said. Bach then goes on to outline what he takes to be an alternative account of the phenomena traditionally viewed as involving conventional implicature. The substance of this account is, however, entirely compatible with the theory of conventional implicature presented here.

Bach's ground for claiming that some purported CIs are actually part of what is said is that they can happily appear in indirect speech reports.

15) Marv: Shaq is huge but he is agile
16) Marv said that Shaq is huge but that he is agile[11].

Bach uses the following test in order to tell whether a lexical item contributes to what is said in an utterance containing it.

(IQ test): An element of a sentence contributes to what is said in an utterance of that sentence if and only if there can be an accurate and complete indirect quotation of the utterance (in the same language) which includes that element, or a corresponding element, in the 'that'-clause that specifies what is said. (Bach 1999, p.340)

A fully complete and accurate quotation of the utterance must attribute everything the speaker said to the speaker and not to the reporter of the speech.

---

identify one of these propositions as being merely (conventionally) implied, his view is otherwise similar to that of Potts. Also see discussion of Bach (1999) below.
[11] This example is taken from Bach (1999, p. 339).

Moreover, no part of the material following the 'that'-clause must be understood as being used to make any sort of metalinguistic claim: Bach is explicit that "the IQ test applies only to fully indirect and not to 'mixed' quotation" (1999, p. 340). In effect then, if it is possible to fully and accurately report person *A*'s utterance of a sentence *s* by placing the sentence *s*, with indexical elements replaced appropriately, into the matrix '*A* said that…' then every lexical element of *s* contributes to what was said by *A*.

It will be shown later that a large class of conventional implicature devices fail Bach's IQ test. Moreover, even with the model case of 'but', Bach's intuitions about the acceptability and accuracy of the indirect quotations he gives are mistaken. First, note that (17) and (18) are syntactically distinct.

17) Marv said that Shaq is huge and Shaq is agile
18) Marv said that Shaq is huge and said that Shaq is agile

Second, note that (16), repeated below, contains more than one 'that', and is really elliptical for (20) and not (19).

16) Marv said that Shaq is huge but that he is agile.
19) Marv said that Shaq is huge but he is agile
20) Marv said that Shaq is huge but said that he is agile

In (20) the 'but' is not really inside the speech report, rather it conjoins two separate speech reports. Moreover, in combining the speech reports using 'but' the speaker of (20) implies that there is a contrast between Marv's two speech acts. According to the CI theorist, (21) therefore specifies what is said in an utterance of (16) and (22) what is implied.

21) Marv said that Shaq is huge and Marv said that he is agile.
22) Marv's saying that Shaq is huge contrasts in some salient way with his saying that Shaq is agile.

Moreover, the way the speaker contrasts Marv's speech acts may be because the speaker believes their contents to contrast, or he may contrast these acts because he believes *Marv* takes their contents to contrast. It is this second way that is of interest here: given background beliefs that one of them is true, Marv thinks it surprising that the other is true. Thus, the CI theorist can explain why (16) may be used to communicate the fact that Marv contrasts being huge with being agile.

Because it is possible to contrast the saying of φ with the saying of ψ without committing oneself to a contrast between φ and ψ, in general, there is no logical contradiction or context independent linguistic transgression in (23).

23) Marv said that φ but Marv said that ψ and I don't want to contrast that φ and that ψ.

So the contrast in the contents of the sayings in (16) need not be ascribed to anyone but Marv: in particular, they need not be ascribed to the speaker.

If, unlike Bach's example, 'but' is really placed inside the syntactic scope of an indirect speech report, as in (19), the resulting sentence is anomalous for many speakers when read as anything other then direct or mixed quotation. Indeed the most natural interpretation of (19) restricts the content of the speech report to the first conjunct alone. The tension in (24) demonstrates the difficulty in interpreting (19) as straightforward indirect quotation of the conjoined sentence with the implied contrast restricted to the person reported.

24) (*) Marv said that [Shaq is huge but he is agile], and I do not want to contrast Shaq's size and agility[12].

Bach does not therefore establish that CIs can generally appear in indirect speech reports.

Bach attempts to provide support for his case against the CI theorist by claiming that purported CIs associated with words like 'but' are similar in many ways to appositives and non-restrictive relative clauses.

> "I [Bach] take it as uncontroversial that non-restrictive relative clauses and appositives (and parentheticals) can be assessed as true or false. The relevant point is that intuitions about the truth or falsity of utterances containing them tend to ignore them. Why should this be? They seem to get ignored because they are not prominent enough to count… the proposition expressed by the main clause is the one whose truth value is intuitively judged to bear on that of the whole utterance. For the same reason, in judging the truth or falsity of utterances containing 'but', we tend to ignore its contrastive force." (Bach, 1999, p. 346)

There is a great deal about this passage that the CI theorist agrees with. Appositives can be assessed as true or false yet this does not affect the truth value of utterances containing them and similarly for the contrastive force of 'but'. Where Bach and the CI theorist disagree is in the reason for this behaviour. Bach thinks it has something to do with relative prominence, the CI theorist thinks it's because these are all cases of conventional implicature and that's what conventional implicatures do.

---

[12] The square brackets in (24) indicate the extent of the 'that'-clause and should not be seen as implicit quotation marks. A similar point is made by Reiber (1997 p. 57) concerning 'even'. Reiber states that in (a) 'even' must be interpreted metalinguistically.
   a. Sandra said that even Albert will pass the test. Personally, I think that Albert will pass and that this is not at all surprising.

Bach's positive account of many alleged cases of conventional implicature is that in these cases more than one proposition is expressed by an utterance: these propositions are then ranked for prominence according to psychological criteria

> "Whatever the exact story of how this ranking is determined, it pertains not to the semantic question of which proposition(s) an utterance expresses but only to the psychological explanation of which proposition(s) our intuitions of truth and falsity take into account and which they ignore" (Bach 1999, p.353)

The CI theorist also claims that more than one proposition is associated with utterances containing devices inducing CIs: the CI theorist labels one of them the proposition expressed and the other the proposition implied and claims a semantic basis for these labels[13]. Assuming that what is said by an utterance is the proposition expressed, then the differences in Bach's view and the CI theorists seem to concern the extent to which this label may be applied and the basis for its restriction. Bach provides no evidence that the ranking of the many propositions expressed on his view is a purely psychological matter. Moreover, he owes an explanation of why, if 'but' expresses two propositions, one of them is always ranked as more important than the other when it comes to the assessment of the truth of the utterance, and of why, systematically, only certain of the propositions associated with CI devices are operated on when the sentences containing the devices are embedded in complex sentences. In contrast the CI theorist has a ready explanation of these facts: the truth of the utterance depends on the proposition expressed and not on that implied, and it is only the proposition expressed by an embedded sentence that is available for sentential operators to work on[14, 15].

---

[13] This at least is the natural implementation of the theory of conventional implicatures in terms of propositions.

[14] Bach (1999, p. 354) seems more than aware of the structural similarity between his view and the CI theorists, stating that it is only in the extent of the label 'what is said' that his view differs from that of Karttunen and Peters. Given this, is appears odd that he is so keen to debunk the notion of conventional implicature.

Interestingly, Eros Corazza (2002) develops a multiple-proposition view of the semantics of personal pronouns in English. Given the similarities drawn here between the multiple-proposition and CI theories, Corazza's view shares many features with the theory of pronouns developed below.

[15] Bach also argues that many purported devices for introducing conventional implicature in the literature such as 'moreover', 'confidentially', 'incidentally' etc are devices for expressing second order speech acts. Nothing prevents the CI theorist from adopting Bach's analysis of the content of these words as a (conventional) implication or even, in many cases, as an assertion.

3. A Hypothesis

With the suspicion that has surrounded conventional implicature in recent years dismissed, it is possible to progress with their examination. To get a firmer grip on the notion of conventional implicature, it is useful to have some tests to distinguish purported cases of conventional implicature from other semantic and pragmatic phenomena. However, as with any theoretical category, the ultimate ground for postulating the existence of conventional implicatures is the explanatory work the category is able to do.

In the literature, the apparatus of conventional implicature has been applied to pejoratives, appositives and honorifics. Honorific status is typically, though not exclusively, syntactically encoded in pronouns (Corbett 1991). Moving on from this, it might be asked: is there any other information syntactically encoded in pronouns that should be treated as a conventional implicature? Pronouns in English are marked for case, number and gender; they must agree in these respects with related verbs and antecedent noun phrases. In many cases these syntactic features also convey information about the objects referred to. The hypothesis to be defended is that the content conveyed by number and gender is a conventional implicature arising from the use of the pronouns. Thus, an utterance containing a referential pronoun, as in (25), is true if and only if the person referred to by the pronoun, 'he', has the property predicated, being fifty. The referential use conventionally implies that the referent is male. Should a speaker succeed in referring to a fifty-year-old woman by uttering (25), what they *said* would nevertheless be true[16].

25) He is fifty.

Since attempting to refer to someone who is clearly female using 'he' results in an anomalous implicature, the speaker would not expect their attempt to be successful

---

[16] Grice himself discusses a case similar to this in his discussion of what is said.

"Suppose someone to have uttered the sentence *He is in the grip of a vice.* Given a knowledge of the English language, but no knowledge of the circumstances of the utterance… One would know that he has said, about some particular male person or animal *x*, that at the time of the utterance (whenever that was), either (1) *x* was unable to rid himself of a certain kind of bad character trait or (2) some part of *x*'s person was caught in a certain kind of tool or instrument (approximate account of course)" (1967, p. 25)

Grice doesn't include the attribution of male sex specifically in the content of what is said here, it only features in specifying the person 'spoken about'. Thus it is consistent with this passage to treat the sex-attribution as beyond truth conditional content.

Bede Rundle makes the same observation: "incorrect use –'she' for a man- does not amount to falsity" (1983, p. 405); however, he is not sympathetic to conventional implicature accounts of such facts.

if there is a clear mismatch between the grammatical gender of the pronoun and the biological sex of the referent. As the speaker would not expect their attempt at reference to be successful, they could not intend to so refer (since intentions are constrained by expectations). Thus when making a referential use of a pronoun, the speaker must typically believe themselves to have made a correct gender-sex match[17]. The case for number is similar.

Further verification of the hypothesis requires applying tests that have been devised to distinguish CIs from other linguistic phenomena and showing that in these tests pronouns pattern with other purported CIs. The hypothesis will be taken to apply to both referential and anaphoric uses of pronouns, but without the details provided by a fully fleshed-out theory, the precise predictions of the hypothesis, for anaphoric pronouns in particular, cannot be stated. Thus application of the tests will concentrate on referential usage[18].

4. Testing Versus Conversational Implicature

Grice (1967) provided two well-known tests to distinguish between conventional and conversational implicatures: *cancellability* and *detachability*.

> "a putative… implicature that *p* is explicitly cancellable if, to the form of words the utterance of which putatively implicates that *p*, it is admissible to add *but not p*, or *I do not mean to imply that p*, and it is contextually cancellable if one can find situations in which the utterance of the form of words would simply not carry the implicature" (1967, p. 44, italics in original)

> "The implicature is nondetachable insofar as it is not possible to find another way of saying the same thing (or approximately the same thing) which simply lacks the implicature" (1967, p. 43)

Since conventional implicatures are part of the conventional meaning of an utterance, the denial of a genuine conventional implicature cannot be appended to a sentence without linguistic transgression. The conventionally implied content associated with a sentence will also arise in any utterance of that sentence: it does not depend on particular contextual features. Conventional implicatures are thus not cancellable either explicitly or implicitly. However, conventional implicatures are detachable. Nondetachable aspects of the communicated meaning of an utterance

---

[17] In fact the speaker must typically believe this to be common knowledge.
[18] The hypothesis treats both masculine and feminine pronouns entirely symmetrically, rather than viewing one or other of these as semantically marked and the other unmarked.

beyond what was said are not derived from the conventional meaning of any particular lexical item, but rather by the fact that an utterance with a particular content was made. Since conventional implicatures *are* part of the conventional meaning of an utterance, but not part of what was said, conventional implicatures *are* detachable.

In contrast, conversational implicatures are cancellable and nondetachable. Thus, these features may serve as a test to distinguish the two phenomena. A third feature that may also perform this role is *reinforceability*. This is a feature of conversational implicatures which conventional implicatures lack. The test is due to Jerrold Sadock.

> "Since conversational implicatures are not part of the conventional import of utterances, it should be possible to make them explicit without being guilty of redundancy" (1978, p. 374)

The sense of 'redundancy' Sadock means is left undefined, but it will be taken to be an intuitive notion. Something akin to:

> An implicature, *p*, of an utterance of a sentence, *s*, in a context, *c*, is *reinforceable* if in some context *c´* following an utterance of *s* with an utterance of *p* communicates content beyond the utterance of *s* alone.

Applying this test to the classic case of 'but', it is clear that the conventional implicature is not reinforceable.

26) (*) She's poor but honest and this latter attribute contrasts with the former.

In any context, the last conjunct of (26) is not needed since the content is already communicated using the first two. The tests of cancellability, detachability and reinforceability thus distinguish conventional from conversational implicatures and must therefore be applied to the hypothesis concerning the gender and number marking of pronouns: gender first.

It is obvious that the purported implicature in (25) is not cancellable: witness the transgression in (27).

27) (*) He is fifty, but I don't wish to imply that that person is male.

Also, on the semantic theory under consideration, (28) expresses virtually the same proposition as (25) but does not give rise to the implicature. So the implicature is detachable.

28) That person/she/it is fifty.

The implicature is also not reinforceable. In any context of utterance, the last conjunct of (29) is not needed since the content is already communicated using the first.

29) (*) He is fifty years old and that person is male.

Thus, the import of the gender of pronouns is easily distinguished from conversational implicatures[19].

As with gender, it is obvious that the purported implicature arising from the use of a singular pronoun in (25) is not cancellable: witness the transgression in (30).

25) He is fifty
30) (*) He is fifty, but I don't wish to imply that there is only one of him.

Also, the implicature is not reinforceable. In any context, the last conjunct of (31) is not needed since the content is already communicated using the first.

31) (*) He is fifty and there is only one of him.

It is unclear how to apply the detachability test, since the test requires there to be a sentence equivalent to (25) but which is neutral as to how many people are referred to. Since all nouns in English are marked for number it is not possible to construct such a sentence (at least without adding semi-technical constructions). On the hypothesis under consideration a speaker who utters (32) says the same thing as (25), but lacks the implicature (though makes an alternative implicature).

32) They are fifty

This confirmation that the purported CI passes the detachability test is clearly circular and demonstrates nothing more than that the hypothesis is consistent. In this case such conditional confirmation is all that can be expected. The import of the number of a pronoun is thus distinguished from a conversational implicature.

5. Testing Versus Presupposition

There is little agreement in the literature concerning the nature of presuppositions[20]. The relationship between the (a) and (b) sentences in (33) and (34) may be taken as typical examples.

---

[19] This does not mean that the use of a masculine or feminine pronoun may not give rise to a conversational implicature on a particular occasion. Intuitions suggesting that what is meant when masculine or feminine pronouns are used is not symmetrical may well be explicable via conversational implicature. In fact, such a hypothesis may be required for a complete explanation of all phenomena (see below). However, the mechanism of conversational implicature cannot be the only one at work. Though he is hostile to the notion of conventional implicature. Bach (1999, p. 332, n. 8) describes cases in which misuse of honorifics gives rise to conversational implicatures. Similar explanations may work for pronouns.

[20] A semantic approach to presupposition treats the presuppositions of a sentence type as requirements for the bivalence of an utterance of it. Bas van Fraassen (1968) adopts the following definition: Sentence A *presupposes* sentence B, just in case B is true whenever A is true or false. A pragmatic approach to presupposition takes the presuppositions of a sentence as items taken to be common

33) a. John is tall.
    b. John exists.
34) a. John stopped beating his wife.
    b. John used to beat his wife.

However, beyond these admittedly rather vague gestures it is better not to commit to one or other particular definition of presupposition –partly because, following Boër and Lycan (1976), Karttunen and Peters (1979), and Neale (1990, p, 54), there are strong suggestions that this is a rather heterogeneous class. For present purposes, pre-theoretic intuition will be used to identify presuppositions as commitments that native speakers intuitively feel a speaker makes in any utterance of a sentence, but which lie beyond the principal content of what the speaker says in making the utterance. It has already been stipulated that the term 'presupposition' will not include conventional implicatures[21].

Karttunen (1973) defines two classes of predicates which are useful in the study of presuppositions:

"*Plugs*: predicates which block off all the presuppositions of the complement sentences

Holes: predicates which let all the presuppositions of the complement sentence become presuppositions of the matrix sentence." (1973, p. 174).[22]

Presupposition plugs (typically 'verbs of saying' or 'performatives') prevent a complex sentence from inheriting the presuppositions of one of its constituent sentences. For example in (35), (a), unlike (b), presupposes (c): 'accuse' is therefore a presupposition plug. (36) (a-c) are similar.

35) a. Harry beats his wife.
    b. Sheila *accused* Harry of beating his wife.

---

ground in a felicitous utterance of the sentence. Stalnaker provides the following gloss on pragmatic approaches.

"A speaker presupposes that *P* at a given moment in a conversation just in case he is disposed to act, in his linguistic behaviour, as if he takes the truth of *P* for granted, and as if he assumes that his audience recognizes that he is doing so." (Stalnaker 1973, p. 448)

The basis of presuppositions on this view is the behaviour of speakers. Presuppositions are therefore primarily properties of utterances rather than sentence types. However, Stalnaker's notion may be extended to cover presuppositions of sentences following Geurts (1999).

"[W]henever it is said that sentence φ presupposes that, what is actually meant is that, normally speaking, a speaker who uttered φ would thereby commit himself to the presupposition that χ is true" (Geurts 1999, p.4)

"[W]e can plausibly say that a given form of words requires that the speaker presuppose something or other" (Geurts 1999, p. 14

[21] Although guilty of using 'presupposition' as a catch-all term, I am at least honest in admitting that I do so.

[22] Karttunen also defines a third class of predicates, "*Filters*: predicates which, under certain conditions, cancel some of the presuppositions of the complement" (1973, p. 174). The distinction between filters and holes is not relevant to this thesis.

c. Harry has a wife.[23]
36) a. Fred has stopped beating Zelda.
   b. Bill *believes* that Fred has stopped beating Zelda.
   c. Fred used to beat Zelda.[24]

Variants can also be produced using 'say', 'mention', 'tell', 'ask', 'promise', 'warn', 'request', 'order', 'criticize' and 'blame'. Arguably, most propositional attitude verbs also function as plugs[25]. In contrast, many, perhaps all, conventional implicatures are not blocked by presupposition plugs.

37) a. The damn Republicans should be less partisan.
   b. Clinton *says* that the damn republicans should be less partisan.
   c. The Republicans are damned.[26]
38) a. Lance, a Texan, has won the Tour de France again.
   b. Ed *believes* that Lance, a Texan, has won the Tour de France.
   c. Lance is a Texan.
39) a. Tu es Napoléon.
   b. Jean pense que tu es Napoléon.
   c. Napoléon and the speaker have an informal relationship.

The behaviour within presupposition plugs distinguishes conventional implicatures from presuppositions and hence provides a means to test for purported CIs.

Applying this family of tests lends further support to the hypothesis. Embedding a referential pronoun inside a presupposition plug such as 'said' shows that the purported CI is not blocked. In (40) to (45), the speaker of (a) is committed to (b).

40) a. Ed said that he is tall.[27]
   b. The referent of 'he' is male.
41) a. Ed said that he/they is/are tall
   b. There is only one referent of 'he'/'they' has several referents.
42) a. Dan believed that she was a woman.
   b. The referent of 'she' is female.
43) a. Dan believed that there was more than one of them
   b. There is more than one referent of 'them'.
44) a. John warned Paul that he was fifty years old.
   b. The referent of 'he' is male.
45) a. John warned Paul that he was fifty years old.
   b. There is only one referent of 'he'.

---

[23] This example is taken from Karttunen (1973, p. 174).
[24] This example is taken from Karttunen (1973, p. 188).
[25] See Karttunen (1973) for a dissenting view.
[26] This structure of this example is due to Potts (2003b). A literal use of (37)(c) does not give a correct specification of the negative content typically implied by 'damn' in (37)(a). However, it is not necessary for present purposes to give a full specification of what is implied and so '…are damned' is used as a stand-in until a better account is available.
[27] This should not be read as a direct quotation.

Moreover, it is not possible to report what the speaker takes to be an erroneous belief about someone's sex using the incorrect pronoun inside a propositional attitude clause. There are no acceptable interpretations of (46) because the use of 'she' always commits the speaker to the referent being female and this is in tension with the attribution of an *incorrect* belief to Dan.

46) (*) Dan wrongly believed that she was female.

Such behaviour is only predicted on the CI hypothesis. So in tests to distinguish CIs from presuppositions, the interpretation of the gender and number of pronouns seems to pattern like CIs.

A related test to distinguish presuppositions from implicatures is provided by Bart Geurts (1999). Let $\varphi \{\chi\}$ be a sentence containing a purported presupposition trigger which induces the inference that χ is true. Then if the presupposition is genuine "it should be possible to construct special, and therefore marked, instances of the schemata [below] which block the inference that χ is true" (1999, p.7).

47) Not-χ and therefore not-$\varphi \{\chi\}$
48) It is possible that $\varphi \{\chi\}$, but it's also possible that not-χ.

The sense of 'possibility' in (48) should be taken to be epistemic rather than logical or metaphysical.

For example, in (49) the purported presupposition (b) of (a) is not a presupposition of (c) or (d).

49) a. Fred regrets kissing Betty
    b. Fred kissed Betty
    c. Fred didn't kiss Betty, and therefore he doesn't regret that he kissed her, either
    d. It is possible that Fred regrets that he kissed Betty, but it's also possible that he didn't kiss her in the first place

Conventional implicatures cannot be put into such constructions.

50) a.(*) The Republicans are not damned, and therefore the damn Republicans will not win
    b.(*) It is possible that Lance, a Texan, won the Tour de France, but it's also possible that Lance is not a Texan

If Geurts' test is applied to pronouns, as in (51), then anomalous sentences are generated.

51) a. (*) He isn't male, and therefore it's false that he is tall
    b. (*) It is possible that he is tall, but it's also possible that it's not the case that he is male

If it is suspected that the reason for the anomaly is the repetition of 'he' in the denial of the purported presupposition of the embedded sentence, then the sentences in (52) ought to be acceptable: they aren't.

52) a. (*) That person isn't male, and therefore he isn't tall.
    b. (*) It is possible that he is tall, but it's also possible that that person isn't male.

The behaviour of CIs when embedded inside plugs and in Geurts' test are explained by properties (c) and (d) in Potts' list. The commitments of a CI are *made by the speaker* and are compositionally independent of what is said. Hence they are always attributed to the speaker rather than becoming attributed to anyone else when embedded inside propositional attitude verbs: CIs are always speaker orientated and are not blocked by plugs. Since 'say' is a presupposition plug which does not block the inheritance of conventional implicatures, conventional implicatures are typically problematic elements to include in indirect speech reports. Thus many CIs fail Bach's IQ test.[28]

6. Testing Versus Truth Conditional Content

In contrast to plugs, presupposition holes pass on the presuppositions of constituent sentences to the complex sentences of which they are part. Examples

---

[28] A final point of distinction between CIs and pragmatic presuppositions concerns accommodation and backgrounding requirements. Stalnaker's (1973, 1974) account of presuppositions of an utterance requires them to either be part of the common ground, propositions that are taken for granted, or added to the common ground via a process of accommodation in order for the utterance to be understood. It follows from this that presuppositions generally contain background rather than novel information. CIs do not share this feature:

   a. Lance, a virgo, won the Tour de France.

In (a) the appositive introduces relatively unknown information about Lance's star-sign. Similarly, the gender of a pronoun can be used to introduce novel or even controversial information. If there is debate about the sex of a person seen from a distance, (b) may be used to communicate that they are female, (c) may then be used to dispute this claim.

   b. She is tall.

   c. No, he's quite short.

Presuppositions may also be used to introduce information that is not part of the common ground via accommodation. The precise details of this process are a matter of debate, but essentially any presuppositions of a sentence that are not already part of the common ground must be added to the common ground in order for update to occur and the sentence to be understood. However, a hearer is not required to adjust their beliefs to include the content of a CI in order to gain information from the sentence used. A hearer who believes that Lance Armstrong is a Gemini does not need to drop or ignore this belief in order to understand (a). Similarly, a hearer who knows that the speaker mistakenly believes the person spoken about to be female does not need to suspend their belief that the referent is male in order to understand (d).

   d. He's fifty.

More advanced theories of presupposition accommodation (Steedman, 2000) may be able to avoid these difficulties, but such theories are yet to gain universal acceptance amongst proponents of presuppositional accounts of the phenomena discussed here.

include: 'know', 'regret', 'understand', 'surprise', 'be significant', 'begin', 'stop', 'continue', 'manage', 'avoid', 'be able', 'be possible', 'force', 'prevent', 'hesitate', 'seem', 'be probable', as well as negation, disjunction[29], questioning and modalisation. The effect is illustrated in (53): all of (a) to (d) presuppose (e), the presupposition of the embedded (f).

> 53) a. John *regretted* stopping his friend from buying a cheap car.
>   b. It *is probable* that John stopped his friend from buying a cheap car.
>   c. *Did* John stop his friend from buying a cheap car?
>   d. John did *not* stop his friend from buying a cheap car.
>   e. John's friend tried to buy a cheap car.
>   f. John stopped his friend from buying a cheap car.

Presupposition holes also pass on embedded conventional implicatures unaltered.

> 54) John *hesitated* to stop the damn republican from buying a cheap car.
>   CI: The republicans are damned.
> 55) a. It *is probable* that Lance, a Texan, won the Tour de France.
>   CI: Lance is a Texan.
> 56) a. *Did* you vote for the damn republicans?
>   CI: The republicans are damned.
> 57) a. Tu *n'es pas* Napoléon
>   CI: The speaker has an informal relationship with the hearer.

Many presupposition holes however do not pass on the truth conditional content of embedded sentences unaltered. (54) does not entail that John stopped the republican from buying a cheap car, (55) does not entail that Lance won the Tour de France and (56) does not entail that the hearer voted republican. (57) does not entail that the hearer is Napoleon. Presupposition holes hence distinguish both presuppositions and conventional implicatures from truth conditional content.

Applying the test again confirms the hypothesis. When pronouns are embedded within presupposition holes, as in (58) to (61), the speaker is committed to the referent of 'he'/'him' being male.

> 58) It is probable that John bought him a cheap car.
> 59) It is possible that he bought a cheap car.
> 60) Did you buy him a cheap car?
> 61) I did not buy him a cheap car.

This would suggest that the attribution of male sex is not part of the truth conditional content of the embedded sentence.

---

[29] The presuppositions of a sentence, φ, will continue to be presuppositions of the sentence 'φ or ψ': entailments of φ will not.

In (62) to (65) the speaker is committed to 'they'/'them' referring to several people.

62) It is probable that they won the Tour de France.
63) It is possible that they bought a house.
64) Did they win the Tour de France?
65) I did not buy them a cheap car.

Again following the interpretation of gender, the interpretation of number on pronouns can be distinguished from the truth conditional content of sentences.

Conditionalisation can also be used to distinguish presuppositions from truth conditional content[30]. The truth conditional content of a sentence embedded as the antecedent of a conditional sentence is not entailed by the complex sentence. The presupposed and conventionally implied content of such a sentence is inherited by the complex sentence.

66) a. If the damn republicans win the election, then nothing will change.
   b. The republicans will win the election.
   c. The republicans are damned.

In (66), (c) is a conventional implicature of (a), but (b) is not entailed by (a).

Again, pronouns pattern with CIs against truth conditional content. (67) implies that the person referred to is male, though it does not entail the truth of the antecedent.

67) If he arrived today, then it did not snow.

The behaviour of CIs under presupposition holes and conditionalisation is explained by property (d) on Potts' list: CIs are logically and compositionally independent of the truth conditional content of the sentence. Presupposition holes and filters typically only block truth conditional entailments; the independence of CIs ensures they are not blocked. In all the tests above the interpretation of gender and number patterns like other CIs.

Finally, it is sometimes possible to argue directly that a particular lexical item does not contribute some purported content to the truth conditions of sentences of which it is part by demonstrating that the supposition that it does leads to a derivation of incorrect truth conditions for the sentence in a standard compositional semantics. Such arguments do not rest on the behaviour of the item triggering the implicature when embedded inside some sentential operator. However, deploying such an

---

[30] This test effectively treats the antecedent of a conditional as a presupposition hole. Karttunen and Peters (1979) have a more sophisticated theory of conditionals as presupposition filters, the details of which go beyond this thesis.

argument requires speakers to have clear intuitions, or other strong antecedent reasons, supporting the assignment of particular truth conditions to the relevant sentences.

When a pronoun is not embedded inside a sentential operator, native speakers' intuitions about whether the sex assignment associated with the pronoun is part of the truth conditional content of a sentence are not stable. Thus is it difficult to argue directly that it should not be included in a compositional semantics[31]. However, in the case of number, unlike gender, there are direct arguments why the truth conditional interpretation of pronouns must ignore this feature. This is because English marks

---

[31] English is unusual amongst languages in not generally syntactically marking nouns for gender. Other languages do do this, and this fact may be exploited to provide a direct argument for the hypothesis.

In certain cases syntactic constraints mean that a pronoun of linguistic gender different to that typically used for the sex of its referent must be used. For example in Spanish 'animal' is marked as masculine, even when a female animal is referred to. It is hence admissible to utter (a) even when it is known that the animals in question were all female.

    (a)   Cada hombre que compra un animal le pega
            every man who bought an.MASC animal him.MASC beat
            'Every man who bought an animal beat it'

Similarly, in French titles usually take feminine agreement even if the referent is male and this forces anaphoric pronouns to take feminine forms as in (b).

    (b)   Votre Majesté partira quand elle voudra
            Your majesty leave.FUT when she wish.FUT
            'Your Majesty will leave when he (literally 'she') wishes' (Voltaire, quoted by Corbett 1991).

Though cases where masculine pronouns are used exist, they are atypical (see Corbett 1991, p. 22 for discussion). In these cases, the syntactic gender of the pronoun must be ignored when interpreting it: as will be shown, this mirrors the case of number in English.

Given that in some languages the gender of personal pronouns can be forced to clash with their semantic interpretation, there is a direct argument that this syntactic coding is truth conditionally inert. Since it does not mark nouns for gender, it is not possible to construct a similar argument for gender/sex in English. The lack a syntactic requirement in English for gender-agreement between pronoun and antecedent allows speakers greater flexibility in the choice of pronoun (the only exceptions possibly being 'he loves himself'/(*)'she loves himself' and similar constructions). Hence a speaker is left open to greater criticism if a mismatch with biological sex occurs. In English, if it is known that it was a female animal being referred to, then 'she' is used and in indeterminate cases 'it' is acceptable[31]. The use of 'he' as an indeterminate personal pronoun in English is now quite infrequent. Speakers are aware of the social implications of such a use, whether they find it personally offensive or not, and now often avoid such constructions. (On 'evasive forms' see Corbett (1991)).

Thus the semantic import of the choice of pronoun appears greater in English than in other languages. However, the direct argument above shows that in languages closely related to English the biological sex of the referent of a personal pronoun is clearly not part of the truth conditions of a sentence in which it occurs. In the interests of giving a uniform truth conditional semantics of English and closely related languages the biological sex of the referent should not be included in the truth conditions of a gender specific pronoun.

It is an interesting question how far the account of pronouns given here should be extended to languages closely related to English. When the gender of a pronoun is forced by agreement with an antecedent it does not seem correct that the use of the masculine or feminine pronoun alone implies anything (either conventionally or conversationally) about the sex of the referent/denotation. In cases where the gender of a pronoun is unforced by syntactic constraints it may be plausible to suppose that a semantic theory similar to that presented here for English may be suitable. Much further work on this question is needed and these questions must be settled on a language-by-language basis.

nouns for number and requires anaphoric pronouns to match their antecedents in this respect. Stephen Neale (1990) has argued that unbound anaphoric pronouns may be taken to go proxy for numberless definite descriptions[32]. Since the descriptions in question are numberless, the syntactic singular or plural marking on the pronoun does not receive a truth conditional interpretation. If the descriptions were either singular or plural then the theory couldn't handle cases such as (68).

68) a. Every man who bought a donkey beat it
   b. [every x: man x & [a y: donkey y](x bought y)][the$_s$ z: donkey z &(x bought z)](x beat z)
   c. [every x: man x & [a y: donkey y](x bought y)][the$_p$ z: donkey z &(x bought z)](x beat z)
   d. [every x: man x & [a y: donkey y](x bought y)][the$_n$ z: donkey z &(x bought z)](x beat z)

In (68), (b) unlike (a) is false if a man bought more than one donkey. Also, (c) unlike (a) is false if a man bought only one donkey. (d) gets things just right[33]. Hence, as Neale says, "agreement between anaphors and antecedent noun phrases is, by and large, a syntactical matter" (1990, p.239): it is not part of truth conditional semantics.

7. Formal Treatment and Assessment

The linguistic tests above provide a prima facie case for the hypothesis; however, it remains to provide a rigorous description of the theory. Karttunen and Peters (1979) provided the first formal treatment designed to capture conventional implicatures specifically, rather than a more general notion of presupposition[34]. The logic they developed, a multi-dimensional form of the model theoretic semantics of Richard Montague (1973), is adopted by Potts (2003a, 2003b, 2005) and extended to

---

[32] The interpretation of a pronoun is computed via the following rules (Neale 1990, pp.182-3):
   (P4) The *antecedent clause* for a pronoun P that is anaphoric on a quantifier Q occurring in a sentence ϕ is the smallest well-formed subformula of ϕ that contains Q as a constituent.
   (P5) If x is a pronoun that is anaphoric on, but not c-commanded by, a quantifier '[Dx: Fx]' that occurs in an antecedent clause '[Dx : Fx](Gx)', then x is interpreted as the most "impoverished" definite description directly recoverable from the antecedent clause that denotes everything that is both F and G.
A full formalisation is provided in the appendix.
[33] Definitions of the formal language used may be found in the appendix. The theory is not perfect as it stands since it makes incorrect predictions for (a)
   a. A man who bought a donkey beat it
   b. [a x: man x & [a y: donkey y](x bought y)][the$_n$ z: donkey z & (x bought z)](x beat z)
(b), unlike (a), is false if a man bought two donkeys and only beat one of them. Here a singular description will work. It is plausible that the complete explanation may need to make use of quantification over events (see Neale (1990) for discussion).
[34] Though much of what Karttunen and Peters call 'conventional implicatures' I call 'presuppositions'.

treat nominal appositives, honorifics and emotives as CIs[35]. This logic may be extended it to cover the interpretation of gender and number on pronouns as well[36]. Full details of the logic, $\mathcal{L}_{CI}$, are given in the Appendix.

Several assumptions are made in the formalisation, the major one of which is to treat all personal pronouns descriptively (with definite descriptions given a quantificational interpretation)[37]. Letting $\varphi(x)$ stand for the descriptive content assigned to the interpretation of a pronoun, α, in a sentence $\chi(\alpha)$, the truth conditional content will be '$[\text{the}_n\ x : \varphi(x)]\chi'(x)$' (where χ' is the formal translation of the sentence matrix χ). If α is a masculine, singular pronoun then the implied content will be '$[\text{the}_s\ x : \varphi(x)]\text{male}(x)$'. Feminine and plural pronouns have the same truth conditional content but the implied content is '$[\text{the}_s\ x : \varphi(x)]\text{female}(x)$' and '$[\text{the}_p\ x : \varphi(x)](x=x)$' respectively (since this is a semantic theory for English, plural pronouns are ungendered)[38]. The difference in the interpretation of referential and anaphoric pronouns will be found in the descriptive content assigned.

For example, in (69) the referential pronoun in (a) will be interpreted as the description in (b), where a is an appropriate (possibly indexical) directly referential term. The truth conditions of (a) are thus specified in (b), the conventionally implied content in (c)

---

[35] The basic logic, $\mathcal{L}_{CI}$, used in the formalisation is that of Potts (2003a, 2005) with some simplifications and adjustments, the most major being abandonment of Potts' intensional machinery. There are several formal properties of this logic that are relevant to its use in formalizing a language with conventional implicatures. It is essentially a multi-dimensional logic that uses lambda terms. However, it uses a type driven translation rather than the rule-by-rule system in Karttunen and Peter's (1979) original paper. The combinatoric system is thus simplified to function application, though the value of lexical items is correspondingly complicated. Types are thus used to restrict semantic interaction between truth conditional and conventionally implied content.

[36] Given Potts' comments about the implication of maleness in the use of a name such as 'Bill' being a conversational (not conventional) implicature (Potts, 2003, p.58), it is unlikely that he would endorse this extension of his theory.

[37] Further assumptions made in the formalisation are that possessive markers are treated as functions forming descriptions, but apart from this no other distinctions are made between cases or pronouns. It is also assumed that relative pronouns are interpreted as abstraction operators, though it is possible to also treat them as descriptions, that policy will not be adopted here. Therefore, 'My son' is interpreted as '$[\text{the}_s\ x : \text{son\_of}(me, x)]$' ('the unique son of me' possibly in some contextually restricted domain), 'he' and 'him' are interpreted identically and 'a student who ψs' is interpreted as '$[\text{an}\ x : \text{student}(x) \wedge \lambda y \psi(y)(x)]$'. It is an interesting question whether the approach adopted here towards the linguistic gender of pronouns can be extended to the semantic significance of the accusative case.

[38] The formula '$(x=x)$' in the implied content of a plural pronoun is a dummy formula, vacuously true of any object, the significance of the implied content is that a plural, rather than numberless, description is used.

69) a. He is tall.
    b. $[\text{the}_n\, x{:}\ x{=}a]\text{tall}(x)$[39]
    c. $[\text{the}_s\, x{:}\ x{=}a]\text{male}(x)$

The details of the interpretation of anaphoric and plural pronouns is given in the appendix.

Perhaps the most significant feature of Potts' logic is the inherent constraint on variable binding. Given the compositional separation between what is said and what is conventionally implicated, it should be expected that there are constraints on the binding of variables in conventionally implied content by quantifiers in the truth conditional content. This feature was reflected in the logic developed by Karttunen and Peters (1979) to model CIs. Indeed they viewed it as a problem, acknowledging that their semantics for 'manage' was flawed because sentence (70) was predicted to have the truth conditions in (a) and to conventionally imply (b).

70) Someone managed to swim the channel'
    a. $\exists x(\text{swim-channel}(x))$
    b. $\exists x(\text{difficult-for}(x, \text{swim-channel}(x)))$

If someone swam the channel with ease and someone else for whom it was difficult to swim the channel failed to swim it, (a) and (b) are both true, though intuitively the implied content of (70) is false.

Following Potts (2002, 2003a), the binding constraints may be seen, not as a defect of the system, but as a virtue[40]. Potts points out that pronouns in as-clauses may not be anaphoric on quantifiers outside the clause.

71) (*) [No reporter]^1 believes that, as he$_1$ wrote, Ames is a spy

Assuming that the as-clause introduces a conventional implicature, then a formal interpretation of (71) with the anaphoric relation marked, attempts to bind across the truth conditional and CI divide. This cannot be done and matches our intuition that (71) is anomalous.

This constraint on variable binding has consequences for the formal implementation of the hypothesis. With rules for the interpretation of pronouns in

---

[39] Even though the determiner here is a numberless description, the fact that the restricting formula, '$x{=}a$', can only be satisfied by a unique object makes the numberless description '$[\text{the}_n\, x : x{=}a]\varphi(x)$' equivalent to the singular description '$[\text{the}_s\, x : x{=}a]\varphi(x)$'; the weight of the conventional implicature is that the denotation is male.

[40] Concerning the particular case of 'manage' Potts uses a system of at-issue (truth conditional) product types to handle sentences such as (70). The quantifier 'someone' binds variables in two dimensions of a product type, and a multi-dimensional truth conditional analysis is given of 'manage'. I am wary of multi-dimensional truth conditional analyses, though this issue needs further discussion than can be given here. It is possible that an appeal may be made to conversational implicature to explain this case.

place, the cases where the CI content will contain a variable that is unbound at that node of the tree can be described. Since the CI content is compositionally inert and isolated from the truth conditional content, these free variables will never be bound in the semantic parsetree. Whether or not the CI content of a pronoun contains a free variable depends on what the descriptive content of its interpretation in $\mathcal{L}_{CI}$ is. If it is assumed that when the CI content of the pronoun contains a free variable it is not interpretable, the conditions for the presence of interpretable CI content may be given in the table below (ignoring cases with complex antecedents for now).

Type of Pronoun	Interpretable CI Content?
Referential	-Always has interpretable CI content (descriptive content is '$x=a \lor x=b\ldots$' and doesn't contain variables other than x)
Anaphoric c-commanded[41]	-Never has interpretable CI content (descriptive content is '$x=y$' with y remaining unbound).
Anaphoric, not c-commanded, antecedent maximal[42]	-If restrictive phrase of antecedent has free variables then doesn't have interpretable CI content. -If restrictive phrase of antecedent doesn't have free variables then has interpretable CI content.
Anaphoric, not c-commanded, antecedent non-maximal	- If entire antecedent clause lacks free variables, then has interpretable CI content -Otherwise no interpretable CI content

What predictions does this make for the presence of conventional implicatures in English? First, referential pronouns are predicted always to carry conventional implicatures, which appears to be a good result. Second, anaphoric pronouns that are c-commanded by their antecedents are predicted to never carry conventional implicatures. Assuming that when an anaphoric pronoun is c-commanded by its antecedent it contains a variable bound by the antecedent phrase, the CI content of the pronoun contains a free variable: since the variable is only bound by a quantifier higher in the truth conditional parsetree, it must be free at the level at which the conventional implicature is generated. In many cases there will be no natural interpretation for the free variable and so no *conventional* implicature will result. Thus, the lack of conventional implicature in (72) to (75) is explicable.

---

[41] A phrase α *c-commands* a phrase β in a sentence *S* if and only if in a syntactic tree for *S* the first branching node dominating α also dominates β (and neither α nor β dominate one another).
[42] A quantifier '$[Dx: Fx]$' is *maximal* if and only if '$[Dx: Fx](Gx)$' entails '$[$every $x: Fx](Gx)$', for arbitrary G.

72) Every child kissed his mother.
73) Every child whose mother kissed him got an A
74) No child kissed her mother
75) The mother of every child kissed him

However, the obvious interpretation for a free variable in the implied content of (76) and (77) allows for an implicature, particularly if 'some/the child' is used with some specific individual in mind.

76) Some child kissed his mother.
77) The child kissed his mother

Third, pronouns whose antecedent anaphors are embedded inside quantified noun phrases often will not carry conventional implicatures. This prediction squares less well with our intuitions, though these vary across cases. The strength of the intuition that something is implied regarding the sex of the children wanes across (78) to (82)[43].

78) Some woman who had a child kissed him.
79) Two women who had a child kissed him.
80) Most women who had a child kissed him
81) Every woman who had a child kissed him.
82) No woman who had a child kissed him.

An utterance of (78) to (82) might still be taken to conversationally imply that the child in question was male. The conditions for conversational implicatures differ from conventional ones: generally, in order to conversationally imply that the child in question was male using it must be common knowledge that the speaker knows the sex of the child[44]; conventional implicatures have no such constraint. The implication of maleness in an utterance of (78) to (82) is weakened when this epistemic constraint is not met[45].

Fourth, pronouns anaphoric on quantified noun phrases with maximal quantifiers are more likely to carry conventional implicatures than those anaphoric on phrases with non-maximal quantifiers. (83) is predicted to lack a conventional implicature, whereas (84) and (85) are predicted to carry conventional implicatures.

---

[43] It is possible that the same explanation as (76) and (77) may be given for the felt presence of a conventional implicature in (78).

[44] This might be weakened to it being common knowledge that the speaker is justified in his belief that the child is male.

[45] The situation is complicated by the fact that the conversational implicature arises from the use of 'him' over 'her' or some alternate formulation and these differences are not part of the asserted content of the utterance (at least not on the theory adopted here). A full explanation requires a better understanding of the relationships between conventional implicatures and general and particular conversational implicatures.

83) Some girl who saw a child kissed him
84) Every girl who saw the child kissed him
85) Some girl who saw the child kissed him

These different predictions for maximal and non-maximal quantifiers may seem to rest on a rather subtle distinction that is not reflected in our intuitions. The formalisation may not be perfect, though arguably our intuitions in this area are not strong enough to support any formal model.

Finally, anaphoric pronouns not c-commanded by their antecedents, but whose antecedents are not embedded inside other quantified noun phrases are typically predicted to carry conventional implicatures, as in (86) and (87).

86) A student came to lunch and he stayed for dinner.
87) If he is in this room then the murderer is male.

This last prediction squares well with pre-theoretic intuitions.

The overall assessment of the formal model of conventional implicatures associated with pronouns in English must take into account many different factors. It is unlikely that any formal model which covers a large fragment of English will be entirely successful, but the above shows the model to be a reasonable first approximation.

8. Concluding Remarks

It is often a difficult matter to ascertain whether or not a particular English sentence does have an implicature associated with it; yet, implicatures, both conventional and conversational, must only be postulated on good grounds. In particular, sloppy counterfactual reasoning of the form 'If you knew it was a woman that was being referred to, you would have used 'she'' is not enough to justify an implication of masculinity with the use of 'he'. The connections between conventional and conversational implicatures are not well understood and this is an area that requires further investigation in order to address some of the issues raised here. What hopefully has been provided by the preceding pages is enough evidence that a theory that takes pronouns as carrying CI content must at least be taken seriously.

Appendix: The Logic L$_{CI}$

What follows is a modified version of Potts' Logic of Conventional Implicatures ($\mathcal{L}_{CI}$) (2003, 2005) together with systematic translation rules between $\mathcal{L}_{CI}$ and syntactic structures of English.

The English words 'he', 'she' and 'they' are used in a variety of ways in different contexts. In order to specify how a particular pronoun is being used in a particular context it must be specified first whether it is being used referentially or anaphorically, and second if it's used referentially what its referent is or if its used anaphorically what its antecedent is. Formal interpretations can only be given once these connections are made explicit. Formal interpretation also requires the scope of quantifiers to be made explicit. Translation rules will hence be provided between the formal language, $\mathcal{L}_{CI}$, and the LF of English sentences (embellished to make the referent of referentially used pronouns explicit) rather than with the ambiguous surface syntax. It is assumed that determiner phrases are 'raised' in LF leaving behind traces which are translated as variables in the formalisation. Since pronouns are to be interpreted as a species of determiner phrase, they will be raised too. As is standard in syntactic theory a system of numerical super/sub-scripts will be used to indicate anaphoric relations. Finally, referential pronouns will have a predicate that is satisfied by all and only their referents added as a subscript[46]. For pronouns, translation rules take something of the form [φ_i]^j as argument (where φ may be 'he', 'she' or 'they' and the superscripts and subscripts mark the relations to referent or antecedent and to trace variables respectively) and map it to a pair of terms of $\mathcal{L}_{CI}$.[47]

As was shown earlier, in (1) the truth conditions of (a) are specified in (b), the conventionally implied content in (c).

---

[46] In simple cases the predicate may by '$x=a_1 \vee x=a_2 \vee \ldots \vee x=a_n$', where $\{a_1, a_2, \ldots, a_n\}$ are the referents of the pronoun. The predicate may also pick out some demonstrative property).

[47] Since the definition makes an exclusive distinction between at-issue and CI types and each term or formula in $\mathcal{L}_{CI}$ must be assigned to one or other type, no individual term or formula of $\mathcal{L}_{CI}$ may carry both CI and at-issue meaning. The formalisation here does not follow Potts in assuming that no lexical item of English contributes both truth conditional and conventionally implied content ('but' is an obvious example). It must therefore be permitted that individual lexical items of English are translated into $\mathcal{L}_{CI}$ as complex terms.

1) a. He is tall.
   b. [the$_n$ x: $x=a$]tall(x)[48]
   c. [the$_s$ x: $x=a$]male(x)

Anaphoric pronouns c-commanded by their antecedents are interpreted as descriptions where the nominal contains a free variable bound by the antecedent noun phrase[49]. In (2), the pronoun in (a) will be interpreted as the description in (b). In this instance, the conventionally implied content will contain a free variable and so the utterance will not be taken to *conventionally* imply anything.

2) a. A student whose mother loves him got an A.
   b. [∃ x: student(x)∧[the$_s$ z : mother_of(z,x)]loves(z, y)]got_A(x).
   c. [the$_s$ y: $y=x$]male(y)

Anaphoric pronouns that are not c-commanded by their antecedents will be interpreted along the lines of Neale's descriptive theory of pronouns (see above). Where the antecedent noun phrase is formed using a maximal quantifier, such as 'the', the pronoun is interpreted as in (3)(b)[50]. Where a pronoun is anaphoric on a noun phrase formed using a non-maximal quantifier, such as 'an', the pronoun is interpreted as in (4)(b). In both (3) and (4), (c) formalises the conventionally implied content of (a).

3) a. Some girl who saw the student kissed him.
   b. [∃ x: girl(x)∧[the$_s$ y: student(y)]saw(y,x)][the$_n$ z: student(z)]kissed(y,z)
   c. [the$_s$ z: student(z)]male(z)
4) a. A student came to lunch and he stayed for supper.
   b. [∃ x: student(x)]lunch(x)∧[the$_n$ y: student(y)∧lunch(y)]supper(y)
   c. [the$_s$ y: student(y)∧lunch(y)]male(y)

The complete details are presented below.

---

[48] Even though the determiner here is a numberless description, the fact that the restricting formula, '$x=a$', can only be satisfied by a unique object makes the numberless description '[the$_n$ x : $x=a$]φ(x)' equivalent to the singular description '[the$_s$ x : $x=a$]φ(x)'; the weight of the conventional implicature is that the denotation is male.

[49] A phrase α *c-commands* a phrase β in a sentence S if and only if in a syntactic tree for S the first branching node dominating α also dominates β (and neither α nor β dominate one another).

[50] A quantifier '[Dx: Fx]' is maximal if and only if '[Dx: Fx](Gx)' entails '[every x: Fx](Gx)', for arbitrary G.

The Logic L_CI

Types:[51]

    a. e^a and t^a are basic at-issue[52] types for $\mathcal{L}_{CI}$.

    b. e^c and t^c are basic CI types for $\mathcal{L}_{CI}$.

    c.   If σ and τ are at-issue types for $\mathcal{L}_{CI}$, then $<\sigma, \tau>$ is an at-issue type for $\mathcal{L}_{CI}$.

    d.   If σ is an at-issue type for $\mathcal{L}_{CI}$ and τ is a CI type for $\mathcal{L}_{CI}$, then $<\sigma, \tau>$ is a CI type for $\mathcal{L}_{CI}$.

    e.   The full set of types for $\mathcal{L}_{CI}$ is the union of the at-issue and CI types for $\mathcal{L}_{CI}$.

Abbreviations:

$$<\sigma^a, \tau^c> = <\sigma, \tau>^c$$
$$<\sigma^a, \tau^a> = <\sigma, \tau>^a$$

Terms for $\mathcal{L}_{CI}$:

    i.   If c is a constant of type τ then $c \in ME(\tau)$.

    ii.   If x is a variable of type τ then $x \in ME(\tau)$.

    iii.   If $\alpha \in ME(<\sigma^a, \tau^a>)$ and $\beta \in ME(\sigma^a)$, then $(\alpha(\beta)) \in ME(\tau^a)$.
            If $\alpha \in ME(<\sigma^a, \tau^c>)$ and $\beta \in ME(\sigma^a)$, then $(\alpha(\beta)) \in ME(\tau^c)$.

    iv.   If $\alpha \in ME(\tau^a)$ and x is a variable in $ME(\sigma^a)$, then $(\lambda x.\alpha) \in ME(<\sigma^a, \tau^a>)$.
            If $\alpha \in ME(\tau^c)$ and x is a variable in $ME(\sigma^a)$, then $(\lambda x.\alpha) \in ME(<\sigma^a, \tau^c>)$.

    v.   If u and v are constants or variables of type e^a then $(u=v) \in ME(t^a)$.
            If u and v are constants or variables of type e^c then $(u=v) \in ME(t^c)$[53].

    vi.   If $\alpha, \beta \in ME(t^a)$ then $\neg\alpha, (\alpha \wedge \beta), (\alpha \vee \beta) \in ME(t^a)$.
            If $\alpha, \beta \in ME(t^c)$ then $\neg\alpha, (\alpha \wedge \beta), (\alpha \vee \beta) \in ME(t^c)$.

    vii.   If $\alpha \in ME(t^a)$, and x is a variable, then $(\exists x \alpha) \in ME(t^a)$.

    viii.   If $\alpha \in ME(<e^a, t^a>)$, and $\beta \in ME(t^a)$, and x_n is a variable then $[\exists x_n: \alpha(x_n)]\beta$, $[\forall x_n: \alpha(x_n)]\beta$, $[\text{the}_s\, x_n: \alpha(x_n)]\beta$, $[\text{the}_p\, x_n: \alpha(x_n)]\beta$ and $[\text{the}_n\, x_n: \alpha(x_n)]\beta \in ME(t^a)$.
            If $\alpha, \beta \in ME(<e^c, t^c>)$, and x_n is a variable then $[\exists\, x_n: \alpha(x_n)]\beta$, $[\forall x_n: \alpha(x_n)]\beta$, $[\text{the}_s\, x_n: \alpha(x_n)]\beta$, $[\text{the}_p\, x_n: \alpha(x_n)]\beta$, and $[\text{the}_n\, x_n: \alpha(x_n)]\beta \in ME(t^c)$.

    ix.   The full set of meaningful expressions for $\mathcal{L}_{CI}$ is the union of all the sets $ME(\tau)$ for all types τ.

Parsetrees for $\mathcal{L}_{CI}$:

    A parsetree is a structure $\mathcal{T} = <T, \mathbf{D}, V>$ where:

    a. $T = \{u_1, u_2, \ldots\}$ is a set of nodes

    b. $\mathbf{D}$ is an irreflexive, intransitive binary relation on T; it is defined so that, for all $u \in T$, there is at most one u' such that $\mathbf{D}(u, u')$ and at most two distinct nodes u', u'' such that $\mathbf{D}(u, u')$ and $\mathbf{D}(u, u'')$.

---

[51] Looking at the definition of types for $\mathcal{L}_{CI}$ shows that, although clause (d) allows for functions that map at-issue types into CI types, there is no symmetrical clause for functions mapping CI types to at-issue types. Conventional implicatures therefore do not affect the truth-value of at-issue content –or even affect at-issue content at all. Interactions between at-issue and CI meaning are only one-way. Moreover, the definition of types does not allow functions from CI types to CI types; the conventional implicatures of a sentence are hence isolated and don't interact with one another.

[52] 'at-issue' content is Potts' label for truth conditional content.

[53] Clause vi is an addition to Potts' system which does not treat '=' as a logical axiom.

c. **D***, the reflexive transitive closure of **D**, is acyclic.

d. There is a unique $r \in T$, the root: there is no $u \in T$ such that $\mathbf{D}(u, r)$.

e. V is a valuation function, taking formulae of $\mathcal{L}_{CI}$ to sets of nodes in T, according to tree-admissibility conditions (A.1)-(A.6) below:

Tree Admissibility Conditions:

α, β, γ and δ range over terms, ρ, σ, τ and υ range over types.

$\bullet$ is a metalogical device for separating independent terms of $\mathcal{L}_{CI}$.

(A.1) *single node trees:*

$$\alpha : \sigma^{\,a}$$
$$\bullet$$
$$\boxed{\gamma : \sigma^{\,c}}$$
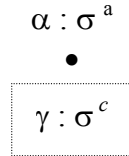
Single node trees decorated with either one or two meaningful expressions of $\mathcal{L}_{CI}$ are allowed. The expressions cannot both be at-issue or CI types.[54]

(A.2) *at-issue application:*

$$\alpha(\beta) : \tau^{\,a}$$

$$\alpha : \langle\sigma^{\,a}, \tau^{\,a}\rangle \qquad\qquad \beta : \sigma^{\,a}$$
$$\bullet \qquad\qquad\qquad\qquad \bullet$$
$$\boxed{\gamma : \rho^{\,c}} \qquad\qquad\qquad \boxed{\delta : \upsilon^{\,c}}$$
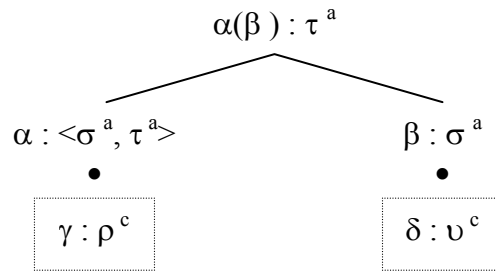
(A.3) *at-issue intersection:*[55]

$$\lambda X.\alpha(X) \wedge \beta(X) : \langle\sigma^{a}, t^{\,a}\rangle$$

$$\alpha : \langle\sigma^{\,a}, \tau^{\,a}\rangle \qquad\qquad \beta : \langle\sigma^{\,a}, \tau^{\,a}\rangle$$
$$\bullet \qquad\qquad\qquad\qquad \bullet$$
$$\boxed{\gamma : \rho^{\,c}} \qquad\qquad\qquad \boxed{\delta : \upsilon^{\,c}}$$

---
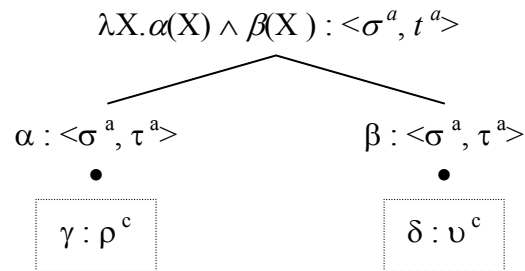
[54] This is in contrast to Potts' system which only allows single nodes to be decorated with one expression of $\mathcal{L}_{CI}$.

[55] This condition is optional (Potts, 2003, p.82), but simplifies our system, keeping at-issue semantics working smoothly in background. It is used for intersective adjectives.

(A.4) *CI application:*

$$\beta : \sigma^{\,a}$$
$$\bullet$$
$$\alpha(\beta) : \tau^{\,c}$$

$$\alpha : <\sigma^{\,a}, \tau^{\,c}> \qquad\qquad \beta : \sigma^{\,a}$$
$$\bullet \qquad\qquad\qquad\qquad\qquad \bullet$$
$$\boxed{\gamma : \rho^{\,c}} \qquad\qquad\qquad \boxed{\delta : \upsilon^{\,c}}$$

(A.5) *Isolated CIs*[56]

$$\beta : \tau^{\,a}$$

$$\alpha : t^{\,c} \qquad\qquad\qquad \beta : \tau^{\,a}$$
$$\qquad\qquad\qquad\qquad\qquad\qquad \bullet$$
$$\qquad\qquad\qquad\qquad\qquad \boxed{\gamma : \rho^{\,c}}$$

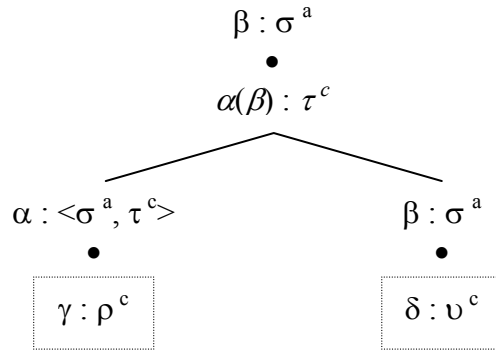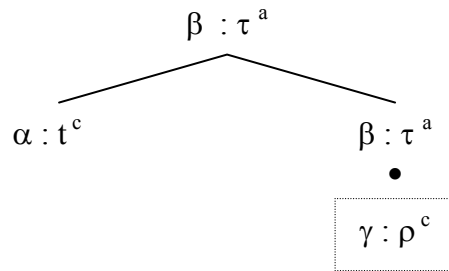*Parsetree Interpretation:*

Let $\mathcal{T}$ be a semantic parsetree with the at-issue term $\alpha : \sigma^{\,a}$ on its root node, and distinct terms $\beta_1 : t^{\,c}, \ldots, \beta_n : t^{\,c}$ on nodes in it. Then the interpretation of $\mathcal{T}$ is the tuple

$$<[\alpha : \sigma^a]\mathcal{M}_g, [\beta_1 : t^c]\mathcal{M}_g, \ldots, [\beta_n : t^c]\mathcal{M}_g>$$

where $[.]\mathcal{M}_g$ is the interpretation function, taking formulae of the meaning language to the interpreted structure, $\mathcal{M}$, relative to a variable assignment g[57].

Lexicon of Constants for $\mathcal{L}_{CI}$:

> *ed, john, sue* : e^{a}
> damned′, female′, girl′, male′, man′, republican′, sleep′, snore′, tall′ : $<e^a, t^a>$
> hit′, like′ : $<e^a, <e^a, t^a>>$

Potts (2003, p.85) uses this rule to allow for CI content is saturated e.g. propositional. Thus there can be have CIs that don't interact with at-issue semantics via function application, for example 'Luke –and you'll never believe this- ate fifty eggs'. I do not make use of this rule but include it for completeness.
[57] In Potts' logic, interpretation uses parsetrees interpreted according to tree admissibility rules. Unlike many standard logics, the interpretation of a tree is not restricted to the value of its root node; rather, the tree is interpreted as a whole. It has been shown that CI types are compositionally inert in that, once generated they may not be applied either to other CI types or to at-issue types. Interpreting a tree as a whole removes the need for any inheritance function that collects together CI types on various branches of the tree. This significantly simplifies semantic interpretation.

Models for $\mathcal{L}_{CI}$:

A model $\mathcal{M}$ for the logic $\mathcal{L}_{CI}$ is a pair $<\mathcal{D}_{\mathcal{M}}, \mathcal{V}_{\mathcal{M}}>$ where:

a. $\mathcal{D}_{\mathcal{M}}$ is a set of domains defined as follows:
   i. The domain of e^a and e^c is $\mathcal{D}_{\mathcal{M}(e)}$ a set of entities
   ii. The domain of t^a and t^c is $\mathcal{D}_{\mathcal{M}(t)} = \{0, 1\}$ a set of truth values
   iii. The domain of a functional type $<\sigma, \tau>$ is $\{f \mid f: \mathcal{D}_{\mathcal{M}(\sigma)} \mapsto \mathcal{D}_{\mathcal{M}(\tau)}\}$

b. $\mathcal{V}_{\mathcal{M}}$ is a valuation taking formulae of $\mathcal{L}_{CI}$ to the model, constrained so that if $\alpha \in ME(\sigma)$, then $\mathcal{V}_{\mathcal{M}} \in \mathcal{D}_{\mathcal{M}(\sigma)}$.

Interpretation for $\mathcal{L}_{CI}$:

The interpretation function for $\mathcal{L}_{CI}$ is given by $[.]\mathcal{M}_g$ where $\mathcal{M}$ is a model and g is a variable assignment: if x is a variable of type σ, then $g(x) \in \mathcal{D}_{\mathcal{M}}$.

a.
$$[\alpha : \sigma]\mathcal{M}_g = \begin{cases} \mathcal{V}_{\mathcal{M}} \text{ if } \alpha \text{ is a constant of } \mathcal{L}_{CI} \\ g(\alpha) \text{ if } \alpha \text{ is a variable of } \mathcal{L}_{CI} \end{cases}$$

b. $[\alpha = \beta: \tau]\mathcal{M}_g = 1$ iff $[\alpha : \sigma]\mathcal{M}_g = [\beta: \sigma]\mathcal{M}_g$[58]

c. $[\alpha(\beta) : \tau]\mathcal{M}_g = [\alpha : <\sigma, \tau>]\mathcal{M}_g([\beta: \sigma]\mathcal{M}_g)$

d. $[\lambda x.\alpha : <\sigma, \tau>]\mathcal{M}_g = $ the f such that $f(\mathbf{d}) = [\alpha : \tau]\mathcal{M}_{g[x:=\mathbf{d}]}$ where $g[x:=\mathbf{d}]$ is an assignment that takes x to $\mathbf{d}$ and maps all variables, y, distinct from x to $g(y)$.

e. $[\alpha \bullet \beta]\mathcal{M}_g = <[\alpha]\mathcal{M}_g, [\beta]\mathcal{M}_g>$

f. $[\neg\alpha]\mathcal{M}_g = 1$ iff $[\alpha]\mathcal{M}_g = 0$

g. $[\alpha\vee\beta]\mathcal{M}_g = 1$ iff $[\alpha]\mathcal{M}_g = 1$ or $[\beta]\mathcal{M}_g = 1$

h. $[\alpha\wedge\beta]\mathcal{M}_g = 1$ iff $[\alpha]\mathcal{M}_g = 1$ and $[\beta]\mathcal{M}_g = 1$

i. $[[\exists x_n\varphi]\mathcal{M}_g = 1$ iff there is a $\mathbf{d} \in \mathcal{D}_{\mathcal{M}}$ such that $[\varphi]\mathcal{M}_{g[xn:=\mathbf{d}]} = 1$.

j. $[[\exists x_n : \varphi(x_n)]\psi]\mathcal{M}_g = 1$ iff there is a $\mathbf{d} \in \mathcal{D}_{\mathcal{M}}$ such that $[\varphi(x_n)]\mathcal{M}_{g[xn:=\mathbf{d}]} = 1$ and $[\psi]\mathcal{M}_{g[xn:=\mathbf{d}]} = 1$.

k. $[[\forall x_n : \varphi(x_n)]\psi]\mathcal{M}_g = 1$ iff for every $\mathbf{d} \in \mathcal{D}_{\mathcal{M}}$ such that $[\varphi(x_n)]\mathcal{M}_{g[xn:=\mathbf{d}]} = 1$, $[\psi]\mathcal{M}_{g[xn:=\mathbf{d}]} = 1$.

l. $[[\text{the}_s x_n: \varphi(x_n)]\psi]\mathcal{M}_g = 1$ iff there is exactly one $\mathbf{d} \in \mathcal{D}_{\mathcal{M}}$ such that $[\varphi(x_n)]\mathcal{M}_{g[xn:=\mathbf{d}]} = 1$ and for such a $\mathbf{d}$, $[\psi]\mathcal{M}_{g[xn:=\mathbf{d}]} = 1$

m. $[[\text{the}_p x_n: \varphi(x_n)]\psi]\mathcal{M}_g = 1$ iff there is more than one $\mathbf{d} \in \mathcal{D}_{\mathcal{M}}$ such that $[\varphi(x_n)]\mathcal{M}_{g[xn:=\mathbf{d}]} = 1$ and for every such $\mathbf{d}$, $[\psi]\mathcal{M}_{g[xn:=\mathbf{d}]} = 1$.

n. $[[\text{the}_n x_n: \varphi(x_n)]\psi]\mathcal{M}_g = 1$ iff there is one or more $\mathbf{d} \in \mathcal{D}_{\mathcal{M}}$ such that $[\varphi(x_n)]\mathcal{M}_{g[xn:=\mathbf{d}]} = 1$ and for every such $\mathbf{d}$, $[\psi]\mathcal{M}_{g[xn:=\mathbf{d}]} = 1$.

Translation Rules between LF and $\mathcal{L}_{CI}$:

'$\Rightarrow$' is used to specify a translation rule from LF to $\mathcal{L}_{CI}$

Trace variables:

$e_i \Rightarrow x_i$

---

[58] This has been added to Potts' system which lacks '=' as a logical constant.

Constants:

$ed \Rightarrow ed : e^a$

$john \Rightarrow john : e^a$

$sue \Rightarrow sue : e^a$

$happy \Rightarrow happy' : <e^a, t^a>$

$pass \Rightarrow pass' : <e^a, t^a>$

$student \Rightarrow student' : <e^a, t^a>$

$tall \Rightarrow tall' : <e^a, t^a>$

$damn \Rightarrow \lambda\varphi.damn'(\varphi) : <<e^a, t^a>, t^c>$[59]

Quantified Noun Phrases:

$every^i \quad \Rightarrow \lambda\varphi.\lambda\psi.[every\ x_i: \varphi(x_i)]\psi : <<e^a, t^a>, <t^a, t^a>>$

$some^i \quad \Rightarrow \lambda\varphi.\lambda\psi.[some\ x_i: \varphi(x_i)]\psi : <<e^a, t^a>, <t^a, t^a>>$

$the^i \quad \Rightarrow \lambda\varphi.\lambda\psi.[the_s\ x_i: \varphi(x_i)]\psi : <<e^a, t^a>, <t^a, t^a>>$

$most^i \quad \Rightarrow \lambda\varphi.\lambda\psi.[most\ x_i: \varphi'(x_i)]\psi : <<e^a, t^a>, <t^a, t^a>>$ (where $\varphi \Rightarrow \varphi'$)

Pronouns[60]:

$[he_i]^j \Rightarrow$

$$\lambda\psi.[the_n\ x_j: \varphi^i(x_j)]\psi : <t^a, t^a>$$

•

$$[the_s\ x_j: \varphi^i(x_j)]male'(x_j) : t^c$$

$[she_i]^j \Rightarrow$

$$\lambda\psi.[the_n\ x_j: \varphi^i(x_j)]\psi : <t^a, t^a>$$

•

$$[the_s\ x_j: \varphi^i(x_j)]female'(x_j) : t^c$$

$[they_i]^j \Rightarrow$

$$\lambda\psi.[the_n\ x_j: \varphi^i(x_j)]\psi : <t^a, t^a>$$

•

$$[the_p\ x_j: \varphi^i(x_j)](x_j=x_j) : t^c$$

The value of φ^i in the interpretations of pronouns above is determined as follows:

1) When i is a predicate, P: 'φ^i' is '$\lambda y.(P'(y)$' (where $P \Rightarrow P'$).
2) When i is a numerical subscript:
    a. If the antecedent of the pronoun is a quantified noun phrase that c-commands the pronoun then 'φ^i' is '$\lambda y.(x_i=y)$'.
    b. If the antecedent of the pronoun is a noun phrase, NP, that does not c-command the pronoun and NP occurs in an antecedent clause 'NP ψ', then

---

[59] This is a simplification of Potts' formal treatment of 'damn' (2005, p.222).

[60] It is a simple matter to add syntactic and semantic clauses for 'it', a singular version of 'they'.

'φ^i' is the most "impoverished" definite description directly recoverable from the antecedent clause that denotes everything that is both one of the NPs and that ψs[61]. More specifically:

i. If the pronoun is anaphoric on, but not c-command by, a quantified noun phrase '[D ζ]^i' with a non-maximal quantifier '*D*' occurring in an antecedent clause the translation of which into $\mathcal{L}_{CI}$ is '[*D*′ x_i: ζ′(x_i)]ψ(x_i)' then 'φ^i' is 'λy.(ζ′(y)∧ψ(y))'.

ii If the pronoun is anaphoric on, but not c-command by, a noun phrase '[D ζ]^i' with a maximal quantifier '*D*' occurring in an antecedent clause the translation of which into $\mathcal{L}_{CI}$ is '[*D*′ x_i: ζ′(x_i)]ψ(x_i)' then 'φ^i' is 'λy.(ζ′(y)'.[62]

iii If the pronoun is anaphoric on, but not c-commanded by, a noun phrase 'n' where 'n' is a referring expression, then 'φ^i' is λy.(n′=y). (where n $\Rightarrow$ n')[63]

iv. If the pronoun is anaphoric on, but not c-commanded by, a complex noun phrase of the form 'α_1 and α_2… and α_n' occurring in an antecedent clause the translation of which into L_{CI} is 'Φ^1∧Φ^2∧…∧Φ^n' (where Φ^i is 'ψ(α′$_j$)' when α_j is a referring expression and $\alpha_j \Rightarrow \alpha$′$_j$, and Φ^i is '[*D*′ x_i: ζ′(x_i)]ψ(x_i)' when α_j is a quantified NP), then 'φ^i' is 'λy.(Γ^1(y)∨Γ^2(y)∨…∨Γ^n(y))' where Γ^i is obtained from the rules in clauses (i-iv) applied to α_i with the initial 'λy.' expression removed.[64]

---

[61] This is an adaptation of Neale's (P5) to include antecedent NPs that are not quantificational NPs.

(P5) If *x* is a pronoun that is anaphoric on, but not c-commanded by, a quantifier '[*Dx*: *Fx*]' that occurs in an antecedent clause '[*Dx* : *Fx*](*Gx*)', then *x* is interpreted as the most "impoverished" definite description directly recoverable from the antecedent clause that denotes everything that is both *F* and *G*.

[62] These last two clauses are adapted from Neale's principles (P5$_a$) and (P5$_b$):

(P5$_a$) If *x* is a pronoun that is anaphoric on, but not c-commanded by a non-maximal quantifier '[*Dx*: *Fx*]' that occurs in an antecedent clause '[*Dx*: *Fx*](*Gx*)', then *x* is interpreted as '[the$_n$ *x*: *Fx* & *Gx*]'

(P5$_b$) If *x* is a pronoun that is anaphoric on, but not c-commanded by a maximal quantifier '[*Dx*: *Fx*]' that occurs in an antecedent clause '[*Dx*: *Fx*](*Gx*)', then *x* is interpreted as '[the$_n$ *x*: *Fx*]'. (1990, pp. 182-3).

(Max) A quantifier '[*Dx*: *Fx*]' is maximal if and only if '[*Dx*: *Fx*](*Gx*)' entails '[every *x*: *Fx*](*Gx*)', for arbitrary G.

[63] Since in extensional contexts a non-empty name, *n*, is equivalent to a description, [the$_s$ *x*: *x*=*n*], in the sense that for any ψ, $\psi \equiv$[the$_s$ *x*: *x*=*n*]ψ(*x/n*) (where 'ψ' does not contain '*x*'), names are equivalent to quantified noun phrases with formed with the maximal determiners, 'the$_s$'. The interpretation of 'φ^i' in clause (iii) is equivalent to the interpretation of 'φ^i' for the corresponding description under clause (ii) and so may be seen as a special case.

[64] This recursive clause can handle pronouns anaphoric on complex antecedents such as:

[John, Sue and the students]$_1$ had lunch and [they^1] had tea.

L(*j*)∧L(*s*)∧[the$_p$ x_1 : S(x_1)]L(x_1) ∧ [the$_n$ x_3 : x_3=*j*∨x_3=*s*∨S(x_3)]T(x_3)

As well as cases where the antecedent noun phrase also contains pronouns, such as:

[John and Sue]^1 had breakfast and [they$_1$ and Greg]^2 had lunch and [they$_2$] had tea.

B(*j*)∧B(*s*)∧[the$_n$ x_1 : x_1=*j*∨x_1=*s*]L(x_1)∧L(*g*)∧[the$_n$ x_2 : x_1=*j*∨x_2=*s*∨x_2=*g*]T(x_2)

Pronouns are considered to be maximal quantifiers and are hence covered under clause (ii). Only distributive readings are under consideration here.

Some Examples:

1. 'He$_{john}$ is tall' ($\equiv$'[He$_{john}$]^1[x_1 is tall]'):

$$[\text{the}_n\ x_1: x_1{=}john]\text{tall}'(x_1) : t^a$$

$$\lambda\psi.[\text{the}_n\ x_1: x_1{=}john]\psi : <t^a, t^a>$$

•

$$[\text{the}_s\ x_1: x_1{=}john]\text{male}'(x_1) : t^c$$

$$\text{tall}'(x_1) : t^a$$

$$\text{tall}' : <e^a, t^a> \qquad x_1 : e^a$$

2. 'A student passes and he is happy' ($\equiv$'[A student]^1[e_1 passes] and [he$_1$]^2[e_2 is happy]'):

$$[\exists\ x_1: \text{student}'(x_1)]\text{pass}'(x_1)\wedge[\text{the}_n\ x_2: \text{student}(x_2)\wedge\text{pass}'(x_2)]\text{happy}'(x_2) : t^a$$

$$[\exists\ x_1: \text{student}'(x_1)]\text{pass}'(x_1) : t^a$$

$$\lambda\psi.[\exists\ x_1: \text{student}'(x_1)]\psi \quad <t^a, t^a> \qquad \text{pass}'(x_2) : t^a$$

$$\lambda\varphi(\varphi\wedge[\text{the}_n\ x_2: \text{student}'(x_2)]\text{happy}'(x_2) : <t^a, t^a>$$

$$\lambda\psi.\lambda\varphi.[\exists\ x_2: \varphi(x_1)]\psi \quad <<e^a, t^a>, <t^a, t^a>> \qquad \text{student}' : <e^a, t^a>$$

$$[\text{the}_n\ x_2: \text{student}'(x_2)\wedge\text{pass}'(x_2)]\text{happy}'(x_2) : t^a \qquad \lambda\psi\lambda\varphi(\varphi\wedge\psi) \quad < t^a, <t^a, t^a>>$$

$$\lambda\psi.[\text{the}_n\ x_2: \text{student}'(x_2)\wedge\text{pass}'(x_2)]\psi : <t^a, t^a> \qquad \text{happy}'(x_2) : t^a$$

•

$$[\text{the}_s\ x_2: \text{student}'(x_2)\wedge\text{pass}'(x_2)]\text{male}'(x_2) : t^c$$

References

Bach, K. (1999) 'The Myth of Conventional Implicature', *Linguistics and Philosophy*, 22: 327-366.

Blakemore, D. (1987) *Semantic Constraints on Relevance*, (Oxford: Blackwell).

Boër, S. and Lycan, W. (1976) *The Myth of Semantic Presupposition*, (Bloomington, Ind.: Indiana Linguistics Club).

Corbett, G. (1991) *Gender* (Cambridge: CUP).

Corazza, E. (2002) 'She' and 'He': Politically Correct Pronouns', *Philosophical Studies* 111(2): 173-96.

van Fraassen, B. (1968) 'Presupposition, Implication and Self-Reference, *Journal of Philosophy*, 65: 132-152.

Frege, G. (1879) *Begriffshrift*. English Translation in J. van Heijenoort (ed.) (1967) *From Frege to Gödel* (Cambridge, Mass.: Harvard Univ. Press).

Geurts, B. (1999) *Presuppositions and Pronouns*, (Oxford: Elsevier).

Grice H. P. (1961) 'The Causal Theory of Perception', *Proceedings of the Aristotelian Society*, 35(Supp.): 121-152.

----- (1967) *Logic and Conversation*, William James Lectures, Harvard University. Published in Grice (1989) *Studies in the Way of Words* (Cambridge, Mass.: Harvard Univ. Press), 1-138.

----- (1987) 'Retrospective Epilogue' in H. P. Grice (1989) *Studies in the Way of Words* (Cambridge, Mass.: Harvard Univ. Press), 269-282.

Karttunen, L. (1973) 'Presuppositions of Compound Sentences', *Linguistic Inquiry*, 4: 169-193.

----- and Peters, S. (1979) *Conventional Implicature*, in O. Choon-Kyu and D. Dinneen (eds.) *Syntax and Semantics: Presupposition*, 11: 1-56.

Kaplan, D. (2004) 'The Meaning of Ouch and Oops: Explorations in the theory of *Meaning as Use*', unpublished manuscript.

Kempson, R. (1975) *Presupposition and the Delimitation of Semantics*, (Cambridge: CUP).

Levinson, S. C. (1983) *Pragmatics* (Cambridge: CUP).

Montague, R. (1973) 'The Proper Treatment of Quantification in Ordinary English', in J. Hintikka, J. Matthew, E. Moravcsik and P. Suppes (eds.) *Approaches to Natural Languages* (Dordrecht: D. Reidel), 221-242. Reprinted in R. Montague (1974) *Formal Philosophy: Selected Papers of Richard Montague* (New Haven: Yale Univ. Press), 247-270.

Neale, S. (1990) *Descriptions*, (Cambridge, Mass.: MIT Press).

----- (1999) 'Coloring and Composition', in K. Murasugi and R. Stainton (eds.) *Philosophy and Linguistics*, (Boulder: Westview), 35-82.

Potts, C. (2003a) *The Logic of Conventional Implicatures*, Ph.D. Thesis, UC Santa Cruz.

----- (2003b) 'Expressive Content as Conventional Implicature' In Makoto Kadowaki and Shigeto Kawahara (eds.), *Proceedings of the North East Linguistic Society 33*, (Amherst, Mass.: GLSA), 303-322.

----- (2005) *The Logic of Conventional Implicatures* (Oxford: OUP).

----- (forthcoming) 'Conventional Implicatures, a distinguished class of meanings' to appear in Ramchand, G. and Reiss, C. (eds.) *The Oxford Handbook of Linguistic Interfaces*, Oxford: OUP.

Rieber, S. (1997) 'Conventional Implicatures as Higher Performatives', *Linguistics and Philosophy*, 20: 51-72.

Rundle, B. (1983) 'Conjunctions: Meaning, Truth and Tone', *Mind*, 92: 386-406.

Sadock, J. M. (1978) 'On testing for Conversational Implicature', in P. Cole (ed.) (1978) *Syntax and Semantics: Pragmatics*, 9 (New York: Academic Press), 281-298.

Stalnaker, R. (1973) 'Presuppositions' *Journal of Philosophical Logic*, 2: 447–457.

----- (1974) 'Pragmatic Presuppositions' In M. Munitz and P. Unger (eds.) *Semantics and Philosophy* (New York: NYU Press), 197–213.

Steedman, M. (2000) 'Information Structure and the Syntax-Phonology Interface', *Linguistic Inquiry*, 31: 649-89.

Williamson, T. (2003) 'Understanding and Inference', *Proceedings of the Aristotelian Society: Supplementary* Volume, 77: 249-293.