Proceedings of SALT Volume 20, 1–15, 2010
doi: (no doi yet)

Triggering Verbal Presuppositions*

Márta Abrusán
University of Oxford

Abstract This paper offers a predictive mechanism to derive the presuppositions of verbs. The starting point is the intuition, dating back at least to Stalnaker (1974), that the information conveyed by a sentence that is in some sense independent from its main point is presupposed. The contribution of this paper is to spell out a mechanism for deciding what will become the main point of the sentence and how to calculate independence. It is proposed that this can be calculated by making reference to event times. As a very rough approximation, the main point of an utterance is what (in a sense to be defined) has to be about the event time of the matrix predicate and the information that the sentence conveys but is not (or does not have to be) about the event time of the matrix predicate is presupposed. The notion of *aboutness* used to calculate independence is based on Demolombe & Fariñas del Cerro (2000).

Keywords: Presuppositions, aboutness, lexical semantics, factivity, sortal presuppositions

1 Introduction

Why do verbs give rise to the presuppositions they do? One possibility, which has been the prevailing attitude in the presupposition literature, is that this question might not have an answer, and for a principled reason: the presuppositionality of verbs (and indeed any expression) is simply an arbitrary lexical property. This idea was implicitly captured by the term *conventional implicature* of Karttunen & Peters (1975, 1979), and has been inherited by much of the research on presuppositions. Thus it is usually assumed that while the lexicon specifies e.g. that *know* has to presuppose its complement, there is no similar lexical specification for *believe*.

There are reasons however to be dissatisfied with this answer. First, as it was pointed out by Levinson & Annamalai (1992) and Simons (2001), if presuppositions

* I thank Denis Bonnay, Nathan Klinedinst, Daniel Rothschild and Philippe Schlenker for many conversations on various versions, Emmanuel Chemla, Paul Egré, David Nicholas, Giorgio Magri for comments on a (longer) draft and Benjamin Spector, David Beaver, Mandy Simons, Sigrid Beck, François Recanati, Chris Barker, Laurent Bartholdi, Danny Fox, Eytan Zweig, Nicholas Asher, Ofra Magidor, Anna Szabolcsi, Matthew Towers and the audiences at LoLa10, The Aboutness Workshop in Toulouse, JSM10, University of York, University of Tübingen and SALT20 for very helpful comments and questions at various stages of this research. All remaining errors are my own. This research was supported by the ESF (Euryi grant to P. Schlenker) and The Mellon Foundation.

were simply conventional, they should manifest the property of *detachability*, i.e. it should be easy to find pairs of expressions which share their truth conditions, but differ in their presuppositional behavior. However it seems that words that express a similar meaning trigger a similar presupposition. Thus (1-a) and its synonyms in (1-b) all seem to imply that John indeed used to smoke.

(1) a. Has John stopped smoking?
b. Has John quit/finished/given up/ceased smoking?

Such examples show that there is a generalization to be captured about what type of meaning can give rise to what type of presuppositions. But they are entirely mysterious given a conventional view of presupposition triggering.

Second, as it was argued by Levinson & Annamalai (1992), if presuppositions were purely conventional elements of the non-truth conditional meaning, one would expect there to be translation difficulties and conceptual mismatch when comparing the presuppositional items of different languages. But this is generally not the case. Levinson & Annamalai (1992) offer a detailed comparison of English and Tamil and show that the presupposition triggers in these two unrelated languages are exactly parallel, and also manifest the same presupposition behavior in complex sentences. Such facts argue that presuppositions should follow somehow from the content of presupposition triggers.

Yet how presuppositions could be predicted from the meaning of triggers has been an elusive and rarely addressed question. While the few attempts in the literature to explain presuppositions of at least certain items provided valuable insights(cf. Sperber & Wilson 1979, Simons 2001 Abusch 2002, 2010), they either did not make correct predictions or failed to be sufficiently explanatory. Stalnaker (1974) and Schlenker (2010) laid out a blueprint for a triggering mechanism, but did not provide a theory themselves.

This paper offers a predictive mechanism to derive the presuppositions of verbs. The starting point is the intuition, dating back at least to Stalnaker (1974), that the information conveyed by a sentence that is in some sense independent from its main point is presupposed. The contribution of this paper is to spell out a mechanism for deciding what will become the main point of the sentence and how to calculate independence. It is proposed that this can be calculated by making reference to event times. As a very rough approximation, the main point of an utterance is what (in a sense to be defined) has to be about the event time of the matrix predicate and the information that the sentence conveys but is not (or does not have to be) about the event time of the matrix predicate is presupposed. The notion of *aboutness* used to calculate independence will be that of Demolombe & Fariñas del Cerro (2000).

2 Aboutness

The notion of aboutness that I use in this paper is a straightforward extension in terms of possible worlds of the notion of being about an argument worked out by Demolombe & Fariñas del Cerro (2000) for first order logic. (For reasons of space, I refer the reader to Demolombe & Fariñas del Cerro's (2000) paper for an exposition of their original ideas.) The proposal has two parts: the definition of variants of a possible world with respect to an object and the definition of being about an object.

2.1 Variants

We define variants of possible worlds wrt. to objects. Roughly speaking, two worlds w and w' are c-variants if they only differ by the properties of c. In this case we need to allow that c-variants differ in the truth assignment to atomic sentences where the expression c appears as an argument of the matrix clause. Let M be a model $\langle W, D, R, [\![\ ]\!] \rangle$, where W is a set of possible worlds, D is a domain of individuals, R$\subseteq$ W$\times$ W is an accessibility relation on W and $[\![p^n]\!]^w \subseteq D^n$, for any non-logical atomic predicate p^n.

For the purpose of calculating variants, a sentence such as *a knows that p at t* will be treated as if it had the more simple syntax *K(a)(t)*, where *K* stands for *knows that p*. The language is assumed not to contain the identity predicate. We can then define for every possible world w$\in$ W, variants w' of w as follows:

- $D_{w'}=D_w$
- $[\![x\ ]\!]^{w'}=[\![x\ ]\!]^w$, for each constant or variable symbol x
- if p is a predicate symbol of arity n: if an element $\langle d_1, ..., d_n \rangle$ of D^n is such that for every j in [1,n], $d_j \neq [\![c]\!]$, then $\langle d_1, ..., d_n \rangle \in [\![p]\!]^{w'}$ iff $\langle d_1, ..., d_n \rangle \in [\![p]\!]^w$.

2.2 Aboutness

Given the above notion of variants, we might define aboutness as follows:

(2) Aboutness
A sentence S is about the object denoted by the constant symbol c iff there are two worlds w and w' in W which are c-variants and $[\![S]\!]^w=1$ and $[\![S]\!]^{w'}=0$

Conversely, we can also give a definition of what it means for a sentence to not be about an object c:

(3) *The property of not-being about*
A sentence S is not about the object denoted by the constant symbol c iff for every w, w' in W st. w and w' are c-variants $[\![S]\!]^w = [\![S]\!]^{w'}$.

2.3 Examples

The sentence S=*Fido is tired* is about Fido iff there are two Fido-variants w, w', st. $[\![S]\!]^w$=1 and $[\![S]\!]^{w'}$=0. Notice that the definition in (2) quantifies over all worlds, therefore the entailment φ of S that *Some individual is tired* is also about Fido, because there are two worlds w, w' which differ only in the properties of Fido and $[\![\varphi]\!]^w$=1 and $[\![\varphi]\!]^{w'}$=0, e.g. if Fido is the only tired individual in w. In general, sentences expressing existential quantification are about every individual. Similarly, a sentence expressing universal quantification is also about every individual in the domain. Suppose our sentence was *Every individual is tired*. Now we can find two worlds which differ solely in the properties of Fido, st. one of these makes the sentence true and the other false: world w in which every individual is in the denotation of the predicate *tired*, and another world w' in which every individual except Fido is in this set. Finally, observe that the sentence *Fido is tired or Fido is not tired* (=ψ) is not about Fido according to the definition above: This is because since ψ is a tautology, it is true in every world.

3 The Proposal: Some Core Examples

I follow Stalnaker (1974) in assuming that presuppositions are also part of the entailed meaning. Presuppositions are simply entailments that are in some way distinguished. In this framework a presupposition triggering mechanism can be viewed as a function that takes as its input the bivalent meaning of a sentence S, and outputs one or more entailments of S, those which are also presupposed.

The main intuition behind this paper, similarly to that in Stalnaker (1974), is that entailments of a sentence that are in some sense independent from the main point of the sentence are presupposed. The main point of a sentence is given by those entailments that are by nature about the event time of the matrix predicate. Propositions that describe events that are not (or do not have to be) about the event time of the matrix predicate of S are independent, and hence presupposed.

To calculate this, I will introduce the notion of a canonical temporal representation of a sentence.[1] Canonical temporal representations of sentences (CT(S)) are sentences in which the tense argument positions of predicates are filled by choosing any constant of the appropriate type. Let's call the temporal arguments replaced

1 I thank E. Chemla for suggesting (pc) to try to run the triggering mechanism on a more abstract representation than the sentence itself, to avoid the problems of a previous version of this proposal.

with new constants during the construction of CT(S) representations TS-arguments, and the constants that replace them CTS-arguments. We can now define the CT(S)-equivalent of an entailment p of S as follows:

(4) The CT(S)-equivalent p' of an entailment p of S (abbreviated as $p=_{CTS} p'$) is
   a. p itself, if (the linguistic form of) p does not contain TS-arguments
   b. if p contains TS-arguments, then p' is the proposition that p can be turned into by replacing its TS-arguments with the corresponding CTS-arguments.

The triggering mechanism predicts an entailment p of S to be presupposed if it has a CT(S)-equivalent proposition p' that is not about the event time of the matrix predicate of CT(S).

(5) *The triggering mechanism for verbal presuppositions*
An entailment p of S is presupposed if S has a CT(S) representation such that the CT(S)-equivalent of p is not about the event time of the matrix predicate of CT(S).

3.1 Background Assumptions

I assume that event times denote salient intervals whose value is assigned by the context. As such, they are rather like pronouns (cf. Partee 1973). For convenience the tense argument is represented in the syntax as well. I use a type-theoretical system which in addition to the basic types e and t contains a type i whose domain is the set of time intervals. In this system predicates have an extra argument slot for time, thus what are usually assumed to be one place predicates such as intransitive verbs are going to be two place predicates, taking an individual and a time argument:

(6) $[\![\text{is tired}]\!]^{w,g}=\lambda t_i.\lambda x_e.$ x is tired at t in w

Tense morphemes are time variables that saturate the time argument slot of predicates. The denotation of this variable is given by the assignment function g supplied by the context, which assigns it an element from the domain of time intervals. E.g. the sentence *John is tired at* t_2 is true iff John is tired at the time assigned to t_2 by g. That is, whatever the value of t_2, it denotes the time of John being tired.

From the syntactic representation of sentences we can now create canonical temporal representations of sentences (CT(S)). These are sentences in which the tense argument positions of predicates are filled by choosing any constant of the appropriate type. The identity of the constants chosen for canonical representations is not relevant, except that the time they refer to should exist in the model. Thus in

canonical representations of sentences temporal binding or co-temporal relations do not have to be preserved.[2] Cf. some examples of CT(S) representations below:

(7) a. John sees Bill (at time t_1)
CT(S): *sees (John,Bill,t)*
b. John believes (at time t_1) that he is tired (at time t_1)
CT(S): *believes(John, tired(John,t'),t)*
c. John hopes (at time t_1) to be promoted (at time t_1)
CT(S): *hopes(John, promoted(John,t'),t)*
d. John stopped smoking (at time t_1)
CT(S): *stopped (John, smoking, t)*

Notice that sentences with infinitival complements such as (7-c) are treated the same way as sentences with tensed propositional complements. I will call the temporal arguments replaced with new constants during the construction of CT(S) representations TS-arguments, and the constants that replace them CTS-arguments. The former are represented using subscripts, and the latter by primes.

3.2 Factive Presuppositions

This section spells out how factive presuppositions can be derived. The example I look at in detail is the verb *know*, but it will be shown that the same analysis carries over to the whole class of factive verbs. Some other members of this class in English include *realize, discover, notice, recognize, find out, remember, forget, be aware that, admit* and a subclass of sensory factives *sense, see, smell, hear, detect, observe*. A major subclass of factive verbs is the class of emotives, factive verbs used primarily to convey the subject's emotional attitude towards information. This class includes predicates such as *regret, be annoyed, be upset, be glad, be happy.*[3]

Suppose that our sentence S is the following example:

(8) a. S: John knows (at time t_1) that Mary is tired (at time t_1)
b. CT(S): know (John, t, tired (Mary, t'))

Let K be the set of all the propositions that (8-a) entails ($\cap$K=S).

2 An exception is the case of (restrictive) relative clauses, where the CTS representation will have to use the same variable in the relative clause and the matrix clause. This is not unnatural considering that temporal dependencies in clausal complements and relative clauses are generally different. A well known example is the sequence of tense phenomenon, which shows wildly different properties in embedded relative clauses and clausal complements.

3 I assume thus that emotive factive verbs such as *regret* are just like cognitive factives in presupposing the truth of their complement, in accordance with Kiparsky & Kiparsky (1970), Karttunen (1971), Gazdar (1979) and in contrast with Klein (1975), Egré (2008), Schlenker (2003).

Assume that the proposition expressed by S in (8) corresponds to some set of worlds W_S. Then for any set of worlds W_1 st. $W_S \subset W_1$, K contains the proposition that corresponds to W_1. Any such entailment of S can be expressed in the form of a disjunction of S and some proposition Q. This set is normally infinite, but some illustrative examples are shown below.

(9) Some entailments in K:

a. (know (John, t_1, tired (Mary, t_1))) or (lazy (Bill, t_2))
b. (know (John, t_1, tired (Mary, t_1))) or (tired (Mary, t_1))
c. (know (John, t_1, tired (Mary, t_1))) or (know (Bill, t_1, tired (Mary, t_1))) or (know (Fred, t_1, tired (Mary, t_1))) or (know (Jane, t_1, tired (Mary, t_1))) or ... (for every individual in D)

Among the set of all the disjunctions some are special. One special case is (9-b), where Q corresponds to what might be called a lexical entailment of S. Lexical entailments of a sentence are intuitively available to speakers based on the meaning of the sentence.[4] In this case the disjunction is equivalent to the lexical entailment that it contains. The second special case is illustrated by (8-c), where the disjunction is equivalent to an existential statement (assuming that the domain is finite), in this case that someone knows at t_1 that Mary is tired.

Which, if any, disjunctions in K are such that their CT(S)-equivalent is not about the event time of the CT(S)? To answer this, it is useful to first look at a more general question: assuming that S is about c, when is a disjunction S $\vee$ Q not about c? As shown in the Appendix, a disjunction S $\vee$ Q, where S is about c, is not about c only in (a) a subset of the cases when Q contains a lexical entailment of S that is not about c or (b) if S $\vee$ Q is a tautology. The intersection of all the entailments that are not about c is equivalent to the intersection of the lexical entailments of S that are not about c. This means that it is not necessary to look at all the entailments of S to find presuppositions. It is enough to look at the lexical entailments, and check which among these are not about c. In other words, closing the lexical entailments of S under logical entailment does not bring in any new presuppositions in addition to the ones we can derive from the lexical entailments alone.

Let's return to example (8-a). Lexical entailments are not given in a formal way: they are only available to speakers to by inspecting their intuitions about the lexical meaning of predicates. Below is a list of some intuitively plausible lexical entailments of (8-a).

4 The lexical meaning of words in the sentence, the sentence itself and thus also its lexical entailments presumably also contain information that comes from world knowledge of the speakers. (cf. e.g. Asher 2010) I return to this issue in Section 3.4 of this paper.

(10) Some lexical entailments of *John knows at t_1 that Mary is tired at t_1*

a. φ=John knows at t_1 that Mary is tired at t_1
b. ψ=John believes at t_1 that Mary is tired at t_1
c. χ=Mary is tired at t_1
d. ξ=John's belief is justified at t_1

NB: It is *not* claimed here that a sentence such as (8-a) can be 'factorized' into its constituent lexical entailments, nor is it assumed that there is a solution to the equation *John knows that p= John believes that* $p \wedge p \wedge X$. (cf. e.g. Williamson 2002, Yablo 2008 etc. on the dangers of such an assumption.) The only claim made is that speakers have intuitive access to plausible lexical entailments. The above list merely provides examples of such entailments and is not meant to be an exhaustive definition of the meaning of S.

Which of the above lexical entailments, if any, are predicted to be presupposed? Here is the idea. Let's take a CT(S) representation of (11) (given in (11-a)) such that t_1, t and t' all refer to non-overlapping intervals. Given the lexical semantics of *know*, its complement, which denotes the proposition that it is raining, is entailed. Since the CT(S) equivalent of this entailment is not about the matrix event time t of CT(S), it is predicted to be presupposed.

(11) S: John knows (at t_1) [that Mary is tired (at time t_1.)]

a. CT(S): knows (John, tired(Mary, t'), t)
b. S$\models$tired (Mary, t_1)
c. tired(Mary, t_1)=$_{CTS}$ tired(Mary, t')
d. tired(Mary, t') is not about t (by (2))
e. therefore, S presupposes that Mary is tired at t_1.

Compare this with the entailment of S that John believes that it is raining. This proposition is not predicted to be presupposed, because its corresponding CT(S)-entailment is necessarily about the matrix event time of its CT(S):

(12) S: John knows (at t_1) [that Mary is tired (at time t_1.)]

a. CT(S): knows (John, tired(Mary, t'), t)
b. S $\models$believes (John, t_1, Mary is tired (at t_1)).
c. believes (John, t_1, tired (Mary, t_1)) =$_{CTS}$ believes (John, t, tired(Mary,t'))
d. believes (John, t, tired(Mary, t')) is about the event time t
e. therefore S does not presuppose that John believes that Mary is tired at t_1

It seems that no other entailment in (10) is such that its CTS-equivalent would not be about t. But if we found other lexical entailments whose CTS-equivalents would not

be about the event time of some CT(S), these entailments would also be predicted to be presupposed. (Cf. Section 3.4)

Notice that existential entailments that we get by replacing the matrix tense argument in the original sentence by an existentially bound tense variable are predicted to be about the matrix tense of the CT(S). This is because existentially quantified sentences are about every individual in the domain (cf. Section 2.3). Thus for any CT(S), the CTS-equivalent of the existential entailment is be about the matrix CTS-argument as well. Therefore this entailment is not predicted to be presupposed.[5] Existential entailments (besides disjunctive entailments), are the main reason why Demolombe & Fariñas del Cerro's (2000) system of aboutness is used in this paper.

3.3 Change of State Verbs

The section looks at regular change of state verbs such as *stop*. As in the previous discussion, the reasoning presented in connection with these predicates will carry over to the whole class of change of state predicates.[6]

As it was argued above, to predict which entailments of the sentence will be presupposed we only need to consider the set of lexical entailments. Consider (13), in which t_1 denotes the event time of the predicate, in this case the time of the stopping. Let's assume that the lexical entailments of (13) are φ, ψ and χ:

(13) John stopped smoking at t_1

a. φ= John does not smoke at t_1
b. ψ=John smoked at t_2 (where t_2 is some contextually given interval before t_1)
c. χ=John stopped smoking at t_1

The event time of S is denoted by t_1. Its denotation is given by the contextually supplied assignment function g, which assigns it an element from the domain of time intervals. In this example, the event time denotes the interval that starts just before the onset of non-smoking, and goes on for a certain, potentially very short time. In some other cases, it might be reasonable to assume that the event time also includes a longer segment of the stage where the previous activity is still going on. This second option might be more intuitive with gradual transitions, e.g. *stop the car*. However, even in this second case the sentence also entails that the previous state held before the event time. Notice that this contrasts with the inference that

5 In the case of sentences such as *John knows that sometimes he is tired.* it has to be assumed that the the CT(S) construction mechanism replaces the temporal adverb itself.

6 Cognitive change of state verbs such as *discover* work on the one hand as regular change of state verbs (presupposing the truth of a previous state), and on the other hand as factive verbs (having a factive presupposition).

the final state continues to hold, which is not an entailment. This is shown by the difference in the acceptability of the examples in (14) below.

(14) a. #John stopped smoking, but he has never smoked before.
b. John stopped smoking, but then he started again.

In the case of factive verbs it was the canonical temporal representation of the sentence that allowed the event time of the embedded clause to be different from that of the matrix event time, and thus presupposed. In the case of change of state verbs some entailments are lexically specified to be true at some time other than the event time. This is what happens in (13), where the the lexical entailment that John used to smoke at some time preceding the event time comes from the lexical semantics of the change of state verb. As the CT(S) equivalent of this entailment is itself, and thus not necessarily about the event time of CT(S), it is presupposed.

(15) a. S: John stopped smoking (at t_1).
b. CT(S): stopped (John, smoke, t)
c. S $\models$smoke(j, t_2), where t_2 refers to some time interval preceding t_1
d. smoke(j, t_2)=$_{CTS}$ smoke(j, t_2) (because t_2 is not a TS-argument)
e. smoke(j, t_2) is not about t (at least for some CT(S))
f. therefore, S presupposes that John used to smoke

The rest of the lexical entailments in (13) are all about t_1, and thus their CTS-equivalent will be about t. Given the reasoning in the Appendix which shows that closure of lexical entailments under logical consequence does not introduce any new presuppositions, no other entailments of (13) are predicted to be presupposed.

One might wonder about the entailment that *John smoked at some time t_2 before t_1*. This proposition is technically about the arguments, according to the definition of aboutness. Doesn't it express an equivalent proposition to (13-b)? Since possible worlds are defined by the combinatorial possibilities in the language, they in fact do not express logically equivalent propositions. The two might be contextually equivalent, there is nothing however in the present system that would prohibit some proposition entailed by a sentence S to be a presupposition, while a contextually equivalent proposition is not.

3.4 Sortal Presuppositions: Adding Common Knowledge

The triggering mechanism proposed in the previous sections was viewed as a function that takes as its input the bivalent meaning of a sentence S, and outputs one or more entailments of S. This section looks at cases that might neccesitate casting a wider net. In certain cases at least, the input to the triggering mechanism is not only the set

of entailments of the literal meaning of a sentence S, but the set of entailments of S given general common knowledge.

Suppose we added the entailment (16-b), as seems reasonable, to the set of lexical entailments of (16-a):

(16) a. John knows that Mary is tired at t_1
b. John is sentient at t_1

According to our rules, the CTS equivalent of (16-b) is about the matrix event time of the CT(S) representation of (16-a). Thus (16-b) is not predicted to be a presupposition.

However it was argued in the literature (cf. Simons 2001, e.g.) that the proposition that John is sentient is in fact a presupposition of sentences such as (16-a). Indeed it seems that selectional restrictions in general should be treated as presuppositions (cf. McCawley 1968, Magidor 2007 and Asher 2010 for recent discussions). Further, as most if not all sortal presuppositions are about the event time of the matrix predicate, it looks as if our system is unable to generate sortal presuppositions.

We might ask however whether (16-b) itself corresponds to the sortal presupposition of S. It seems more likely that the true sortal presupposition of S is not the episodic statement in (16-b), but rather the characterizing statement in (17).

(17) John is sentient (in general)

Is (17) itself a lexical entailment of (16-a)? It is hard to tell, but we might safely assume that at least it is an entailment of (16-b) *given common knowledge* (cf. Magri 2009). I.e. given world knowledge, speakers can be expected to assume that if John is sentient at a certain time t, then he is sentient in general. Given this it is also safe to say that (17) is an entailment of (16-a) *given common knowledge*. The present proposal *does* predict (17), the contextual entailment of (16-a) to be a presupposition. This is because characterizing statements such as the above are typically assumed (cf. Chierchia 1995) to contain an instance of the generic operator **Gen**:

(18) **Gen** s [C(j,s)] [sentient (j,s)]

The variable C in the restriction of **Gen** expresses the property of being at an arbitrary location. Thus (18) expresses that whenever John might be located in some situation s, he is a sentient being in s. For our present purposes, I will simplify the above by saying that the Davidsonian argument simply ranges over times t. Generic statements cannot be simply equated with universal quantification because they allow exceptions. Thus (19), but not (20) is contradicted by the existence of some after-dinner time at which John does not smoke.

(19) John smokes after dinner
Gen t [after-dinner(t)∧ C(j,t)] [smokes (j,t)]

(20) John always smokes after dinner
∀t [after-dinner(t)∧ C(j,t)] [smokes (j,t)]

Recall from Section 2.3 that according to our definitions universal statements are about every individual. By the same reasoning the universal statement in (20) above is about every individual in the domain. However, as it was argued above, generic statements are not equivalent to universal statements about times t in a given domain. The CTS equivalent of the contextually entailed generic statement is itself. But we cannot conclude that a generic statement such as (17) is about the event time of the CT(S). So while the CTS equivalent of the entailment (21-a) is about the event time of the CT(S) of (16-a), and is therefore not presupposed, the contextually entailed generic statement in (21-b) cannot be proved to be about the matrix event time of the CT(S) of (16-a), and is therefore presupposed.

(21) a. John is sentient at t_1
b. John is sentient (in general)

Sortal presuppositions of a sentence S can then be predicted by the present system as presuppositions that arise from the set of entailments of S given by common knowledge.[7]

4 Discussion

4.1 Predictions

In general the theory makes the prediction that verbs that entail the truth of their propositional complement will also presuppose the truth of this complement. This is because there will always be a CT(S) representation such that the CTS-equivalent corresponding to the proposition denoted by the complement is not about the event time of the CT(S). This property predicts not only the presuppositions of traditional factive verbs, but also the presuppositions of examples such as (22), where the truth of the embedded infinitival complement, namely that Mary run, is presupposed.

(22) John forced Mary to run

The difference then between a factive verb such as *know* and a non-factive one such as *believe*, or verbs such as *force* as opposed to *want* reduces to the fact that the latter

7 Similar considerations might apply to the presuppositions of verbs such as *manage*, whose presupposition might be argued to express a dispositional statement as well: *John managed to solve the exercise* presupposes that the exercise is hard for John (in general).

do not entail that their complement is true, i.e. their veridicality.

Further, the system makes the prediction that any entailment that does not contain a matrix TS-argument and whose tense argument is not quantified over is presupposed. Conversely, entailments of a sentence S whose temporal argument is the TS-argument corresponding to the matrix CTS argument of the CTS representation are not predicted to be presupposed. Therefore presuppositions of change of state verbs are predicted to be about some time other than the event time of a change of state verb. As far as I know this prediction is borne out.[8] Further, it is also predicted that entailments of change of state verbs that are not about the event time cannot be not presupposed. Recall that the inference we might get from *stop* that the final state continues to hold is not itself an entailment, as it was shown in (14). But thus does not mean that propositions about events that are true in the future of the matrix tense can not be presupposed: (22) was exactly such a case.

Looking beyond the scope of change of state verbs, it is generally predicted that entailments of atomic sentences that are not about the event time will be presupposed. This prediction seems to be borne out too. An example might be the sentence with the simple transitive predicate *kill* such as (23). Some plausible lexical entailments might be φ, ψ and ξ as shown below.

(23) John killed Bill

a. φ=John killed Bill at t_1
b. ψ=Bill is dead at t_1
c. χ=Bill was alive at t_2 (where t_2 refers to some time before t_1)

Among the above, χ is not about t_1. This means that for any CT(S), χ's CTS-equivalent will be itself and therefore it will be possible to find CT(S) representations such that χ is not about their event time. Notice again the contrast between the entailment of (23) that Bill was alive at t_2 and the inference that Bill continued to be

8 Mandy Simons (pc) has asked what happens in the case of examples such as *John is winning the race (at time t_1)*, which she claims presupposes that John is participating in the race (at time t_1). This cannot be predicted by the present system since the latter proposition is about the event time. I believe that what is going on here is that the sentence in fact presupposes that John participated before the onset of the winning, (i.e. he entered the race) but this presupposition further gives rise to a pragmatic inference that he continued to participate while he was winning as well. This pragmatic inference arises from a contextually warranted inertia assumption, namely the belief that if nothing intervenes states and processes continue. I believe that this claim is backed by the observation that there is a difference in the status of the two inferences:

(i) A: Look, John is winning the race now!
B: Hey wait a minute! I did not know he entered the race.
B': ? Hey wait a minute! I did not know he was supposed to be participating now.

dead after the event time of the killing. While the first is indeed a lexical entailment, the second is only a pragmatic inference that follows from our world knowledge.

The present theory predicts presuppositions based on the meaning of atomic sentences and predicates. But it is a separate question of why predicates happen to entail what they entail, for example why *know* but not *believe* happens to be veridical. Answering this second question would mean giving a general theory of concept formation. This daunting question is beyond what a presupposition triggering theory could aspire to do.

4.2 Symmetric Pairs?

This paper also predicts that atomic sentences that have the same meaning should trigger the same presuppositions, which seems largely correct. Some examples in the literature might seem though to challenge this prediction. Fillmore (1971) argued that there was a near-symmetry between the predicates *accuse-criticize*, in that 'a accused b of p' presupposed that a judged the action denoted by p bad, and asserted that b did p, 'a criticized b for p' presupposed that b did p and asserted that a indicated that p was bad. As it was pointed by e.g. by Sperber & Wilson (1979), this near-symmetry is imprecise. Another such pair was put forth by Abusch (2002, 2010). She has argued that the pairs *be right-be aware* are symmetric in the following way: A sentence such as *John is right that dinner is ready* asserts the truth of its complement and presupposes that John believes that dinner is ready, while the sentence *John is aware that dinner is ready* asserts that John believes that dinner is ready and presupposes its complement. As pointed out in Schlenker (2008, 2010) however, it seems that syntactically the two do not behave alike, and that the sentence *John is right that dinner is ready* is syntactically more complex, akin to *John is right in claiming that dinner is ready*. If these arguments are on the right track, to date no really convincing cases of symmetric pairs have been found.

4.3 Context Sensitivity?

The triggering mechanism proposed in this paper takes general common knowledge into account, as argued in Section 3.4, but otherwise it is not sensitive to the context in which the sentence appears. This is in contrast with Stalnaker (1974), Simons (2001) who assume that the triggering mechanism is a pragmatic mechanism operating on complex sentences, and also with Schlenker (2010) who argues that the triggering mechanism should be sensitive to both the linguistic and extralinguistic context in which the expression triggering the presupposition appears.

Schlenker (2010, 2008) argues that there are expressions, which he terms 'part-time triggers', that trigger a presupposition only when they appear in certain contexts.

Such cases, he argues, support a triggering theory that predicts presuppositions not only based on the meaning of the expressions involved, but based on the literal meaning of the expressions together with the linguistic and extra-linguistic context in which these expressions appear.

An example of a 'part-time trigger' is the verb *announce*. In some contexts, it does not entail the truth of its complement and in these contexts it does not presuppose the truth of its complement either. In other contexts, it entails and presupposes the truth of its complement:

(24) Mary has announced that she is pregnant

a. *Mary is 30 years old and she is expected to be reliable.*
(The context entails the truth of the embedded proposition.)
→ (24) presupposes that Mary is pregnant

b. *Mary is 7 years old and is not expected to be reliable.*
(The context does not entail the truth of the embedded proposition.)
→ (24) does not presuppose that Mary is pregnant

As Schlenker points out, the verb *announce* contrasts minimally with the verb *inform*, which seems to lexically entail and presuppose the truth of its complement in the above context. Further complications arise from examining cases, discussed in Schlenker (2006), which show that *inform* itself is a part time trigger. In contexts in which the subject is not only assumed to be reliable, but extra-reliable, the factive inference of both *announce* and *inform* disappears. Look at the context below:

(25) *George is the family butler. He is very reliable. If he says p, then we can infer that p is the case, and if he does not say p, we can infer that p is not the case.* Has George announced/informed the guests that dinner is ready?
→ there is no implication that dinner is ready.

While the triggering mechanism in this paper could be made compatible with the facts in (24) (by including contextual entailments among candidate entailments for presuppositions), it could not cover all the facts in (24) and (25). This is because even if we extended the mechanism to apply to contextually given entailments, it could not be sensitive to the presence of an additional contextual entailment to *block* the presupposition from arising. Notice that Schlenker's (2010) formulation of the desiderata for a triggering theory is compatible with all the above facts.

The present paper can thus be seen as part of the following picture. There is a lexical/semantic process of presupposition triggering, which is sensitive to world knowledge but otherwise insensitive to contextual effects. Further effects of presupposition-like phenomena such as the cases of part-time triggers described above must then result from a separate pragmatic mechanism that triggers presupposition-like infer-

ences based on contextual factors. The workings of this second, yet to be discovered, mechanism are plausibly very different from the triggering mechanism offered here, for example because this mechanism will have to yield non-monotonic inferences, as shown above.

APPENDIX: Disjunctions

Assuming that S is a sentence about c, when is a disjunction S $\vee$ Q not about an object c? Disjunctions S $\vee$ Q will only not be about c in a subset of the cases where Q contains a lexical entailment of S that is not about c or S $\vee$ Q is a tautology.

a. If one of the disjuncts (or a subformula of the disjunction) expresses a tautology, then the whole disjunction is not about c. *proof*: The disjunction S $\vee$ Q is about c if there are two c-variants w and w' st. S $\vee$ Q is true in one but not the other. However tautologies are true in every world.

b. Suppose now that the disjunction S $\vee$ Q is not a tautology.

i. If no disjunct in Q is entailed by S, then the disjunction is about c. *proof*: A disjunction is true in a world w if at least one of its disjuncts is true in w, and false if no disjuncts are true in w. Therefore the disjunction S $\vee$ Q will be about c if it is possible to find two c-variants st. one of them makes all the disjuncts S $\vee$ Q false, while the other makes at least one disjunct true. Since Q does not contain a disjunct that is entailed by S, and S is about c, it is possible to find two c-variants w,w', st. $[\![Q]\!]^{w}=[\![Q]\!]^{w'}=0$ and $[\![S]\!]^{w}=1$ and $[\![S]\!]^{w'}=0$. Thus S $\vee$ Q will be true in w and false in w', and therefore S $\vee$ Q is about c.

ii. Let ψ be an element of a disjunction in Q. If ψ is entailed by S and is about c, then the disjunction S $\vee$ Q is about c. *proof*: Suppose S $\vee$ Q was not about c. Then for all c-variants w,w', $[\![S \vee Q]\!]^{w}=[\![S \vee Q]\!]^{w'}$. Since ψ is about c, it is possible to find two worlds w, w' which are c-variants st. $[\![\psi]\!]^{w}= 1$ and $[\![\psi]\!]^{w'}=0$. Now to show that S $\vee$ Q is about c, we only need to show that every disjunct in S $\vee$ Q other than ψ can be false in w'. Since ψ is entailed by S, $[\![S]\!]^{w'}=0$. Since any other disjunct φ in Q is by assumption independent from S, it is possible to find a w' st. for all φ in Q, $[\![\varphi]\!]^{w'}=0$.

iii. If Q contains a disjunct ψ that is entailed by S and ψ is not about c then the whole disjunct is not about c, unless Q also contains a disjunct that is about c and does not entail ψ. *proof:* Suppose there are two worlds w, w' which are c-variants and $[\![S \vee Q]\!]^{w}=1$ $[\![S \vee Q]\!]^{w'}=0$, and thus S$\vee$ Q

is about c. This means that every disjunct is false in w', and there is at least one disjunct in S$\vee$ Q that is true in w. Since ψ is not about c, it will have to be either true in both w and w', or false in w and w'. Suppose first $[\![\psi]\!]^w$=$[\![\psi]\!]^{w'}$=0. Since ψ is entailed by S, $[\![S]\!]^w$=$[\![S]\!]^{w'}$=0. Therefore $[\![S \vee \psi]\!]^w$=$[\![S \vee \psi]\!]^{w'}$=0. If Q does not contain any other disjunct that is about c, then it is not possible that $[\![S \vee Q]\!]^w$=1 and $[\![S \vee Q]\!]^{w'}$=0 and we derive a contradiction. If Q also contains a disjunct φ that is about c and does not entail ψ then it is possible that $[\![S \vee Q]\!]^w$=1 and $[\![S \vee Q]\!]^w$=0. Suppose now $[\![\psi]\!]^w$=$[\![\psi]\!]^{w'}$=1. Then automatically, $[\![S \vee Q]\!]^w$=$[\![S \vee Q]\!]^{w'}$=1, and so again we have a contradiction.

References

Abusch, Dorit. 2002. Lexical alternatives as a source of pragmatic presuppositions. In Brendan Jackson (ed.), *Proceedings of SALT XII*, Ithaca, NY: CLC Publications.

Abusch, Dorit. 2010. Presupposition triggering from alternatives. *Journal of Semantics* 27(1). 37–80.

Asher, Nicholas. 2010. *Lexical Meaning in Context: A Web of Words*. Cambridge University Press.

Chierchia, Gennaro. 1995. Individual level predicates as inherent generics. In Manfred Krifka, F.J. Pelletier, G. Carlson, Alice ter Meulen, Gennaro Chierchia & Godehard Link (eds.), *The Generic Book*, Chicago: The University of Chicago Press.

Demolombe, Robert & Luis Fariñas del Cerro. 2000. Towards a logical characterization of sentences of the kind "sentence p is about object c". In S Holdobler (ed.), *Intellectics and computational logic: papers in honor of Wolfgang Bibel*, Kluwer Academic Press.

Egré, Paul. 2008. Question-Embedding and Factivity. In F Lihoreau (ed.), *Grazer philosophische studien 77*, 85–125.

Fillmore, Charles. 1971. Types of lexical information. In Danny Steinberg & Leon Jakobovits (eds.), *Semantics. an interdisciplinary reader in philosophy, linguistics and psychology*, 370–392. Cambridge: Cambridge University Press.

Gazdar, Gerald. 1979. *Pragmatics: Implicature, Presupposition and Logical Form*. Academic Press, New York.

Karttunen, Lauri. 1971. Some Observations on Factivity. *Papers in Linguistics* 5. 55–69.

Karttunen, Lauri & Stanley Peters. 1975. Conventional implicature in Montague Grammar. In *Bls 1: Proceedings of the first annual meeting of the Berkeley Linguistic Society*, 266–278. Berkeley, CA.

Karttunen, Lauri & Stanley Peters. 1979. Conventional implicature. In Choon-Kyu

Oh & David A. Dinneen (eds.), *Syntax and Semantics*, vol. 11: Presupposition, 1–56. New York: Academic Press.

Kiparsky, Paul & C. Kiparsky. 1970. Fact. In Manfred Bierwisch & Karl Heidolph (eds.), *Progress in linguistics*, 143–173. The Hague:Mouton.

Klein, Ewan. 1975. Two sorts of factive predicate. Pragmatics Microfiche it 1.1. Frames B5–C14.

Levinson, Stephen C. & E. Annamalai. 1992. Why presuppositions aren't conventional. In R. N. Srivastava (ed.), *Language and text: Studies in honour of Ashok R. Kelkar*, 227–242. Delhi: Kalinga Publications.

Magidor, Ofra. 2007. *Category Mistakes*. D. Phil dissertation, University of Oxford.

Magri, Giorgio. 2009. A theory of individual-level predicates based on blind mandatory scalar implicatures. *Natural Language Semantics* 17(3). 245–297.

McCawley, James D. 1968. Concerning the base component of a transformational grammar. *Foundations of Language* 4. 243–269.

Partee, Barbara H. 1973. Some structural analogies between tenses and pronouns in English. *The Journal of Philosophy* 70(18). 601–609.

Schlenker, Philippe. 2003. The Lazy Frenchman's approach to the Subjunctive. *Proceedings of Romance Languages and Linguistic Theory* 269–309.

Schlenker, Philippe. 2006. Presupposed Entailments: The Triggering Problem Revisited. Talk presented at Sinn und Bedeutung 11.

Schlenker, Philippe. 2008. *Be Articulate*: A Pragmatic Theory of Presupposition Projection. *Theoretical Linguistics* 34(3). 157–212.

Schlenker, Philippe. 2010. Local Contexts and Local Meanings. *Philosophical Studies* .

Simons, Mandy. 2001. On the conversational basis of some presuppositions. *Semantics and Linguistic Theory, 11* .

Sperber, Dan & Deirdre Wilson. 1979. Ordered entailments: An alternative to presuppositional theories. *Syntax and Semantics XI: Presupposition* 299–323.

Stalnaker, Robert C. 1974. Pragmatic presuppositions. *Semantics and Philosophy* 197–214.

Williamson, Tim. 2002. *Knowledge and its Limits*. Oxford University Press, USA.

Yablo, Steve. 2008. Semantic Arithmetic. Available at `http://www.mit.edu/~yablo/semanticarithmetic.pdf`.

Márta Abrusán
Somerville College
Woodstock Road
OX2 2HD, UK
abrusan@alum.mit.edu