Strong and weak presupposition:
German *'ja'* under quantifiers

Stefan Kaufmann
Northwestern University

November 30, 2010

1   Introduction

German *'ja'* is one of the most widely studied discourse particles, yet a precise and detailed understanding of its meaning continues to elude us. There is little agreement even on such questions such as what *kind of* meaning *'ja'* contributes, nor are the relevant empirical facts fully explored and widely agreed-upon. This paper contributes to both the theoretical and the empirical discussions on the topic. I do not presume to resolve all open issues; rather, the goal is to shed some light on a set of data that I believe is of special relevance to the fundamental question of how to approach the analysis of *'ja'*.

Specifically, I am interested in the interaction of *'ja'* with discourse referents and quantificational contexts. These data are relevant to a number of theoretical questions, chief among them whether the contribution of *'ja'* ought to be analyzed as *expressive meaning*. Kratzer (1999, 2004) was the first to argue for that classification, based in part on the claim that *'ja'* cannot occur in such contexts. I argue below that the descriptive claim is wrong. This may be taken to remove part of Kratzer's basis for concluding that *'ja'* contributes expressive meaning; on the other hand, one might insist on the classification and take the facts to call for a more nuanced and multifaceted definition of that category.

Aside from the fact that *'ja'* can occur in quantificational contexts, I show that its meaning *projects* in these contexts in a way similar to presuppositions, although there are subtle but important differences in detail. The formal analysis in the paper is dedicated to showing that this behavior can be captured quite naturally with devices originally developed for the treatment of (ordinary) presuppositions. The question then arises whether the contribution of *'ja'* *is* in fact a presupposition. In this paper I assume that it is; however, this claim comes with its own caveats. The most familiar standard tests for presupposition-hood are not applicable in the case

of *'ja'*; for instance, *'ja'* resists the scope of negation and is used (in the relevant sense) only in declarative sentences. What I take to be undisputed, however, from my own analysis as well as the literature, is the following: *'Ja'* imposes a condition on its felicitous use which makes crucial reference to the speaker's beliefs about the common ground. This condition is very closely related to Stalnaker's (2002) pragmatic notion of speaker presupposition. The two are not identical, however, and the subtle differences explain the observed differences in projection behavior.

Section 2 sets the stage by delineating the relevant uses of *'ja'* and discussing the relevant previous work. Section 3 introduces the relevant data. The formal analysis is developed and discussed in detail in Section 4. Section 5 mentions three open issues not yet addressed by the analysis, and Section 6 concludes the paper.

2   Preliminaries

'Ja' is a versatile particle which takes on different functions in different contexts. It is not clear at this point whether all of its uses can or even should be subjected to a uniform analysis. In any case, not all of them are relevant to the concerns of this paper, and I begin in this section by setting aside those that are not. I then outline the major ideas behind prior proposals regarding the analysis of *'ja'*, and briefly discuss their strengths and shortcomings.

2.1   Uses of *'ja'*

First, in all the examples that are relevant here, *'ja'* is short and unstressed. This removes from the purview of this paper two major uses under which it is always stressed. The first is its use as an affirmative response to polar questions:

(1)   A: Gehen wir essen?
         go   we eat
         Shall we go (out to) eat?
      B: Ja.
         yes
         Yes.

The second use on which *'ja'* is always stressed is as an emphatic particle in imperatives (here boldfaced to indicate the obligatory stress):

(2)   a. Geht **ja** nicht in   den Wald!
          go   JA not   into the forest
          Don't you go into the forest!

2

b. Mach' **ja** deine Hausaufgaben!
   do   JA *your homework*
   Do your homework!

The environments in which *'ja'* is always unstressed (and short) fall into two classes again: *exclamative* sentences, such as (3), and *declaratives* like (4) (both from Lindner, 1991).

(3)   Das ist ja interessant!
   this is JA *interesting*

   Now that's interesting!

(4)   Fritz kommt immer etwas später zum   Kegeln, weil   er ja seine Katzen
   Fritz comes always a bit later to the bowling because he JA *his cats*
   zu versorgen hat.
   to look after has

   Fritz always gets to the bowling a bit late because he has got his cats to look after.

Among the various uses of *'ja'* mentioned, these two are probably the ones most susceptible to a unified analysis, as was in fact attempted by Lindner (1991). Kratzer (1999, 2004) adopted a variant of Lindner's account. However, in this paper I focus exclusively on declarative sentences like (4). The reason for this restriction is that the kind of interaction with quantifiers that is my main concern cannot be observed in exclamatives.

2.2 Previous accounts

It is generally agreed that *'ja'* behaves like a sentential operator, combining with a sentence p to form a new sentence *'ja(p)'*. This behavior is subject to certain grammatical conditions, some of which I discuss below. The general consensus is that *'ja'* marks its propositional complement as beyond dispute (Dahl, 1985) or self-evident (Helbig, 1988). Lindner (1991) states the contribution of *'ja'* as follows:

Lindner (1991): In using MP [=modal particle – SK] *ja* the speaker indicates that in his/her eyes the proposition p is not controversial.   (p. 174)

A more recent proposal is due to Karagjosova (2004), who characterizes the contribution of *'ja'* in similar terms:

Karagjosova (2004): [T]he meaning of *'ja'* ...can be specified in terms of a belief of the speaker that the proposition in the scope of *'ja'* is *active common knowledge* of speaker and hearer. (p. 191, emphasis added)

According to Karagjosova, active beliefs "represent a restricted portion of the belief state where reasoning takes place."[1] This qualification is significant in Karagjosova's account of the semantic difference between *'ja'* and *'doch'*, but it is not crucial for the discussion in this paper.

While there is broad agreement about the meaning contributed by *'ja'*, the theoretical status of this contribution is still debated. Karagjosova argues that *'ja'* adds a preparatory condition to the speech acts performed by utterances of sentences containing it. Kratzer (1999, 2004), on the other hand, argues that this contribution is properly analyzed at the level of *expressive meaning*, as a comment by the speaker on what is asserted. Kratzer assumes that descriptive and expressive meanings are calculated separately and proposes the following characterization:

Kratzer (1999, 2004): *'ja(p)'* is interpreted on two tiers, D(escriptive) and E(xpressive):

D: p
E: p is true and might be known to the addressee (1999)
     p is part of shared knowledge or verifiable on the spot (2004)

Both of these definitions reflect the intuitive notion of p being "not controversial." Kratzer stops short of simply requiring that p be known to both the speaker and the addressee because this requirement would be too strong for certain exclamative uses of *'ja'*, for instance (3) above. As I focus on declarative uses of *'ja'* in this paper, this issue can be set aside.

My preliminary description of what is conveyed by the speaker's use of *'ja(p)'* will be that *the speaker believes that p is commonly believed between the interlocutors*. I make this definition precise below. It covers what most authors would doubtless agree are the most typical uses of *'ja'* in declaratives (see also Zimmermann, to appear).[2] It is also an informal statement of Stalnaker's (**?**) notion of speaker presupposition. Consequently, I argue that *'ja'* induces a pragmatic presupposition. I do not thereby mean to deny the status of this contribution as

---

[1] The notion has been formalized and used in the literature on resource-bounded reasoning in Artificial Intelligence and Philosophy (see Wassermann, 2000, and references therein, especially Cherniak, 1986). In this tradition, active beliefs are those held in short-term memory at the time in question, including ones that the agent does not hold (yet) but is merely considering or evaluating.

[2] It is not impossible to use *'ja'* in violation of this requirement, i.e., to convey new information. The process by which such sentences are interpreted is akin to accommodation, but as I argue below, it is different from the accommodation of ordinary presuppositions.

expressive meaning, *pace* Kratzer (2004), who argues passionately that these two categories are disjoint.

I return to the question of the relationship between presupposition and expressive meaning below. For now, only one aspect of Kratzer's argument is important: As a consequence of the formal separation between descriptive and expressive meaning, the account predicts that *'ja'* cannot interact semantically with operators outside its own scope. In particular, it should be unable to intervene between quantifiers and the variables they bind. In the next section, I present a series of examples to show that this prediction is not borne out.

3   Data on *'ja'*

The purpose of this section is two-fold: first, to demonstrate that *'ja'* does in fact show up felicitously in contexts in which Kratzer's account predicts it to result in ill-formedness, and secondly, to give the reader an intuitive idea of what its contribution consists in and how it should be characterized.

3.1   Universal quantification

Consider first the sentence in (5), an unremarkable *'ja'*-less universal statement.

(5)   Jeder dieser   Arbeiter verlor seinen Job, weil   er in der Gewerkschaft
      each of these workers lost   his   job because he in the union
      war.
      was

      Each of these worker lost his job because he was in the union.

      > All (of these) workers were in the union.

This sentence entails that all workers were in the union. To some speakers, including myself, this particular semantic element has a presuppositional flavor, presumably due to the connective *'weil'* 'because'. Indeed, it has been claimed that generally, *'A because B'* presupposes B (Lagerwerf, 1998), and we will see more evidence for this claim below. However, it should also be quite uncontroversial that in (5) this presupposition is rather "weak," in the sense that the hearer can easily accommodate it, and it is hard to think of a context in which its failure would result in infelicity. In (6), on the other hand, the presupposition has intuitively a quite different status.

(6)   Jeder dieser Arbeiter verlor seinen Job, weil er ja in der Gewerkschaft war.

Each of these worker lost his job because he was JA in the union.

≫ All (of these) workers were in the union.

This is the example on which Kratzer (1999) based her claim that *'ja'* cannot intervene between quantifiers and the variables they bind. The idea is that (6) is ill-formed because it violates this constraint. Formally, she argues that if descriptive and expressive meaning were computed on different tiers, the variable would end up bound in the declarative part of the meaning and free in the expressive part, resulting in ill-formedness for the whole sentence. In this way, Kratzer uses the claim that (6) is in fact ill-formed to argue that the meaning contributed by *'ja'* is expressive.

Most speakers I consulted disagree with this judgment, however: (6) is well-formed and fully felicitous in a context in which it is common knowledge that all workers were in the union. Unlike in (5), however, in (6) this condition is a very strong one. Whereas in the former, the presupposition can easily be accommodated if it is not already in the common ground, the failure of the condition induced by *'ja'* is considerably harder to repair.[3]

I leave it at this admittedly vague statement, postponing a more precise formulation until the formal framework is in place. As a notational device, I use the symbol '>' in (5) for the ordinary, accommodable presupposition, in contrast to the symbol '≫' in (6). The following examples from contexts other than universal quantification show that the difference is not merely one in "strength" in this sense.

3.2 Existential quantification

Consider next the case of indefinite noun phrases. (7), the existential counterpart of (5), may be seen to presuppose that *some* worker was (or some workers were) in the union. As above, this may be attributed to a presupposition triggered by *'weil'*, albeit a weak one in the sense that it can very easily be accommodated.

(7) Einer dieser   Arbeiter verlor seinen Job, weil   er in der Gewerkschaft
    one   of these workers lost   his   job because he in the union
    war.
    was

One of these workers lost his job because he was in the union.

---

[3]I am a native speaker of German myself, and I have so far not to found any native speaker who would judge (6) ill-formed. I should note that, on the contrary, some speakers of German do not feel any difference between (5) and (6), nor between any of the pairs below. Such judgments are problematic not only for Kratzer's account, but also for mine. Based on the informants I have consulted, there seems to be some dialectal variation, which however I have yet to explore systematically.

$>$ A worker was in the union.

With *'ja'*, however, the sentence imposes the same strong condition on the common ground as its counterpart in (6) above:

(8) Einer dieser Arbeiter verlor seinen Job, weil er ja in der Gewerkschaft war.

One of these worker lost his job because he was JA in the union.

$\gg$ All (of these) workers were in the union.

This sentence is infelicitous unless it is common knowledge that all workers were in the union. The contrast between (7) and (8) suggests that the contribution of *'ja'* and the presupposition triggered by *'weil'* are distinct, and hence should not be collapsed in the case of universal quantifiers either.

3.3 Proper names

Unlike existential quantifiers, proper names do not give rise to a universal presupposition. Both (9) and (10) suggest that Fritz was in the union, not that everyone was. However, as above, the presupposition is stronger in (10).

(9) Fritz verlor seinen Job, weil   er in der Gewerkschaft war.
     Fritz lost   his   job because he in the union   was

Fritz lost his job because he was in the union.

$>$ Fritz was in the union.

(10) Fritz verlor seinen Job, weil er ja in der Gewerkschaft war.

Fritz lost his job because he was JA in the union.

$\gg$ Fritz was in the union.

Even with proper names, however, there is still a difference in the strength or accommodability of the presupposition.

3.4 Context dependence

The following examples summarize and reinforce the observations so far. In the context given in (11), *'ja'* is generally infelicitous, and the universal quantifier leads to infelicity with or without *'ja'*.

(11) Genau die Hälfte der Arbeiter war in der Gewerkschaft.
exactly the half of the workers was in the union

Exactly half of the workers was in the union.

    a. #Jeder Arbeiter verlor seinen Job, weil er (ja) in der Gewerkschaft war.
    b. Ein Arbeiter verlor seinen Job, weil er (#ja) in der Gewerkschaft war.
    c. Fritz verlor seinen Job, weil er (#ja) in der Gewerkschaft war.

Two comments are in order: First, the sentences in (11a,b) do becomes felicitous with *'jeder/einer dieser Arbeiter'* 'each/one of these workers. In this case the noun phrase is contextually restricted the previously mentioned set of workers who were in the union, so that the presupposition is of course satisfied. With the determiners in (11), this confounding reading is considerably harder to get. Second, in (11c), I assume that it is not commonly believed that Fritz was among those in the union. Otherwise the sentence is felicitous with *'ja'*, as we saw in (10).

With these caveats in mind, it is clear that (11a) is simply false in the given context, with or without *'ja'*, while (11b,c) are infelicitous with *'ja'* but unproblematic without it. In contrast, in a context in which it is known that all workers were in the union, such as (12), all of the sentences are felicitous with and without *'ja'*.

(12) Alle Arbeiter waren in der Gewerkschaft.
all workers were in the union

All workers were in the union.

    a. Jeder Arbeiter verlor seinen Job, weil er (ja) in der Gewerkschaft war.
    b. Ein Arbeiter verlor seinen Job, weil er (ja) in der Gewerkschaft war.
    c. Fritz verlor seinen Job, weil er (ja) in der Gewerkschaft war.

3.5 Cross-sentential anaphora

We saw above that the universal presupposition arises with indefinite noun phrases, suggesting that may be tied to the *discourse referents* they introduce. If this is so, then it should operate across sentence boundaries as well. This is indeed the case.

First, notice that the sequence in (13) does not carry any (relevant) presupposition.[4] In (14), however, we observe the same effect as in (8) above.

(13) Einer dieser Arbeiter verlor seinen Job. Er war in der Gewerkschaft.
one of these workers lost his job he was in the union

One of these workers lost his job. He was in the union.

---

[4]The absence of any presupposition in (13) supports the view that what presupposition there is in (7) is due to *'because'*.

8

(14) Einer dieser Arbeiter verlor seinen Job. Er war ja in der Gewerkschaft.

One of these workers lost his job. He was JA in the union.

≫ All (of these) workers were in the union.

Thus the proper analysis of the contribution of *'ja'* requires a framework in which the persistence of discourse referents across sentence boundaries is accounted for. Below, I will use standard dynamic semantics to this end.

3.6 Rhetorical roles

The examples discussed so far all contained the subordinating conjunction *'weil'* 'because', and one may wonder whether the observed effects might not be due to the *explanation* relation between the clauses. Indeed, even in (13) and (14) above, despite the absence of any overt indication, the same relation between the clauses is induced by default. Dahl (1985) assumes that the meaning contributed by *'ja'* is inextricably tied to the causal relation between the clauses (but see Karagjosova, 2004).

However, neither the use of *'ja'* nor the universal presupposition depend on this explanation relation. This is illustrated in the following examples, which show that a concessive relation gives rise to the same pattern.

(15) Einer dieser   Arbeiter verlor seinen Job, obwohl   er in der
      one   of these workers lost   his   job even though he in the
      Gewerkschaft war.
      union   was

One of these workers lost his job, even though he was in the union.

> One of these workers was in the union.

(16) Einer dieser Arbeiter verlor seinen Job, obwohl er ja in der Gewerkschaft war.

One of these workers lost his job, even though he was JA in the union.

≫ All (of these) workers were in the union.

Thus neither the conjunction *'weil'* nor the explanation relation it enforces between the clauses is responsible for the observations. There are, however, some more subtle effects which depend on the kind relation that holds between the clauses. To these I return below, once the formal analysis is in place.

3.7 Relative clauses

As in English, German relative clauses can have restrictive or non-restrictive readings. Restrictive relative clauses serve to delimit the (contextually given) domain of quantification over which the referent denoted by the noun phrase they are adjoined to ranges. Non-restrictive relative clauses play no such role, but rather add a "comment" on the discourse referent. In the English glosses of (17) and (18), the difference is indicated with commas, corresponding to the "comma" intonation generally required for non-restrictive relatives.[5]

In (17), both readings are available for the relative clause:

(17) Ein Arbeiter, der   seine Frau liebte, verlor seinen Job.
     a   worker   who his   wife loved lost   his   job
   a. ✓A worker, who loved his wife, lost his job.   *[non-restrictive]*
       ≫ Some workers were married.
   b. ✓A worker who loved his wife lost his job.   *[restrictive]*
       ≫ Some workers were married and loved their wives.

In contrast, the restrictive reading is unavailable if the relative clause contains *ja*, as (18) illustrates. In addition, the presupposition associated with the non-restrictive reading is universal and has the same strong flavor as in the above cases.

(18) Ein Arbeiter, der ja seine Frau liebte, verlor seinen Job.

   a. ✓A worker, who JA loved his wife, lost his job.   *[non-restrictive]*
       ≫ All (of these) workers were married and loved their wives.
   b. ✗A worker who JA loved his wife lost his job.   *[restrictive]*

Notice also an interesting interaction with the presuppositions of the relative clause. That x is married is presupposed by *'x loved his wife'*. This presupposition becomes part of the meaning contributed by *ja*: What is conveyed is not that all workers who were married loved their wives, but that all workers were married and loved their wives.

I return to such interactions and consider some more relevant examples below. For now, I conclude the survey of the data by pointing out one class of irrelevant cases.

---

[5]Informally, on the non-restrictive reading the noun phrase could be paraphrased as *'a worker, who, incidentally, loved his wife'*, whereas on the restrictive reading the paraphrase would be closer to *'one of those workers who loved their wives'*.

3.8 The scope of *'ja'*

Kratzer (1999) notes that the scope of *'ja'* is similar to that of sentential adverbs. This has an important consequence for the kind of data that are relevant to the present topic. In particular, no universal presupposition is projected when *'ja'* is inserted anywhere in a *simple* existential sentence, as in (19).

(19) Ein Arbeiter war ja in der Gewerkschaft.
      one worker   was JA *in the union*

      One worker was JA in the union.

      ≫ One worker was in the union.

As indicated in (19), the presupposition here is that (at least) one worker was in the union, not that all workers were. It is important to point out that this fact poses no problem for my analysis. It is merely a consequence of the fact that *'ja'* takes the whole clause as its scope, thus in this case the existential quantifier must scope under it.[6] The contribution of *'ja'* in this case can be paraphrased as *'You and I both know that there was a worker who was in the union'*.

In order to make the kind of observations that are relevant for the present paper, one needs to look at sentences like the ones used earlier, in which *'ja'* scopes over a clause that is itself fully contained within the scope of the quantifier in question.

3.9 Questions to be addressed

This concludes the brief survey of the relevant data on the distribution of *'ja'* and its interaction with various quantificational contexts. Before moving on, I stop for a brief preview of the questions to be addressed and in the claims to be argued for in the remainder of this paper.

The first task is to offer a formal semantic account which predicts the above observations about *'ja'*. Of particular interest in this connection is the question as to whether such an account can be given as a natural extension of the proposals Lindner (1991); Kratzer (1999, 2004); Karagjosova (2004); Zimmermann (to appear) and others have made about simpler, non-quantificational sentences. I will argue that the answer is affirmative; indeed, the predictions follow rather straightforwardly from an implementation of the usual analysis of *'ja'* in a standard dynamic formal framework. This implementation is developed and discussed in detail in Section 4.

As I already mentioned, I consider the semantic contribution of *'ja'* to be a special kind of presupposition. Once this claim is clarified and fleshed out in Section 4,

---

[6]Why this is the case is an interesting question, but one that is orthogonal to my present concerns.

the next question that needs to be addressed is whether and how this semantic contribution differs from "ordinary" presuppositions. Above I have repeatedly alluded to an vague but clearly felt distinction between "weak" and "strong" presuppositions, which intuitively has to do with the ease with which the presuppositions in question can be accommodated. In Section 4.4 I make this intuitive difference formally precise. It turns out that in a certain sense, the contribution of 'ja' is a presupposition *par excellence* as far as its projection behavior is concerned.

The final questions concerns the status of the contribution of 'ja' as expressive meaning. I return to this question in Section 5.2, without however solving it conclusively. I will show that the contribution of 'ja' differs from that of "ordinary" carriers of expressive meaning no less than it does from "ordinary" presupposition triggers. But just as the latter differences only call for a more nuanced view on the phenomenon of presupposition (or so I argue), so too the former do not conclusively show that an analysis from the perspective of expressive meaning would not be useful in illuminating some facets of 'ja'.

4 Analysis

The formal framework in which I spell out the semantic analysis is inspired in part by Groenendijk et al. (1996), but modified to suit the purposes of the present analysis. In this section I introduce the main ingredients of the formal analysis and show how it accounts for the peculiar projection behavior of the contribution of 'ja'. The system is further extended below.

In dynamic semantics, the effect of an assertion is usually modeled by applying the corresponding *Context-Change Potential* (CCP) to some formal object, typically a representation of the hearer's belief state or of the common ground between the interlocutors. Clearly, though, this is not a complete depiction of what goes on in reality. It glosses over numerous intermediate steps, background inferences and tacit negotiations, which are needed in order for communication to succeed but are left out of the picture for simplicity and convenience.[7] This paper is no exception. I am mainly interested in discourse referents and the interlocutors' beliefs about them. This is where the formal part is most explicit and detailed. Other aspects of communication receive the same simplifying treatment that they are given in most

---

[7]To mention but a few: First, the hearer must recognize the utterance as a communicative act whose point is to offer its content φ for addition to the common ground. Second, he must believe that the speaker is sincere – i.e., that she would not offer up φ unless she believed φ. Third, he must believe that the speaker is epistemically competent on the subject matter – i.e., that she would not believe φ unless φ were true. Finally, a variety of *grounding* devices are employed to ensure that the interlocutors end up agreeing on whether φ actually did end up in the common ground.

dynamic accounts. In Section **??**, I do give a brief informal overview of what I believe a complete account would have to look like.

4.1 Formal framework

Some of the following definitions will be revised in the next subsection. They are marked as "first versions." I start with three disjoint non-empty sets, W (possible worlds), D (individuals), and $\mathbb{X}$ (discourse referents). Strictly speaking, worlds and individuals are part of the *model*, whereas discourse referents belong to the formal *language* to be defined below. Interlocutors' beliefs and the common ground between them are modeled in terms of *possibilities*, or world-assignment pairs:

Definition 1 (Possibilities – first version)
The set I of possibilities *is defined as follows:*

$$I = \{\langle w, g \rangle | w \in W, g \in D^X, X \subseteq \mathbb{X}\}$$

Thus each possibility contains, in addition to a possible world, a function from some set of discourse referents to individuals (D is constant across all worlds). The referents in the domain of g are the *active* discourse referents. As will become clear below, their number increases whenever a new referent is introduced into the discourse, as is the case with indefinite noun phrases.

For the purposes of this paper, I make two simplifying assumptions about referents not made by Groenendijk et al.: that the set of active referents is shared between interlocutors, and that quantifiers always introduce "fresh" referents (i.e., ones that are not already active). As Groenendijk et al. discuss, these assumptions are strictly speaking unrealistic: All that is shared between interlocutors is the set of pronouns and other referring expressions in use, and these linguistic items should not be confused with discourse referents. Moreover, these expressions can be reused and reassigned to new referents as the discourse evolves. To address this issue, Groenendijk et al. use *referent systems*, in which pronouns are assigned to individuals only indirectly, through the mediation of "pegs." I avoid this layer of complexity here for the sake of exposition, not thereby denying the utility of pegs in general.

Interlocutors' *belief states* are defined as accessibility relations between possibilities:

Definition 2 (Belief state)
A belief state *is a relation $B \subseteq I \times I$ which is serial, transitive, and euclidean.*[8]

---

[8] Serial: $\forall i \exists j. iBj$. Transitive: $\forall i, j, k. (iBj \wedge jBk) \rightarrow iBk$. Euclidean: $\forall i, j, k. (iBj \wedge iBk) \rightarrow jBk$.

These conditions ensure that belief states are consistent and introspective (see Fagin et al., 1995; Stalnaker, 2002; Kaufmann, 2005; Kaufmann et al., 2006; Portner, 2009, among others, for more discussion). As it stands, the definition does not require that all possibilities within or across interlocutors' belief states have the same set of active referents. It may be useful for some purposes to model a situation in which, for instance, the speaker does not know which discourse referents the hearer considers active. I have no occasion to make use of this option, however, thus I assume implicitly throughout that there is no uncertainty at any time regarding the set of active referents.

The *common ground* between two or more agents is modeled in terms of their respective belief states, following Stalnaker (2002). Formally, it is the transitive closure of the union of their respective accessibility relations:

Definition 3 (Common ground)
The common ground $C_{\alpha_1,\dots,\alpha_k}$ *between agents* $\alpha_1, \dots, \alpha_k$ *is the transitive closure of* $\bigcup_{1 \le i \le k} B_{\alpha_i}$.

In this paper I am exclusively concerned with the special case of two agents s, h and their common ground $C_{s,h}$. According to Definition 3, $i_0\, C_{s,h}\, i_n$ just in case there is a sequence $i_0 \dots i_n$ with either $i_m\, B_s\, i_{m+1}$ or $i_m\, B_h\, i_{m+1}$ for all $m < n$. The relation $C_{s,h}$ is serial and transitive if B_s and B_h are, but it is not generally euclidean, even if B_s and B_h are, unless s and h have mutually compatible beliefs (i.e., unless there are possibilities accessible via both B_s and B_h). In the following, I will drop the subscripts from $C_{s,h}$ because this will cause no confusion in the two-person setup I will be discussing.

Speakers and hearers generally do not know the *actual* common ground, which is therefore of little use in explaining their linguistic behavior. They do have *beliefs* about each other's beliefs and the common ground, however. For instance, the speaker's beliefs about the common ground, or "the common ground according to s," which will play a role in explaining the use of *'ja'*, is represented by the relation $B_s \circ C$, which comprises all possibilities that are compatible with what the speaker believes to be in the common ground.

When new discourse referents are activated, they are added to the domain of the assignment function and assigned randomly to individuals. Formally, this involves an *activation relation* between possibilities, defined for each discourse referent:

Definition 4 (Referent activation – first version)
For each $x \in \mathbb{X}$, *an* activation relation $|x|$ *in* $I \times I$ *is defined as follows:* $\langle w, g \rangle |x| \langle w', g' \rangle$ *iff (i)* $w = w'$; *(ii)* $x \notin dom(g)$; *(iii)* $dom(g') = dom(g) \cup \{x\}$; *and (iv)* $g'(y) = g(y)$ *for all* $y \in dom(g)$. *Furthermore, for each* $x \in \mathbb{X}$, *relation* $[x]$ *is defined for* $(I \times I) \times (I \times I)$ *as follows:* $\langle i, j \rangle [x] \langle i', j' \rangle$ *iff* $i|x|i'$ *and* $j|x|j'$.

The possibilities related by $[x]$ share the same world and agree on the assignment for all referents that are already active. The extension to pairs of possibilities facilitates the use of referent activation in the definition of belief update. First, I adapt from Groenendijk et al. (1996) the notion of *subsistence*.

Definition 5 (Subsistence)
A pair $\langle i, j \rangle$ subsists in B' iff for some $\langle i', j' \rangle \in B'$, there is a sequence of zero or more discourse referents $x_1, \ldots, x_n$ such that $\langle i, j \rangle([x_1] \circ \ldots \circ [x_n])\langle i', j' \rangle$.[9]

The language I use for illustration is defined in Definition 6 as a variant of the standard language of first-order logic, with the one exception that expressions of the form '$\exists x$' are treated as formulas in their own right. In Boolean compounds, I will drop parentheses when no ambiguity is likely to result. Below in the illustrations, I use English words as constants instead of symbols like P.

Definition 6 (Language)
For each $n \in \mathbb{N}$, let a set $\mathcal{C}^n$ of n-ary constants be given. The language $\mathcal{L}$ is defined as follows:
   - *For $n > 0$, if $t_1, \ldots, t_n \in \mathbb{X} \cup \mathcal{C}^0$ and $P \in \mathcal{C}^n$, then $P(t_1, \ldots, t_n) \in \mathcal{L}$.*
   - *If $x \in \mathbb{X}$, then $\exists x \in \mathcal{L}$.*
   - *If $\varphi, \psi \in \mathcal{L}$, then $\neg(\varphi), (\varphi \wedge \psi) \in \mathcal{L}$.*

Discourse referents and constants are interpreted at individual possibilities. Their values are given by the assignment function and the world coordinate, respectively, as in Definition 7. If α is an n-ary predicate constant P^n, then $w(\alpha)$ is a relation in D^n.

Definition 7 (Interpretation of constants)
For all $\alpha \in \mathbb{X} \cup \mathcal{C}^n$, $n \geq 0$, and possibilities $i = \langle w, g \rangle \in I$:

$$i(\alpha) = \begin{cases} g(\alpha) & \text{if } \alpha \in \mathbb{X} \\ w(\alpha) & \text{otherwise} \end{cases}$$

With these definitions in place, we can proceed to define the context-change potentials (CCPs) denoted by sentences. CCPs are modeled as functions between

---

[9]Here and below, the symbol '$\circ$' stands for relation composition, read left-to-right: $x(R \circ R')z$ iff for some y, xRy and $yR'z$.

accessibility relations, written in postfix notation in Definition 8.[10,11]

Definition 8 (Belief update – first version)
*A function $[\![\cdot]\!]$ maps formulas to functions from relations in $I \times I$ to relations
in $I \times I$, subject to the following conditions:*

$$B[\![P(t_1, \ldots, t_n)]\!] = \{\langle i,j \rangle \in B | \langle j(t_1), \ldots, j(t_n) \rangle \in j(P)\}$$
$$B[\![\neg\varphi]\!] = \{\langle i,j \rangle \in B | \langle i,j \rangle \text{ does not subsist in } B[\![\varphi]\!]\}$$
$$B[\![\exists x]\!] = \{\langle i',j' \rangle | \text{for some } \langle i,j \rangle \in B, \langle i,j \rangle[x]\langle i',j' \rangle\}$$
$$B[\![\varphi \wedge \psi]\!] = [\![\varphi]\!] \circ [\![\psi]\!]$$

Updates with atomic and negated sentences proceed by elimination of links
from the accessibility relation. Updates with $\exists x$ are not eliminative: They map the
input B to its image under $[x]$, i.e., a relation in which x is active and which other-
wise preserves all the information contained in B (recall the assumption that quan-
tifiers always introduce "fresh" discourse referents). Conjunction is interpreted as
composition, where '$B([\![\varphi]\!] \circ [\![\psi]\!])$' is defined as '$(B[\![\varphi]\!])[\![\psi]\!]$' (see also Footnote 9
above). Other connectives can be defined in terms of these:

(20)
$$[\![\varphi \rightarrow \psi]\!] =_{\mathrm{df}} [\![\neg(\varphi \wedge \neg\psi)]\!]$$
$$[\![\varphi \vee \psi]\!] =_{\mathrm{df}} [\![\neg(\neg\varphi \wedge \neg\psi)]\!]$$
$$[\![\forall x(\varphi \rightarrow \psi)]\!] =_{\mathrm{df}} [\![(\exists x \wedge \varphi) \rightarrow \psi]\!]$$

The notion of *belief* is defined for arbitrary accessibility relations, applicable
to both individual agents' belief states and the common ground.

Definition 9 (Belief)
A sentence φ is believed *at possibility i relative to accessibility relation R, written
$R_i \models \varphi$, iff for all j such that iRj, $\langle i,j \rangle$ subsists in $R[\![\varphi]\!]$. φ is believed relative
to R, written $R \models \varphi$, iff $R_i \models \varphi$ for all i.*

Finally, I turn to *presupposition*. Following Stalnaker (1974, 2002), I define it
as a propositional attitude: To presuppose a sentence is to believe that it is com-

---

[10]Many formal accounts of presupposition assume that CCPs are partial functions, undefined on
belief states which do not support the presuppositions of the content (Heim, 1983; Beaver, 2001,
among others). Although presupposition figures prominently in the present paper, I am interested in
it as a propositional attitude. There is no need for my purposes to complicate the formal framework
by modeling it as a definedness condition on belief updates.

[11]The result of the update may be empty, in which case it is not technically a belief state according
to Definition 2 above. Therefore Definition 8 refers more generically to accessibility relations.

monly believed.[12] As a first approximation, one might define this attitude as follows:

Definition 10 (Speaker presupposition – first version)
The speaker speaker-presupposes φ if and only if (s)he believes that φ is commonly believed, i.e., if and only if $[B_s][C]\varphi$ is true.

As I discuss below, however, Definition 10 does not adequately render Stalnaker's intention. It glosses over some details that will turn out crucial in understanding the mechanics of accommodation and the differentiating between the contribution of *'ja'* the presuppositions introduced by other triggers. For now, I proceed with Definition 10 and note that it is just a formal restatement of the semantic contribution of *'ja'* discussed in Section 2 above. Thus we may say:

Definition 11 (Contribution of *'ja'* – first version)
For declarative sentences φ, 'ja(φ)' is appropriately used only if the speaker is presupposing φ.[13]

4.2 Speaker reference

The last subsection laid out the basic ingredients of the formal model. Before moving on, I introduce a modification required to get a more realistic account of the introduction of discourse referents and the accumulation of information about them.

Clearly information about discourse referents – which ones are active and what is known about them – should be represented in the common ground. Formally, I defined the common ground in terms of the interlocutors' beliefs. In such a model, changes in mutual joint beliefs about discourse referents should likewise emerge from the way in which their introduction and the transmission of information about them affect the beliefs of the speaker and the hearer. Now, in a realistic model of

---

[12]Stalnaker (1974) originally put forth a broader definition: "Presupposing is ...not a mental attitude like believing, but is rather a linguistic disposition – a disposition to behave in one's use of language as if one had certain beliefs, or were making certain assumptions." With this more nuanced definition, Stalnaker included cases of pretense (for the sake of argument, say, or for deception). Later, Stalnaker (2002) states that "[s]peaker presupposition is a propositional attitude of the speaker..." As I understand it, the apparent contrast is merely one of taxonomy: Stalnaker (2002) deals with pretense and similar phenomena under the term "acceptance," a related but weaker notion than belief. This distinction has some useful consequences, which are, however, orthogonal to my concerns.

[13]The locution in Definition 11 is borrowed from Stalnaker (2002, p. 709; also Fn. 14). See Section 4.4 below for more discussion.

communication these operations cannot work indiscriminately on their respective belief states.

Consider for concreteness the simple sentence in (21). The formal framework introduced so far is plausible from the hearer's perspective: The activation of referent x proceeds by random assignment to all individuals in the domain, and once x is activated, the hearer accumulates more information about x by learning that it refers to a worker, and so on.

(21) a. Ein Arbeiter war in der Gewerkschaft.
          one worker   was in the union
          One worker was in the union.
      b. $[\![\exists x]\!] \circ [\![W(x)]\!] \circ [\![U(x)]\!]$

What happens on the speaker's side? Presumably after the activation of x, what she subsequently asserts about it is not new to her: She does not *learn* that x refers to a worker in the same sense in which the hearer does.[14] But if the activation of x is modeled with random assignment on the speaker's side as well as on the hearer's, then the speaker cannot believe at this point that x was a worker unless she believed prior to the introduction of x that *everything* was a worker!

I consider it a truism that when speakers introduce discourse referents in assertions, while they may not know their identity, they do already know what they are going to say about them.[15] Hearers naturally do not share this information. This asymmetry decreases as the speaker imparts information to the hearer, but it may never be removed entirely (nor does it have to be in order for speakers and hearers to reach their practical communicative goals). To model such situations, I appeal to the notion of *the speaker's (intended) reference*.

The extant formal treatments of speaker reference differ in detail, but all assume that the speaker introduces a discourse referent with some implicit *restriction* on the range of individuals it may refer to. In some accounts this simply means that the speaker has more descriptive content in mind than she makes explicit in the indefinite noun phrase that introduces the referent (Kadmon, 1990; Stanley and Gendler-Szabó, 2000; Schwarzschild, 2002, among others). However, van Rooy (2001) shows that while this characterization is appropriate for some cases, it does not generalize well to others. For instance, the speaker may intend the referent to refer to a rigidly designated individual that is not correctly identifiable across

---

[14]What the speaker does learn, if the assertion goes through, is that x's referring to a worker has become an agreed-upon fact about the discourse between herself and the hearer. But this is a higher-order belief about the hearer's beliefs.

[15]This statement may have to be relativized if we are to include discourse in which speakers describe a scene which unfolds before their eyes. I ignore this case here.

worlds by any linguistic description other than *'individual that the speaker has in mind'*.[16]

I use a formulation that covers both of these cases. The idea is that the activation of a discourse referent x has different consequences for the respective belief states of the speaker and the hearer. The implicit restriction accompanying the speaker's introduction of x is represented formally as a property r_x. Its extension may vary between worlds (e.g., *'workers who were in the union'*) or be rigid (e.g., *'these individuals'* (pointing)), and it may be singleton at all worlds (as in *specific* uses) or not. Its extension of r_x at a given world can in principle be any subset of the domain.[17] While r_x may be coextensive, or even "co-intensive," with a predicate of the language, this is not required in general.

A few changes to the definitions are required to implement the idea. First, I add a third parameter r to the possibilities in the model. For each active discourse referent, r records the restriction with which it was introduced by the participant who introduced it.

Definition 12 (Possibilities – final version)
The set of possibilities *is the set I of triples $\langle w, g, r \rangle$ such that $\langle w, g \rangle$ is a possibility according to Definition 1, and $r : dom(g) \mapsto (W \mapsto \wp(D))$ assigns properties to the active discourse referents.*

Secondly, the referent activation relation $[x]$ is restricted to ensure that in each post-update possibility, x is assigned to an individual in the extension of r_x.

Definition 13 (Referent activation – final version)
For each $x \in \mathbb{X}$, the activation relation $|x|$ is redefined as follows: $\langle w, g, r \rangle |x| \langle w', g', r' \rangle$ iff $\langle w, g \rangle |x| \langle w', g' \rangle$ according to Definition 4, and in addition, (i) $x \notin dom(r)$; (ii) $dom(r') = dom(r) \cup \{x\}$; (iii) $r'(x') = r(x')$ for all $x' \in dom(r)$; and (iv) $g'(x) \in r'(x)(w')$.[18] The relation $[x]$ for $(I \times I) \times (I \times I)$ is defined as before.

Finally, the update operation for the introduction of discourse referents is made sensitive to r. This is where the difference between the effect on B_s and that on B_h comes in: After the update, it is commonly believed that (i) the speaker who introduced x knows of some restriction that it is the actual one, and (ii) the hearer does not know what that restriction is.

---

[16]Another motivation for van Rooy's rejection of the descriptive account concerns cases of *pronominal contradiction*, which I will ignore here because it crucially involves a violation of one of the simplifying assumptions I make, *viz.* that the speaker is right about his assertions.

[17]It may be reasonable to impose additional conditions. For instance, one could sensibly require of each r_x that there be some world at which its extension is non-empty. I leave this option open.

[18]Condition (iv) would have to be relaxed in order to allow for pronominal contradiction.

Definition 14 (Belief update – final version)
The update of the speaker's and hearer's belief states with the activation of new discourse referents is redefined as follows:

$$B_s[\exists x] = \{\langle i', j'\rangle | r_{i'}(x) = r_{j'}(x) \text{ and for some } \langle i, j\rangle \in B_s, \langle i, j\rangle[x]\langle i', j'\rangle\}$$

$$B_h[\exists x] = \{\langle i', j'\rangle | \text{for some } \langle i, j\rangle \in B_h, \langle i, j\rangle[x]\langle i', j'\rangle\}$$

These operations result in a difference in the way the possibilities are inter-linked by the respective accessibility relations after the update. On the speaker's side, for a given possibility i', for all j' accessible from i' the restriction $r_{j'}(x)$ is the same (though the extensions of that restriction may vary). Not so for the hearer, for whom all possible restrictions are live doxastic possibilities.[19]

Notice also that both $B_s[\exists x]$ and $B_h[\exists x]$ are euclidean, and so is the new common ground if the prior common ground was. However, $B_h[\exists x] \circ B_s[\exists x]$, the relation representing the hearer's beliefs about the speaker's beliefs, is not: It lacks negative introspection. Intuitively, the hearer knows (i) that some restriction is the intended one, and (ii) that he does not know which it is. The speaker's subsequent linguistic behavior will give her clues as to what it is. The speaker, meanwhile, knows that the hearer does not know which restriction is the actual one and therefore does not share all of the speaker's beliefs about x.

4.3 Explaining the data

Consider the sentence in (22a).[20] As indicated, it conveys the speaker's presupposition (in the above sense) that all workers who were in the union lost their jobs. How does this come about?

(22) a. Ein Arbeiter war in der Gewerkschaft und verlor ja deswegen seinen
        one worker   was in the union   and lost   JA therefore his
        Job.
        job
        One worker was in the union and therefore lost JA his job.
        ≫ All workers who were in the union lost their jobs.
     b. $[\![\exists x]\!] \circ [\![W(x)]\!] \circ [\![U(x)]\!] \circ [\![ja(\text{Lj}(x))]\!]$

---

[19]This is quite likely to be too unrestricted. In reality, there will often be some rather small set of possible restrictions to consider. Accounting for that would require reference to such notions as relevance and awareness, which would lead beyond the concerns of this paper.

[20]This sentence was not discussed in Section 3, but its behavior is as expected on the basis of the discussion there. We will see below that it does not exhibit certain additional complexities arising with subordinating conjunctions like *'weil'* 'because' or *'obwohl'* 'even though'.

Suppose the sentence's denotation (22b) is applied to the hearer's belief state according to the rules outlined above: First, the new discourse referent x is introduced; second, x's range of denotation is narrowed down by eliminating links to possibilities in which x is not assigned to a worker who was in the union. At this point, the *'ja'*-containing clause is encountered, by which the speaker not only informs the listener that x lost his job, but also that the speaker believes this to be already in the common ground. In effect, the speaker adds the comment in (23).[21]

(23)   I (the speaker) know that we both (already) know that x lost his job.

How can the speaker believe that this belief is already shared by the hearer at this point? In the hearer's belief state, x was introduced with random assignment, and all the information conveyed about so far it is contained in the first two updates. Clearly, the only way for the hearer to already believe that x lost his job, he must have believed from the outset, i.e., before x was activated, that *all* workers who were in the union lost their jobs. That is what the speaker must be presupposing in order for her utterance of (22) to be appropriate.

Thus the universal projection of the presupposition is predicted straightforwardly by a combination of standard dynamic semantics with the above interpretation of *'ja'*. The account offered so far explains the other observations in Section 3 as well, not just the behavior of *'ja'* under existential quantification. I only mention a couple of those contexts here. First, recall that proper names do not give rist to universal quantification in the induced presupposition. The relevant example is (10):

(10)   Fritz verlor seinen Job, weil   er ja in der Gewerkschaft war.
       Fritz lost   his   job because he JA *in the union   was*

       Fritz lost his job because he was JA in the union.

       ≫ Fritz was in the union.

This is not surprising under the present analysis: Proper names crucially differ from indefinite noun phrases in that they do not introduce referents with random assignment, but rather have a unique denotation at each possibility. Thus it is not surprising that (10) only presupposes that Fritz was in the union, not that all individuals were.

---

[21]One may quibble with the use of *'know'* vs. *'believe'* in (23). Recall, however, that the properties of belief states stipulated in the definitions above ensure that as long as the interlocutors have consistent beliefs, they cannot conceive of the possibility that their own beliefs are false, hence for them knowledge and belief are indistinguishable.

The behavior of *'ja'* in relative clauses observed in (3.7) is also in line with the account offered above, in particular the contrast between (18a) and (18b), repeated below: It makes sense for the speaker to add a comment regarding a newly introduced discourse referent to the effect that it is already commonly known that its referent loved his wife. But it would make little sense to *restrict* its range of reference to individuals with a property that its referent is already commonly believed to have. On this analysis, the source of the infelicity in (18b) is pragmatic: *'ja'* marks the purported restriction as redundant.

(18) Ein Arbeiter, der ja seine Frau liebte, verlor seinen Job.

    a. ✓A worker, who JA loved his wife, lost his job.　　*[non-restrictive]*
        ≫ All (of these) workers were married and loved their wives.
    b. ✗A worker who JA loved his wife lost his job.　　　　*[restrictive]*

Before turning to some additional observations on the examples in Section 3 which take the discussion beyond the question of how the universal presupposition arises, I discuss some questions about presuppositions in general.

4.4 Accommodation

In Section 4.1 I adopted Stalnaker's formal characterization of presupposition as a propositional attitude: To presuppose φ is to believe that φ is commonly believed. To this, Stalnaker adds the assumption that certain linguistic forms are "appropriately used only if the speaker is presupposing" certain other forms.[22] Definition 11 above borrowed this locution in characterizing the contribution of *'ja'*: *'ja φ'* is appropriately used only if the speaker is presupposing φ. The right understanding of this attitude is instrumental in explaining the projection behavior of this semantic element and its differences and commonalities with other presuppositions.

Stalnaker further assumes that in virtue of the speaker's using a form that can be used appropriately only if she is presupposing φ, the fact that she is presupposing φ becomes automatically part of the common ground.[23] He goes on to show that in such a situation, the hearer's coming to belief φ is sufficient to ensure that φ is

---

[22]This is a somewhat roundabout statement of a relation between sentences, but Stalnaker refrains from treating this relation in its own right as "semantic presupposition." There is no basis for assuming, he argues, that all the possible reasons for which the relation may hold between two sentences constitute a unified semantic phenomenon. Nor would an analysis of the reasons for which it holds be of much help in an effort to explain the pragmatics of presupposing and accommodating. I follow this approach here; in Section 5.2 I return briefly to the question of precisely what kind of meaning is involved.

[23]This to be a consequence of the fact that the speaker's use of the form is a *manifest event*.

indeed commonly believed. This is because the pattern in (24) is valid in the logic of common belief Stalnaker relies on (as I do here):

(24)   It is common belief that the speaker believes that it is common belief that φ
       The hearer believes that φ
       ───────────────────────────────
       It is common belief that φ

One consequence is that in case the speaker *falsely* believes that φ is commonly believed, the hearer can "repair" the situation by making the second premise in (24) true, thus ensuring that the common ground conforms to the speaker's belief after all.

Importantly, though, according to Stalnaker this is *not* what presupposing and accommodating φ consist in. In his discussion (though not in his formal framework), he adds a temporal dimension which is crucial in understanding how his analysis accounts for the fact that new information can be conveyed by presupposing. Stalnaker distinguishes between the time of the utterance on the one hand, and "a (perhaps somewhat idealized) point after the utterance event has taken place, but before it has been accepted or rejected," on the other. The speaker's presupposition is an attitude she has *at* the former *about* the latter. Strictly speaking, then, it is an attitude towards the future: At utterance time, the speaker believes that φ *will be* commonly believed. If the hearer does not yet believe φ at utterance time, the speaker's belief is not therefore false.[24]

This point is subtle, but of great importance. The temporal dimension is crucial in understanding the fine details of the projection and accommodation of various kinds of presuppositional content. Besides Stalnaker's notion of presupposition as an attitude about the future common ground, one as an attitude about the common ground at utterance time can be identified and put to good explanatory use. I propose a corresponding terminological distinction, calling them *weak* and *strong* presupposition, respectively:

Definition 15 (Speaker presupposition – final version)
- *The speaker* weakly *presupposes φ if and only if (s)he believes that φ will be commonly believed (in the immediate future, at the time of the update in question).*

───────────────────

[24]Nor, according to Stalnaker, is the hearer's *post-hoc* coming to believe φ a repair strategy. Typically, the speaker's presupposition becomes virtually self-verifying in virtue of the her use of the form in question. This happens whenever the speaker is mutually believed to be an epistemic expert on the question of whether φ, i.e., when it is assumed that she would believe φ only if φ were true. In this case, the hearer comes to believe φ directly as a result of learning that the speaker presupposes (and thus believes) φ. For the purposes of the present paper, this particular part of Stalnaker's story does not play an essential role.

- *The speaker* strongly *presupposes* φ *if and only if (s)he believes that* φ *is commonly believed (at utterance time).*

Definition 15 is meant to replace the atemporal version in Definition 10 above. As discussed above, Stalnaker's account of accommodation is explicitly designed for (what I call) weak presuppositions. I claim that strong ones do exist, however, and *'ja'* is a case in point.

Definition 16 (Contribution of *'ja'* – final version)
For declarative sentences φ, *'ja* φ' *is appropriately used only if the speaker is strongly presupposing* φ.

The distinction between strong and weak presuppositions has consequences for their behavior in the quantificational contexts we are interested in. Simply put, strong presuppositions cannot be accommodated by the mechanism Stalnaker appeals to. If the speaker strongly presupposes $P(x)$ and is wrong about it (i.e., the listener does not already believe $P(x)$), then the hearer's updating his belief state with $P(x)$, though sufficient to ensure that $P(x)$ is commonly believed, does not resolve the disagreement over the common ground. This is best seen by working through an example in detail. Consider again (22).

(22)   a. Ein Arbeiter war in der Gewerkschaft und verlor ja seinen Job.
          one worker   was in the union   and lost   JA *his   job*
          One worker was in the union and therefore lost JA his job.
          $\gg$ All workers who were in the union lost their jobs.
       b. $[\![\exists x]\!] \circ [\![W(x)]\!] \circ [\![U(x)]\!] \circ [\![ja(Lj(x))]\!]$

Suppose that at the outset, the hearer considers it possible that there were exactly two workers who were in the union – call them a and b – and a lost his job while b did not. Thus the world coordinate in at least one possibility accessible via B_h verifies these facts. Let i be such a possibility. After the activation of x and the update with the information that x was a worker and in the union, there are at least two descendants of i that are accessible via the hearer's new accessibility relation, both sharing the same world coordinate and differing only in that one assigns x to a whereas the other assigns x to b. Call these possibilities $i^{[x/a]}$ and $i^{[x/b]}$. Notice that the hearer does not believe that x lost his job, for he does not believe that b lost his job and he entertains the possibility that x is assigned to b. Now to accommodate, the hearer might update his belief state at this point with $[\![Lj(x)]\!]$. This will make $i^{[x/b]}$ inaccessible (along with any other possibility that maps x to an individual who did not lose his job). As a result, it is indeed common belief that x lost his job. The possibility $i^{[x/a]}$ is of course still accessible

via the hearer's belief state. But recall that in this possibility b is a worker who was in the union and did not lose his job. So even though it is commonly believed that x lost his job, it is not commonly believed that all workers who were in the union lost their jobs.

In a precise sense, therefore, although the presupposition has been accommodated, the disagreement about the common ground has not been resolved. This is easily seen from the fact that in the resulting state, should the speaker choose to utter (22) again (ignoring the pragmatic awkwardness that such a move might entail for independent reasons), her use of *'ja'* would once again be inappropriate.

4.5   Local vs. global accommodation

The account presented here has much in common standard dynamic theories of presupposition projection. In this subsection I discuss this similarity in some detail.

Heim (1983) offered a dynamic account of presupposition projection based on two main premises: First, the presuppositions of a sentence constrain the domain of its Context Change Potential: The update is only defined if the input context supports the sentence's presuppositions. Second, presuppositions triggered in embedded positions must be satisfied *locally*, by the derived contexts involved in processing complex expressions.

Heim herself pointed out that as it stands, this account wrongly predicts that (25a) presupposes (25b).

(25)   a. A fat man was pushing his bicycle.
       b. Every fat man had a bicycle.

Technical details aside, the reason why this prediction is made is essentially the same as what we saw above for *'ja'*: The indefinite subject NP triggers the activation of a discourse referent x which is then restricted to overweight men. Next, the expression *'x was pushing x's bicycle'* is processed, which presupposes that x had a bicycle.[25] According to Heim, infelicity results when a semantic presupposition is not entailed by the common ground at the time the expression containing its trigger is processed. Since the local context after the initial updates holds possibilities for *all* ways of assigning x to fat men, it only entails that x had a bicycle if the original context, prior to any updates, entailed that *every* fat man did. Clearly, however, the sentence does not carry such a strong presupposition. Heim's solution is an appeal to accommodation.

---

[25]Heim treats (semantic) presupposition as a relation between sentences, a move that Stalnaker would be reluctant to make (see Fn. 22 above).

If we view semantic presuppositions as definedness conditions on dynamic updates then the point of accommodation is to map contexts c outside of the domain of a given CCP $[\![\varphi]\!]$ into its domain. Now, if $[\![\varphi]\!]$ is decomposable into a sequence of updates, then a presupposition failure may occur at a non-initial step. Suppose for instance that $[\![\varphi]\!] = [\![\psi]\!] \circ [\![\chi]\!]$, and $c[\![\psi]\!]$ is defined but $(c[\![\psi]\!])[\![\chi]\!]$ is not. In this case there are two obvious ways to accommodate: either by mapping c to a context in the domain of $[\![\varphi]\!]$, or by mapping $c[\![\psi]\!]$ to a context in the domain of $[\![\chi]\!]$. These options are known as *global* and *local* accommodation, respectively. In our example (25a), global accommodation amounts to an update with the information in (26a) (the accommodated information is underlined). In contrast, local accommodation amounts to an update with the information in (26b).

(26) a. <u>Every fat man had a bicycle and</u> a fat man was pushing his bicycle.

[global]

    b. a fat man <u>owned a bicycle and</u> was pushing his bicycle.   *[local]*

Heim suggests, echoing an earlier claim of Gazdar's, that as a general tendency "the global option is strongly preferred, but the local option is also available in certain circumstances that make it unavoidable." However, she notes, the accommodation in a case like (25a), though local, "seems to happen with the ease typical of global ... accommodation." Subsequent proposals aimed at removing the prediction of a universal presupposition (see Beaver, 2001, for an overview and one such proposal) achieved improved descriptive coverage, but it is still an open question why local accommodation is so easily available, perhaps even preferred, in these cases.

As applied to the triggers considered by Heim, this question goes beyond the scope of this paper. For present purposes, what matters is that my proposal amounts to the claim that local accommodation, the preferred strategy according to Heim, is not an option with 'ja'. Nor does this result have to be stipulated – rather, it is a direct consequence of the standard analysis of 'ja' when combined with a detailed account of discourse dynamics. Indeed, considering the fact that the local accommodability of "ordinary" presuppositions was something of a problem for Heim, the contribution of 'ja' turns out to be just the kind of meaning which most seamlessly fits in her account. It is in this sense that I claimed in Section 3.9 that 'ja' is a presupposition trigger *par excellence*.

5   Loose ends

The main body of the paper glossed over some questions that are relevant and important, but whose detailed exploration would have led too far afield. I mention

and briefly discuss three of them in this section: The relation between the structure of the sentence containing *'ja'* and the precise content of the presupposition; the nature of the meaning contributed by *'ja'*; and (what appears to be) the polarity sensitivity of *'ja'*.

5.1 Discourse structure

The first problem is one that I glossed over in Section 4 above. It concerns sentences like the following, which is structurally similar to (8) above:

(27) Einer dieser Arbeiter verlor seinen Job, weil   er ja seinen Chef
     one of these workers lost   his   job because he JA *his   boss*
     verpfiffen   hatte.
     whistle-blown had

   One of these workers lost his job because he blew JA the whistle on his boss.

   ≫ All (of these) workers blew the whistle on their bosses.

   ≫̸ All (of these) workers who lost their jobs blew the whistle on their bosses.

   The presupposition is that all workers blew the whistle, not just those who lost their jobs. In other words, the restriction of the universal quantification in the presupposition does not include all the material that precedes the trigger in the sentence. Thus it seems that the clause containing *'ja'* is evaluated prior to the processing of the information that the worker in question lost his job. I am not ready at this point to give a principled explanation of this fact; I do believe, however, that one might be found in the discourse relation between the sentence's constituent clauses: The second serves as an *explanation* of the first (Kehler, 2002; Asher and Lascarides, 2003; Webber et al., 2003). In support of this hypothesis, notice first that in (28) the restrictor does include all the material preceding the clause containing *'ja'*:

(28) Einer dieser Arbeiter verpfiff   seinen Chef und verlor ja seinen Job.
     one   of these workers whistle-blew his   boss and lost   JA his   job

   One of these workers blew the whistle on his boss and lost JA his job.

   ≫̸ All (of these) workers lost their jobs.

   ≫ All (of these) workers who blew the whistle on their bosses lost their jobs.

That this effect is due to the discourse relation between the clauses, rather than the particular syntactic constructions in which they occur, is clear from the fact that a parallel contrast can be observed in multi-sentence sequences. Consider (29), compared with (30):[26]

(29) Einer dieser   Arbeiter verlor seinen Job. Er hatte ja seinen Chef
      *one   of these workers lost   his   job he had JA *his   boss*
      verpfiffen.
      whistle-blown

      One of these workers lost his job. He had JA blown the whistle on his job.

      ≫ All (of these) workers had blown the whistle on their bosses.

      ⋙ All (of these) workers who lost their jobs had blown the whistle on their bosses.

(30) Einer dieser   Arbeiter verpfiff   seinen Chef. Er verlor ja (daraufhin)
      *one   of these workers whistle-blew his   boss he lost   JA *thereupon*
      seinen Job.
      his   job

      One of these workers blew this whistle on his boss. He lost JA his job (as a result).

      ⋙ All (of these) workers lost their jobs.

      ≫ All (of these) workers who blew the whistle on their bosses lost their jobs.

The only relevant difference between (29) and (30) is that the clause containing *'ja'* is interpreted as an explanation in the former and as "sequential" (Kehler, 2002) in the latter. Exactly how this distinction gives rise to the observed contrast between the presuppositions induced by *'ja'* remains to be worked out.

5.2 Expressive meaning?

The second open question concerns the status of the meaning contributed by *'ja'*. As I discussed in the introduction, Kratzer (1999, 2004) used the case of German

---

[26]In (30), the addition of *'daraufhin'* 'as a result' makes the intended interpretation salient. Without this addition, an interpretation of the second sentence as an explanation for the first would be more prominent, which would again change the content of the presupposition. In general, *'ja'* occurs frequently in explanations; but this is not part of its semantic content, as seen in Section 3.6 above, as well as in sentences like (28) and (30).

'ja' as an illustration of expressive meaning. Jointly with theory-internal assumptions about the way expressive meaning is computed, this view led her to predict that (6) and, more generally, any sentence in which *'ja'* intervenes between an operator and the variable it binds, is ill-formed. Now, the fact that this particular prediction is not borne out may not speak decisively against an analysis of *'ja'* in terms of expressive meaning, but the proponents of such an analysis must face further questions.

First, the fact that *'ja'* can occur in the scope of quantifiers is significant. If the meaning of *'ja'* is to be classified as expressive, then the interaction of expressive meaning with quantifiers is more complex than originally thought. Alternatively, if the inability to intervene between quantifiers and the variables they bind is to be a hallmark (indeed, a diagnostic test) of expressive meaning, then *'ja'* does not belong in that category.

A second and related point concerns the status of expressive meaning *vis-a-vis* presupposition. Kratzer (2004) assumes that the two categories are mutually exclusive. But we may eventually see different kinds of expressive meaning and a partial overlap with, or intrusion into, presupposition (see Schlenker, 2007, for the claim that another presuppositional phenomenon was classified as expressive meaning too hastily).

The third point is that, however the first two are resolved, if the contribution of *'ja'* is to be classified as expressive meaning, then it must be recognized that there are different kinds of the latter. The reason is that the expressions usually cited as prime examples of expressive meaning interact with discourse referents and quantifiers in ways different from *'ja'*.

For instance, drawing generalizations about expressive meaning from the observations about *'ja'*, we might conjecture that expressive meaning that is predicated of a discourse referent introduced by an indefinite noun phrase projects as a universal presupposition, just as we observed with *'ja'*. However, in (31), no universal presupposition is observed. What is conveyed here is that the speaker considers the (specific) worker he is talking about to be a son of a bitch, not all (of these) workers.

(31) Einer dieser   Arbeiter verlor seinen Job, weil   der Hundesohn   in der
       one   of these workers lost   his   job because the son of a bitch in the
       Gewerkschaft war.
       union   was

       One of these workers lost his job because the son of a bitch was in the union.

       ≫ All workers were sons of bitches.

29

Nor do we get a universal projection if the epithet is combined with *'ja'*, as in (32). Here the speaker presupposes that the worker in question was in the union like all other workers, but not that all workers were sons of bitches.

(32) Einer dieser   Arbeiter verlor seinen Job, weil   der Hundesohn   ja in
      one   of these workers lost   his   job because the son of a bitch JA *in*
      der Gewerkschaft war.
      the union   was

      One of these workers lost his job because the son of a bitch was <u>ja</u> in the union.

      ≫ All workers were in the union.
      ≫̸ All workers were sons of bitches.

In its interaction with universal quantifiers, too, the epithet differs from *'ja'*. In line with Kratzer's claims about expressive meaning, (33) is only felicitous if *'der Hundesohn'* 'the son of a bitch' refers anaphorically to a previously introduced individual; it cannot corefer with the variable bound by the universal quantifier. In this it differs from the pronoun *'er'* 'he' in (6), the counterpart of (33). Accordingly, the sentence does not express the speaker's presupposition that all workers were in the union (nor that all workers were sons of bitches).

(33) Jeder dieser   Arbeiter verlor seinen Job, weil   der Hundesohn   in der
      each of these workers lost   his   job because the son of a bitch in the
      Gewerkschaft war.
      union   was

      Each of these workers lost his job because the son of a bitch was in the union.

      ≫̸ All workers were in the union.
      ≫̸ All workers were sons of bitches.

Taken together, these facts suggest that the contribution of *'ja'* differs in important respects from typical cases of expressive meaning. Now, whether it should nevertheless be considered expressive meaning is above all a matter of taxonomy (see Potts, 2003a,b,c, to appear, for attempts to locate this amorphous phenomenon within the landscape of better-known semantic categories). In such a situation, a good understanding of the phenomenon is more urgently needed than a taxonomic label for it.

5.3 Polarity

The last problem I have to mention is that *'ja'* does not seem to occur in the scope of negation or in other downward-entailing contexts. Thus while the sentences in (34a) are perfectly well-formed and interpretable, their counterparts with *'ja'* in (34b) are not.

(34) a. {Keiner / Kaum einer} dieser   Arbeiter verlor seinen Job, {weil   /
            none   hardly any   of these workers lost   his   job   because
          obwohl   } er in der Gewerkschaft war.
          even though   he in the union   was
      b. ✗{Keiner / Kaum einer} dieser   Arbeiter verlor seinen Job, {weil   /
            none   hardly any   of these workers lost   his   job   because
          obwohl   } er ja in der Gewerkschaft war.
          even though   he JA *in the union   was*

The nature of this constraint is not clear to me. It is not predicted by the assumption that *'ja'* triggers a presupposition, nor by assuming that it introduces expressive meaning. It therefore does nothing to decide between those two kinds of meaning. It does limit the range of applicable tests for presupposition-hood, however: We cannot test whether the meaning of *'ja'* projects out of negation.

6   Conclusion

This paper gave a formally precise analysis of the meaning of *'ja'*. The question of how this meaning is to be classified remains unsettled. It seems that no category fits perfectly, but that our understanding of the nature of different kinds of meaning is sharpened by the debate. Meanwhile, we may borrow Stalnaker's locution and say that *'ja(φ)'* is appropriately used only if the speaker is (strongly) presupposing φ. What remains to be determined, then, is how exactly this condition on its felicitous use comes about.

References

Abraham, W., editor. 1991. *Discourse Particles*. John Benjamins.

Asher, N. and A. Lascarides. 2003. *Logics of Conversation*. Cambridge University Press.

Beaver, D. 2001. *Presupposition and Assertion in Dynamic Semantics*. CSLI Publications and Folli.

Cherniak, C. 1986. *Minimal Rationality*. MIT Press.

Dahl, J. 1985. *Ausdruckmittel für Sprechereinstellungen im Deutschen und Serbokroatischen*. PhD thesis, München.

Fagin, R., J. Y. Halpern, Y. Moses, and M. Y. Vardi. 1995. *Reasoning about Knowledge*. MIT Press.

Groenendijk, J., M. Stokhof, and F. Veltman. 1996. Coreference and modality. In Lappin, S., editor, *The Handbook of Contemporary Semantic Theory*, pages 179–213. Blackwell.

Heim, I. 1983. On the projection problem for presuppositions. In Barlow, M., D. Flickinger, and M. Wescoat, editors, *Proceedings of WCCFL 2*, pages 114–125. Stanford University.

Helbig, G. 1988. *Lexikon deutscher Partikeln*. Verlag Enzyklopädie, Leipzig.

Kadmon, N. 1990. Uniqueness. *Linguistics and Philosophy*, 13:273–324.

Karagjosova, E. 2004. *The Meaning and Function of German Modal Particles*. PhD thesis, Saarland University, Saarbrücken, Germany.

Kaufmann, S. 2005. Conditional truth and future reference. *Journal of Semantics*, 22:231–280.

Kaufmann, S. 2009. On the projection of expressive presuppositions. Presented at the Workshop on Expressives and Other Kinds of Non-truth-conditional Meaning, DGfS 31, University of Osnabrück.

Kaufmann, S., C. Condoravdi, and V. Harizanov. 2006. Formal approaches to modality. In Frawley, W., editor, *The Expression of Modality*, pages 71–106. Mouton de Gruyter.

Kehler, A. 2002. *Coherence, Reference and the Theory of Grammar*. CSLI Press.

Kratzer, A. 1999. Beyond *Ouch* and *Oops*: How descriptive and expressive mean-

ing interact. Handout, Cornell Conference on Theories of Context Dependency. semanticsarchive.net [January 2004].

Kratzer, A. 2004. Interpreting focus: Presupposed or expressive meanings? A comment on Geurts and van der Sandt. *Theoretical Linguistics*, 30:123–136.

Lagerwerf, L. 1998. *Causal Connectives Have Presuppositions: Effects on Coherence and Discourse Structure*. Holland Academic Graphics.

Lindner, K. 1991. Wir sind ja doch alte Bekannte: The use of German *ja* and *doch* as modal particles. In Abraham (1991), pages 163–201.

Portner, P. 2009. *Modality*. Oxford University Press.

Potts, C. 2003a. Expressive content as conventional implicature. In Kadowaki, M. and S. Kawahara, editors, *Proceedings of NELS 33*. GLSA.

Potts, C. 2003b. Expressive content as performative content. http://people.umass.edu/potts/class10-expressives-as-performatives-4up.pdf. [February 2004].

Potts, C. 2003c. *The Logic of Conventional Implicatures*. PhD thesis, UC Santa Cruz.

Potts, C. to appear. Conventional implicature and expressive content. In Maienborn, C., K. von Heusinger, and P. Portner, editors, *Semantics: An International Handbook of Natural Language Meaning*. De Gruyter.

van Rooy, R. 2001. Exhaustivity in dynamic semantics: Referential and descriptive pronouns. *Linguistics and Philosophy*, 24:621–657.

Schlenker, P. 2007. Expressive presuppositions. Ms., UCLA and Institut Jean-Nicod.

Schwarzschild, R. 2002. Singleton indefinites. *Journal of Semantics*, 19:289–314.

Stalnaker, R. 1974. Pragmatic presuppositions. In Munitz, M. K. and P. K. Unger, editors, *Semantics and Philosophy: Essays*, pages 197–213. New York University Press.

Stalnaker, R. 2002. Common ground. *Linguistics and Philosophy*, 25:701–721.

Stanley, J. and Z. Gendler-Szabó. 2000. On quantifier domain restriction. *Mind and Language*, 23:219–261.

Wassermann, R. 2000. *Resource-Bounded Belief Revision*. PhD thesis, University of Amsterdam, The Netherlands.

Webber, B., M. Stone, A. Joshi, and A. Knott. 2003. Anaphora and dicourse structure. *Computational Linguistics*, 29(4):545–587.

Zimmermann, M. to appear. Discourse particles. In Portner, P., C. Maienborn, and K. von Heusinger, editors, *Handbook of Semantics*. Mouton de Gruyter, Berlin.