The Accommodation Potential of Implicative Verbs

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Paper presented at the Amsterdam Colloquium 2011

Abstract. We present an analysis of *implicative verbs*,[1] complement-taking verbs which induce entailment-like inferences, but which are also claimed to trigger presuppositions. What is presupposed, however, is much more variable than with e.g. factive verbs. Sketching a formal treatment in Logical Description Grammar we consider the role of pragmatic reasoning and accommodation in deriving these presuppositions.

Keywords: Implicative verbs, presupposition, accommodation, LDG

1 Introduction

Since Karttunen's work on *implicatives* in English [K71a] [K71b], verbs such as 'to manage to', 'to forget to', 'to happen to', or 'to force to', etc., have become known for their characteristic inference pattern. On the one hand, they are claimed to *entail or implicate* the truth or falsity of their complement sentence, depending on the polarity of the embedding construction. For instance, we have

(1) a. Jim managed to button his coat.
→ Jim buttoned his coat.
b. Jim did not manage to button his coat.
Jim did not happen to manage to button his coat.
→ Jim did not button his coat.

Various subclasses can be distinguished. Following [NCK06], 'to manage to' might be called a *two-way* implicative, because it triggers an entailment both in its unnegated and its negated form; moreover, it may be called *affirmative* because it implies the truth of the complement sentence in its bare, unnegated form.

On the other, implicative verbs are often claimed to evoke *presuppositions*. Verbs of success or failure are taken to presuppose that there is or was an attempt on the subject's part to achieve the state or event described by the complement sentence. In addition, 'to manage to' is often said to presuppose that there is some difficulty to be overcome in order to achieve the complement state or event. Thus, both (1a) and (1b) would presuppose[2], variously,

[1] This research was supported by a grant from the Netherlands Organisation for Scientific Research (NWO), which is gratefully acknowledged.

[2] Some papers, notably [KP79], classify these inferences as conventional implicatures.

(2) $\rightsquigarrow$ Jim made an attempt to button his coat.
$\rightsquigarrow$ It was difficult for Jim to button his coat.

Verbs of forgetting or remembering are often taken to presuppose that there is or was an obligation on the subject's part to achieve the state or event described by the complement sentence. More tentatively, it is suggested that these verbs evoke the supposition that the subject intends to achieve the complement state or event, or that, less specifically, he is expected to do so, or ought to do so.

Moreover, most implicatives evoke what may be called characteristic causal or explanatory presuppositions: reasons why the state or event denoted by the complement sentence is or is not achieved in the case at hand. This comes out perhaps most clearly in cases such as (3) where the implicative is negated,

(3) Ed didn't manage / remember / bother / dare / happen to open the door.

all of which imply that Ed did not open the door but presuppose a different *reason* for this fact. Ed did not make a sufficient effort or was not sufficiently skilled to open the door, he did not keep in mind his plan or obligation to close it, he did not care enough or did not take the trouble, he did not have sufficient courage, or somehow the right circumstances did not apply.

While most of the early descriptive literature [K71a] [Giv73] and some more recent papers [Luz99] [NCK06] concentrate on the entailments or implications of sentences with implicative verbs, the focus of this paper is on their presuppositional side. In particular, we are concerned with the *variability* of the presuppositions — if indeed that is what they are. We will investigate how these inferences may come about, and consider what that means for the interaction between general pragmatic reasoning and the satisfaction of lexical presuppositional conditions in a dynamic semantic perspective on sentence meaning.

Existing treatments of implicatives within the dynamic semantic paradigm, e.g. [Bea01], tend to treat them exclusively as presupposition triggers and often only provide an analysis of the bench-mark case 'to manage to'. We aim to improve on this in the following way. Firstly, if we want to account for the presuppositions of implicatives, we cannot pass by their implications or entailments. Only on the basis of their full inferential signature may the core semantic content of implicative sentences be teased apart from any requirements on context they induce. What is presupposed then follows from the interaction with general pragmatic reasoning. Secondly, it is fruitful to look at implicatives other than 'to manage to', which happens to be one that induces virtually uncancellable implications both in its bare and negated form. Not all implicative verbs are like that, and we will zoom in on a slightly weaker instance, namely 'to remember to'.

Finally, the status of the inferences under discussion as presuppositions can be called into question. While some of them can be viewed as scalar and conversational implicatures, we propose that most of them are 'pragmatic presuppositions' (Stalnaker), or 'secondary inferences' that result from the need to satisfy and explain a basic appropriateness condition of the implicative verb. They constitute accommodated material in the wide sense of [Tho90].

Our analysis is couched in Logical Description Grammar for discourse, a model of text interpretation which combines underspecification with discourse theory, and uses compositional DRT as semantic representation language. Unlike most dynamic semantic formalisms, it supports a liberal notion of accommodation, where what is accommodated can be more than what is minimally required to satisfy conditions on contexts, in terms of logical strength. What comes out as a most preferred context specification follows from the interaction with the interpreting agent's common knowledge and pragmatic reasoning. Thus, on the basis of a sufficiently general requirement on a context, a variety of more specific suppositions can be abduced.

We start off with a sketch of the LDG formalism, highlighting what is relevant for the topic at hand. Our analysis of implicative verbs is laid down in subsequent sections. For reasons of space, we concentrate on the core proposal and economize on discussion of data.

2 Discourse Meaning and Accommodation in LDG

The LDG *framework of discourse interpretation*, laid down in [LM03] [Leu07], consists of a description grammar, which embodies a language user's linguistic knowledge, a representation of his world knowledge and beliefs, and a preference system, which models his capacity to assign preferences over different potential interpretations of a discourse and to draw default inferences. In processing a discourse, the language user incrementally constructs a *discourse description* from input sentence descriptions. It describes the specific syntactic, semantic, and pragmatic properties of the discourse.

Descriptions are sets of statements in a logical language (classical type logic, in our case). The objects described by sentence and discourse descriptions are fully specified linguistic tree structures. Interpretation is a *reasoning* task, in which the hearer infers what tree structures fit or verify the discourse description given his grammar and nonlinguistic knowledge. As descriptions can be partial, there can be more than one verifying tree structure. Each structure comes with a potential reading of the sentence or discourse, and one or more of them may come out as most preferred.

See [Leu07] for an explication of the incrementality of the formalism and the specifics of the parsing process. A central feature of the model is that it makes available *local contexts* as a parameter in the compositional semantics. Each node k in a sentence or discourse tree comes not just with the usual syntactic categories and semantic values (σ_k), but also carries a local context (Γ_k). Local contexts are constructed from semantic values going top-down and from left to right through the discourse tree. The local context of the root of a discourse tree is identified with B, the *implicit background* to the discourse. B stands for whatever is taken for granted or pragmatically presupposed by the discourse participants in the view of the interpreting agent.

Crucially, local contexts are underspecified objects; *accommodation* is the (partial) specification of local contexts as it results from the satisfaction of con-

straints stated on them in the grammar and the discourse description. The implicit background is a largely underspecified body of information which is described bit by bit in the course of the interpretation process. We call this *context specification*.[3]

The discourse grammar specifies a few general conditions on local contexts, and elements the lexicon may introduce specific ones. Typically, context-sensitive elements such as anaphors and presupposition triggers contribute the latter. *Discourse meaning* is defined as $B \oplus \sigma_r$, i.e., what was 'taken for granted' merged or updated with 'what was said', where all the syntactic, semantic and pragmatic conditions collected in the discourse description must be satisfied, including constraints on local contexts. To illustrate, the discourse meaning of the out-of-the-blue sentence in (4a) is shown in (4b), where, among others, the requirements on B in (4c) and (4d) must be satisfied.

(4) a. Ed closed the door.
b. $B \oplus [\ |\ w_r\colon o_0\ \textit{closed}\ \sigma_3^\pi\ ]$
c. triggered by the name: $[o_0 \mid w_r\colon \textit{Ed}\ o_0] \sqsubseteq B$
d. triggered by the definite description: $[\sigma_3^\pi\ |\ ] \sqsubseteq B,\ \ B \models [\ |\ w_r\colon \textit{door}\ \sigma_3^\pi]$

Semantic values are in a variant of compositional DRT put forward in [LM03]. σ_k^π is an underspecified discourse marker. [..|...] is a DRS, to the left of the | sign is the universe, to the right the conditions. We use $o_k, u_k, w_r, \ldots$ for different types of discourse markers; u_k represent *new* referents (generated in the discourse); o_k represent *old* ones; w_r stores the actual world. '$w_r\colon \textit{door}\ u_3$' should be read as 'the occupant of u_3 is a door in the world occupying w_r'. The operator $\oplus$ *merges* DRSs, $\sqsubseteq$ denotes *inclusion* and $\models$ denotes *entailment*.

The hearer may satisfy (4c) and (4d) by accepting $[o_0 \mid w_r\colon \textit{Ed}\ o_0] \sqsubseteq B$ and $[\ u_7 \mid\ w_r\colon \textit{door}\ u_7] \sqsubseteq B$ (where u_7 is an arbitrary fresh discourse marker). By further reasoning the hearer may obtain (5) as final discourse meaning:

(5) $B \oplus [w_r, o_0, u_7 \mid w_r\colon \textit{Ed}\ o_0,\ w_r\colon o_0\ \textit{closed}\ u_7,\ w_r\colon \textit{door}\ u_7]$

Note that this interpretation builds on *accommodation*: the hearer adjusts his representation of the implicit background in order to satisfy linguistically generated requirements.

A hearer may freely abduce background information, selecting a context scenario which is most likely to explain what is presupposed, and consistent with what he considers to be common knowledge and the speaker's beliefs and intentions in making his assertion. What is accommodated in any given case is not just a matter of satisfying presuppositional conditions, it depends on the total of the hearer's beliefs and preferences. Pragmatic reasoning is indispensible for generating preferences over accommodation options. We assume the preference system of the model implements a form of defeasible reasoning about what the speaker is committing to given his beliefs and intentions and what he said so far. The pragmatic rules are not formally specified, but we consider their impact in the interpretation process.

[3] [Leu07] provides a treatment of local and intermediate accommodation as well.

3 Reasoning towards Culmination

Right from the birth of 'implicative verbs' as a distinct class in [K71a], there has been discussion about the strength or status of the derived complements. In [NCK06], Karttunen and co-authors point out that "it can be difficult to distinguish **entailments** that is, what the author is actually committed to, and **conversational implicatures**, that is, what a reader/hearer may feel entitled to infer." Indeed, judgements may vary. For instance, 'to remember to' is viewed as a two-way implicative in [NCK06], but we prefer to categorise it as a one-way implicative, in line with [Horn72]. Consider

(6) a. Martha remembered to turn out the lights.
b. Martha turned out the lights.
c. Martha didn't remember to turn out the lights.
d. Martha didn't turn out the lights.
e. (i) ... so I had to remind her.
(ii) ... but luckily she brushed against the switch.

While (6a) implies (6b) in a strong sense, (6c) only 'invites the inference' in (6d). As can be seen from the continuations in (6e), the inference is defeasible. Horn categorises it as a subspecies of implicature.

The strong inferences can be recognised by their resistance to cancellation:

(7) a. # Though Jim managed to button his coat, he did not button it.
b. ?? Though Martha remembered to call the dean, she didn't call him.

It can be hard to determine whether the inference arises and is cancelled or not, however. For one, some verbal constructions, e.g. 'to be able to', are ambiguous between implicative and nonimplicative senses. In other cases, strong contrastive marking may override the implicative inference, or select a nonimplicative sense of the construction. Moreover, the inferences are temporally specific [Giv73]; they inherit, among more, the temporal setting of the implicative predicate. Thus, (8a) constitutes no evidence of cancellation, the continuation in (8a) is simply consistent with the inference (8b):[4]

(8) a. Martha didn't remember to turn out the lights (t_1), but she turned them out later on ($t_2, t_1 < t_2$).
b. Martha didn't turn out the lights (at t_1)

Finally, the inferences depend on the tense and aspect of the implicative predicate. The clearcut 'actuality entailments' evoked with simple past predicates do not surface with a generic or progressive use of the same verb. Arguably, these uses evoke generic and progressive implicative inferences.

[4] Perhaps a two-way analysis of 'to remember to' can be defended along these lines.

Analysis As [Luz99] observes, implicatives always occur as part of a sequence of verbs expressing a single process. We may add that in general, that process is resultative. The implicative verb refers to an attitude or state of the subject or an activity he is involved in, which in the view of the speaker is a necessary prestate, or causes, or culminates in the state or event referred to by the complement sentence. In line with the intuitive analysis of [K71a], we suggest that in the context of interpretation, the implicative state or activity figures as a sufficient and/or necessary condition for the achievement or culmination (or lack thereof) of the complement state or event. This explains the implicative inferences.

We'll come to a formal implementation of this shortly, but like to emphasize that, ultimately, pragmatics is what drives these inferences, and what explains why implicative verb senses come into existence in a language. There is a general pragmatic drift to expect that a process culminates or a purpose is achieved or an intention made true, when a speaker asserts that a precondition for the result or goal is satisfied or that an intentional act took place. And when he conveys that a precondition is not fulfilled, we expect that the result or the goal is not achieved. In the course of time, for some verbs the implicativeness can become conventionalised and part of their lexical description. Specialisation may take place, resulting in groups of semantically closely related verbs which differ only in the optionality or obligatoriness of the implication they evoke. Verbs which express the same core meaning across languages can be expected to differ in the strength of the implicative inference.

4 The Implicative Condition

We propose that implicative verbs lexically introduce an *implicative condition*, a requirement on their local context which defines the resultative, causal or conditional relation between the state or action the implicative verb refers to, and the state or event described by the complement sentence. In combination with the semantic content of the sentence containing the verb, it accounts for the implicative inferences in context. The one-way implicative 'to remember to' presupposes, we propose, a sufficient condition: in the relevant local context, remembering to close the door results in a door-closing. Suppose a hearer computes the discourse meaning of out-of-the-blue sentence (9a). At some point he may have inferred (9b), while the implicative condition (9c) must still be satisfied.

(9) a. Ed remembered to close the door.

b. $B \oplus [w_r\, o_0\, t_1 \mid w_r{:}\, \mathit{Ed}\ o_0,$
$\quad w_r : \mathit{remember.at}\ (o_0, \lambda w, t[\mid w : o_0\ \mathit{close.door.at}\ t], t_1),\ t_1 < n\,]$

c. Implicative condition, contributed by the inflected verb:
$B \mid\!\sim$
$[\,|\,[\,t_1 \mid w_r : \mathit{remember.at}\ (o_0, \lambda w, t[\mid w : o_0\ \mathit{close.door.at}\ t], t_1),\ t_1 < n\,] \Rightarrow$
$[\,t_2 \mid w_r : o_0\ \mathit{close.door.at}\ t_2,\ t_1 \bigcirc t_2,\ t_2 < n\,]\,]$

Various accommodation options arise. The one shown in (10a) can be excluded because it sins against a grammatical constraint: B must be a *proper DRS* but would contain free discourse marker t_1. The other two are viable options.

(10) a. $[\, t_2 \,|\, w_r : o_0\ \mathit{close.door.at}\ t_2,\ t_1 \bigcirc t_2,\ t_2 < n\,] \sqsubseteq B$

b. $[\,|\,[\, t_1 \,|\, w_r : \mathit{remember.at}\ (o_0, \lambda w, t[\,|\, w : o_0\ \mathit{close.door.at}\ t], t_1),\ t_1 < n\,] \Rightarrow$
$[\, t_2 \,|\, w_r : o_0\ \mathit{close.door.at}\ t_2,\ t_1 \bigcirc t_2,\ t_2 < n\,]\,] \sqsubseteq B$

c. $[\,|\,[\, t_1 \,|\, w_r : \mathit{remember.at}\ (o_0, \lambda w, t[\,|\, w : o_0\ \mathit{close.door.at}\ t], t_1),\ t_1 < n\,] \Leftrightarrow$
$[\, t_2 \,|\, w_r : o_0\ \mathit{close.door.at}\ t_2,\ t_1 \bigcirc t_2,\ t_2 < n\,]\,] \sqsubseteq B$

Considering what would explain the speaker's use of an implicative in the given context, the hearer might assume that he simply intends to describe a state of affairs and takes for granted that Ed remembering to close the door in the situation at hand is sufficient to make him close it. Thus the hearer would accept option (10b). However, he may go on to ask what makes the speaker mention Ed's remembering at all, if he could have said right away that Ed opened the door. Quite possibly because in the situation under discussion, the speaker considers it a *necessary* requirement as well: without remembering to close the door Ed would not have closed it. If, in addition, Ed's remembering is relevant in the sense that it is an open issue in the discourse whether he did or not, the speaker has good reasons to mention it. Now the hearer accepts (10c).

The indefeasibility of the implicative inference with the bare positive use of the verb is now accounted for, because there is no grammatical interpretation in which the implicative condition is not satisfied. With the negated form, however, only the interpretation corresponding to option (10c) predicts the implicative inference. We suggest that this is the preferred option in principle.[5] The implicative inference is then predicted to arise with the negated form in out-of-the-blue use and in linguistic contexts such as (6e.i) which reinforce the inference. But when it is disconfirmed, as in (6e.ii), the hearer selects accommodation option (10b). Typically, the continuation in (6e.ii) conveys that there is another action beside remembering that would result in Martha turning out the lights on the relevant occasion. So the speaker does not consider Martha's remembering a necessary requirement. The availability of accommodation option (10b) accounts for the defeasibility of the implicative inference with the negated form.

Because the implicative condition is 'presuppositional', i.e. a requirement on local context, the resultative or conditional link constitutes non-at issue information. It will commonly project to global context, unless forced to accommodate locally, e.g. through metalinguistic denial. As such it is employed by the hearer in the computation of discourse meaning. More complex examples in which one implicative construction embeds another will be interesting test-cases. If the various preconditions project to global context, the implicative inferences evoked by the sentence should follow from their interaction in the spirit of [K71b].

Furthermore, the implicative condition is stated in the domain of locality of the implicative verb and fires relative to its local context. This has some important consequences, which space restrictions allow us only to mention here. One is that entailments which hold locally do not necessarily surface globally. Thus, it can be explained that when triggered in the scope of e.g. modal and

[5] In terms of pragmatic rules, it provides a 'better explanation' of the speaker's use of an implicative.

generic operators the implicative inference is not evoked. Another is that it solves the notorious 'binding problem', detected in [KP79].

Every implicative verb comes with its own characteristic implicative condition. In the case of 'to manage to', we follow the general trend (cf. [Bea01]) and assume that its semantic content says that the complement state or event obtains. The entailments with both the positive and the negated use of the verb follow from this straight away, and are predicted to be indefeasible. Instead of the usual attempt/difficulty-presupposition, however, we'll have an implicative condition which says that the complement state or event holds only if the subject individual makes an effort (of at least degree d) to obtain that result:

(11) a. Someone managed to close the door.
b. $B \oplus [u_1 \mid w_r : \mathit{human}\, u_1,\ w_r : u_1\ \mathit{close.door.at}\, t_1,\ t_1 < n]$
c. $B \oplus [u_1 \mid w_r : \mathit{human}\, u_1\,] \mid\!\sim\ [\,|\,[\,t_1 |\, w_r : u_1\ \mathit{close.door.at}\, t_1,\ t_1 < n\,] \Rightarrow$
$[\,t_2 |\, w_r : \mathit{put.effort.d}\overset{\leq}{=}\mathit{in.at}\,(u_1, \lambda w, t[\,|\, w : u_1\ \mathit{close.door.at}\, t], t_2),$
$t_2 \bigcirc t_1,\ t_2 < n\,]\,]$

This differs minimally from standard treatments in that the requirement that an effort be made is a *post*condition on the succes of the complement state or event, and is formulated in somewhat less specific terms than attempt or difficulty.

5 Linguistic presuppositions or pragmatic strengthening?

While any specific implicative verb can carry additional presuppositions, we are interested to see how far the implicative condition may take us in accounting for the presuppositions claimed to be evoked by implicatives, given interaction with pragmatic reasoning. Remember the presuppositions are a diverse lot; focusing on 'to manage to' we will go through them one by one.

The implicative condition accounts directly for the characteristic *causal* or *explanatory* presuppositions mentioned in the introduction. Satisfying the implicative condition in (11c), the hearer may accommodate that for anybody to close the door on the particular occasion under discussion, he must make a certain effort, and doing so will cause the closing of the door. If we are told that a subject did not manage to close the door, then not having made that effort is a likely explanation of why he didn't close it. Thus, the satisfaction of the implicative condition induces the accommodation of explanatory suppositions.

Now for the *attempt suppositions*. The hearer may very well satisfy the implicative condition by accommodating that opening the door on this occasion requires an intentional, active attempt to do so on the agent's part. This is a plausible instance of putting in a certain effort. Arguably, with a positive use of the verb the attempt-inference is defeasible in examples like the following. The less specific inference signals that the implicative condition is still satisfied:

(12) Without intending it, Bill managed to insult the dean.
$\not\rightsquigarrow$ Bill attempted to insult the dean.
$\rightsquigarrow$ Bill was involved in some effort which resulted in insulting the dean.

With the negated use of the implicative (and a neutral stress pattern), as in

(13) Jack didn't manage to convince the dean.

the hearer is predicted to infer that the subject did not make the effort necessary to cause convincing the dean. In general, however, a more specific inference is evoked, namely that Jack did make an effort, though an insufficient one. This reading results from selecting a logically stronger context specification. Among the factors which can explain the preference for this reading, we suggest Gricean-style scalar reasoning is a central one. Given satisfaction of the implicative condition, in context 'Jack did not put a sufficient effort into convincing the dean' is a stronger alternative than 'Jack did not convince the dean.' Presumably, the speaker didn't communicate the stronger alternative because he doesn't believe that Jack did not put a sufficient effort into convincing the dean. If the speaker is informed about the matter, it follows that he believes that Jack tried to convince the dean. Thus analysing the inference as a scalar implicature, its defeasibility in constructions such as (14) is predicted.

(14) Jack didn't manage to convince the dean, in fact, he didn't even try.

The *difficulty suppositions* are naturally accounted for as an accommodation effect of satisfying the implicative condition. If it requires an effort on Jack's part to convince the dean, then probably there is some difficulty or challenge involved in this, which explains why the effort is needed. A most preferred context does not just make the implicative condition true but also plausible in the situation under discussion. Testing in projection and cancellation contexts reveals that the difficulty suppositions are generally persistent, often generic, but always adapted to the situation under discussion given common knowledge. The difficulty may be specific to the subject given his opportunities and skills, as in (2), it can be a difficulty in the action or goal to be achieved for anybody in general, or it can be completely contingent on the situation at hand. All of this is to be expected when the inference is not hard-wired as a linguistic presupposition, but rather the product of context specification. Finally, the implicative condition is sufficiently unspecific to account for cases like the following in which the effort made by the subject on the event referred to does not involve any concrete difficulty.

(15) John generally runs 10 miles per hour. Small wonder he managed to run 5 miles in 30 minutes yesterday.

$\not\rightsquigarrow$ It was difficult for John to run 5 miles in 30 minutes yesterday.
$\rightsquigarrow$ It is difficult for most people to run 5 miles in 30 minutes.
$\rightsquigarrow$ For John to run 5 miles in 30 minutes requires a certain effort.

A discussion of suppositions of *expectation* or *norm* and those of *obligation* attached to 'to remember to' shall have to wait for another occasion. We hope to have shown that an analysis in terms of implicative condition, pragmatic reasoning and accommodation effect is well-suited to account for the variability and defeasibility of the inferences under discussion.

6 Conclusion

We looked into the inferential behavour of implicative verbs, and argued that they contribute a presuppositional constraint that characterises the process they describe as resultative, culminating in the state or event described by the complement sentence. It was proposed that what are often claimed to be presuppositions can be accounted for as implicatures or secondary inferences resulting from the need to satisfy and explain the implicative condition of the verb. The analysis builds on a liberal notion of accommodation, where pragmatic reasoning rules serve to generate preferences over accommodation options.

Further research is needed, especially the interactions with tense, aspect and modality must be spelled out. More extensive testing of the projection behaviour of inferences and cancellation contexts is needed. Cross-linguistic research will be helpful to get a grasp on the diversity of implicitive word senses within the language system. Moreover, the explicit specification of pragmatic reasoning rules that justify the selection of accommodation options constitutes a theoretical challenge. The investigation of implicative verbs will be of interest for the theory of presupposition as well as the theory of pragmatics/accommodation. If implicative verbs are to find their place within the family of projective elements, a rich semantic-pragmatic interpretational system is called for. This might be LDG for discourse, or a model of comparable strength.

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