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POLARITY PARTICLE RESPONSES AS A WINDOW ONTO THE INTERPRETATION OF QUESTIONS AND ASSERTIONS

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This article provides an account of the distribution and interpretation of POLARITY PARTICLES in responses, starting with *yes* and *no* in English, and then extending the coverage to their crosslinguistic kin. Polarity particles are used in responses to both declarative and interrogative sentences, and thus provide a window onto the semantics and discourse effects of such sentences. We argue that understanding the distribution and interpretation of polarity particles requires a characterization of declaratives and interrogatives that captures a series of challenging similarities and differences across these two sentence types. To meet this challenge we combine and extend insights from inquisitive semantics, dynamic semantics, and commitment-based models of discourse. We then provide a full account of the English data that leads to a typology of polarity particles and a series of crosslinguistic predictions. These predictions are checked against data from Romanian, Hungarian, French, and German, languages that contrast with English in that they have ternary polarity particle systems, and contrast with one another in further subtle ways.*

Keywords: polarity particles, questions, assertions, inquisitive semantics, dynamic semantics, commitment-based discourse models, crosslinguistic semantics

> 'I don't think I know what you mean,' she said; 'you use too many metaphors; I could never understand allegories. The two words in the language I most respect are *yes* and *no*.'
> (Mrs. Touchett in Henry James's *The portrait of a lady*)

1. INTRODUCTION. Across languages, responses to questions and assertions often involve so-called POLARITY PARTICLES. We illustrate with *yes* and *no*, the two polarity particles of English.

(1) Amy left.
  a. Yes(, she did).
  b. No(, she didn't).
(2) Did Amy leave?
  a. Yes(, she did).
  b. No(, she didn't).

This article addresses a number of issues concerning the distribution and interpretation of such particles, in English and beyond. Our point of departure is the basic observation that polarity particles are ANAPHORIC, in the sense that they require a suitable antecedent, and their interpretation is dependent on this antecedent. As with anaphoric expressions in general, a full account of polarity particles thus requires a proper understanding of the expressions that provide their antecedents. Or, put more optimistically, investi-

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gating the distribution and interpretation of polarity particles may tell us something about the interpretation of the expressions that they are used to respond to as well. In this sense, polarity particles offer a window onto the interpretation of questions and assertions. As such, their investigation is not only interesting in its own right, but potentially has broader repercussions as well.

The article proceeds as follows. First, we provide an overview of the empirical landscape, presenting a number of puzzling observations about polarity particles and identifying, based on these observations, the broader issues that need to be addressed (§2). Driven by these empirical considerations, we then formulate in §3 a list of desiderata for a semantic theory of declaratives and interrogatives, which need to be met in order to establish a suitable basis for an account of polarity particles. Subsequently, we develop a theory that satisfies these desiderata, bringing together and extending insights from inquisitive semantics (e.g. Ciardelli et al. 2013a), dynamic semantics (e.g. Karttunen 1969, Kamp 1981, Heim 1982, Groenendijk & Stokhof 1991), and commitment-based discourse models (e.g. Gunlogson 2001, Farkas & Bruce 2010). Next, we present our account of polarity particles, first considering the details of English and then deriving a series of predictions about the typology of polarity particle systems crosslinguistically (§4). These predictions are tested against data from Romanian, Hungarian, French, and German in §5, and some further repercussions of our theory, beyond the proper realm of polarity particle responses, are discussed in §6. We compare our analysis with previous approaches in §7, and then conclude (§8).

2. Overview of the empirical landscape.

2.1. Licensing conditions. The most basic challenge with regard to polarity particles is to characterize the precise range of discourse initiatives that license polarity particle responses, and to understand how these initiatives differ from those that do not license such responses. We have seen in 1 and 2 above that both assertions and polar questions license polarity particle responses. By contrast, wh-questions do not, as illustrated in 3.

(3) Who left?
  a. *Yes, Amy did.
  b. *No, Amy didn't.

One specific task, then, is to characterize what it is that assertions and polar questions have in common in this regard, and what sets them apart from wh-questions. Moreover, if we look beyond these three basic types of initiatives, further issues arise. In particular, in the domain of disjunctive questions we find some intriguing contrasts. For instance, it needs to be explained why 4 and 5 below, which at first glance seem perfectly equivalent, differ in their potential to license polarity particle responses (full-sized upward and downward arrows are used in these examples and throughout the article to indicate rising and falling pitch, respectively).

(4) Is the door open↑ or is it closed↓?
  a. *Yes, it is.
  b. *No, it isn't.
(5) Is the door open↑ or is it not open↓?
  a. Yes, it is.
  b. No, it isn't.

2.2. Sensitivity to polarity of the antecedent. A second general phenomenon that stands in need of explanation, in fact already foreshadowed by the contrast between

4 and 5, is the sensitivity of polarity particle responses to the polarity of their antecedent. Consider, for instance, the use of polarity particles in agreeing and disagreeing responses to the plain positive assertion in 6 and to its negative counterpart in 7 (small capitals indicate obligatory contrastive stress).

(6) Peter passed the test.
 a. agreement: Yes, he did./*No, he did.
 b. disagreement: *Yes, he didn't./No, he didn't.

(7) Peter didn't pass the test.
 a. agreement: Yes, he didn't./No, he didn't.
 b. disagreement: Yes, he DID./No, he DID.

We see that in responses to positive assertions, the division of labor between *yes* and *no* is clear: *yes* is used to express agreement, and *no* is used to express disagreement. In responses to negative assertions, however, this division of labor is no longer in force; indeed, both particles can be used in either type of response. A similar pattern is found when we consider responses to positive and negative polar questions rather than assertions.[1]

In languages other than English, we also find polarity particles that are clearly sensitive to the polarity of their antecedent. For instance, the French particle *oui* can be used in response to positive initiatives, but not in response to negative ones, while the particle *si* exhibits exactly the opposite pattern. A third particle, *non*, can be used in response to both types of initiatives, but in one case it signals agreement with the antecedent, while in the other it signals disagreement.

(8)	Claude est à la maison.		'Claude is home.'
a.	agreement:	Oui/*Non/*Si, elle y est.	'Yes, she is.'
b.	disagreement:	Non/*Si/*Oui, elle n'y est pas.	'No, she isn't.'
(9)	Claude n'est pas à la maison.		'Claude is not home.'
a.	agreement:	Si/*Non/*Oui, elle y est.	'No, she isn't.'
b.	disagreement:	Non/*Oui/*Si, elle n'y est pas.	'Yes, she IS.'

2.3. Bare particle responses. A third general issue concerns the status of BARE polarity particle responses, in comparison with responses in which the particle is accompanied by an explicit prejacent. In some cases, bare particle responses are considerably less felicitous than ones with an explicit prejacent. Responses to negative assertions and polar questions are a notorious case in point.

(10) Did Peter not pass the test?/Peter didn't pass the test.
 a. ?Yes./✓Yes, he didn't pass./✓Yes, he DID pass.
 b. ?No./✓No, he didn't pass./✓No, he DID pass.

The exact status of bare particle responses to such negative initiatives has been investigated experimentally by Kramer and Rawlins (2012). We briefly review their experimental set-up and results, as well as the main generalizations that emerge from these results.

In 11 and 12 below are two examples of the experimental items used by Kramer and Rawlins. Each item consisted of a context, a question, and a bare particle response to that question. The question was either POSITIVE, as in 11, or NEGATIVE, as in 12; the answer was either *yes*, as in 12, or *no*, as in 11; and the context was either POSITIVE in the sense that it verified the sentence radical of the question, as in 11, or NEGATIVE in the

[1] See Brasoveanu et al. 2013 for experimental work corroborating the acceptability of both *yes* and *no* in agreeing responses to negative assertions, as well as a significant preference for *no* over *yes* in simple cases like 148 below.

sense that it falsified the sentence radical of the question, as in 12 (the sentence radical of the question in 12 is taken to be 'John took his vacation').

(11) [Context: John was supposed to send an email to a customer. Bill helped John write it and finally send it. Sue wasn't involved at all and doesn't know this.] (POS)
Sue: Did John send the email? (POS)
Bill: No. (NEG)

(12) [Context: John was planning to take a vacation soon. Bill is John's boss and knows that he didn't go on vacation. Sue just noticed John's car in the parking lot.] (NEG)
Sue: Did John not take his vacation? (NEG)
Bill: Yes. (POS)

Participants were asked to assess (i) the felicity of the answer on a scale of 1–7, and (ii) the truth of the answer in the given context, picking one of three available options: *true*, *false*, and *unsure*.

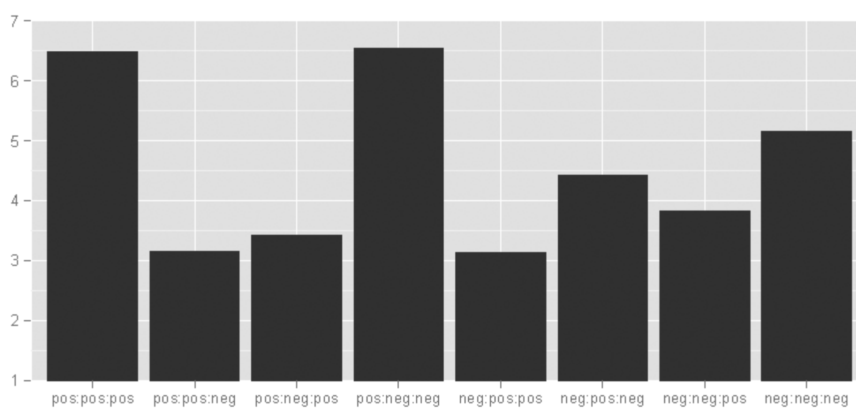


FIGURE 1. Felicity judgments, where conditions are coded as question : answer : context.

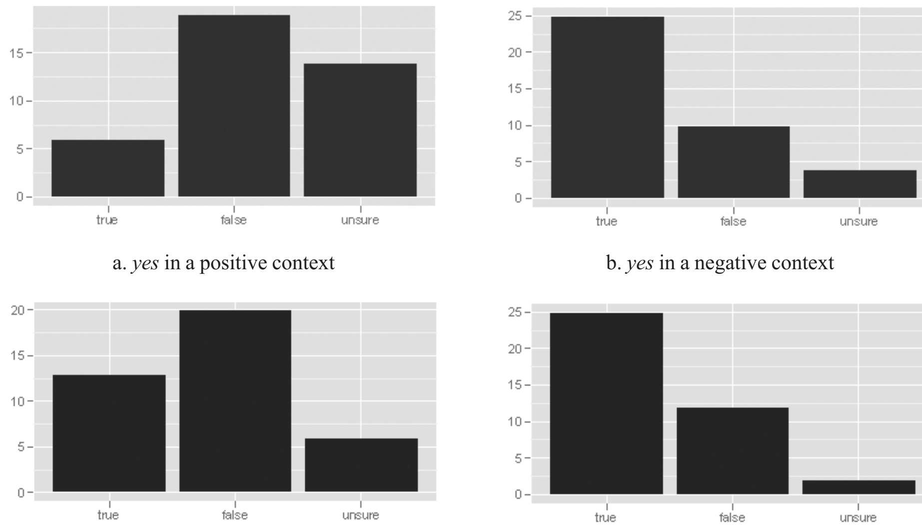
The felicity judgments obtained for all 2 × 2 × 2 = 8 conditions are given in Figure 1, which is taken from Kramer & Rawlins 2012. The main generalizations that can be drawn from these results are the following (Kramer and Rawlins themselves focus on the second).

(13) GENERALIZATIONS FROM FELICITY JUDGMENTS

F1: Bare particle responses to negative polar questions are less felicitous than truthful bare particle responses to positive polar questions (each of the last four bars in Fig. 1 is lower than the first and the fourth bars).

F2: In response to negative polar questions, both bare *yes* and bare *no* are less felicitous when the context is positive than when the context is negative (the fifth bar is lower than the sixth, and the seventh bar is lower than the eighth). Kramer and Rawlins explicitly report that this difference is significant, both for *yes* and for *no*.

The results also suggest that in response to negative polar questions, bare *no* is less infelicitous than bare *yes*, both when the context is positive and when the context is negative (the fifth bar is lower than the seventh, and the sixth is lower than the eighth). However, Kramer and Rawlins report that these differences are statistically not significant.



a. *yes* in a positive context

b. *yes* in a negative context

c. *no* in a positive context

d. *no* in a negative context

FIGURE 2. Truth-value judgments for answers to negative questions.

Turning now to truth-value judgments, the results for negative questions are plotted in Figure 2, again taken from Kramer & Rawlins 2012. The results for positive questions did not involve any surprises—that is, *yes* was judged true in positive contexts and false in negative contexts, and *no* the other way around—and are therefore not explicitly displayed here. Again, two main generalizations can be drawn from these results.

(14) GENERALIZATIONS FROM TRUTH-VALUE JUDGMENTS

T1: Bare particle responses to negative polar questions are ambiguous. They are interpreted much more equivocally than bare particle responses to positive polar questions.

T2: In response to a negative polar question, schematically of the form $?\neg p$, both *yes* and *no* are more often interpreted as confirming $\neg p$ than as rejecting $\neg p$.

The pairs of generalizations in 13 and 14 provide a nuanced characterization of the status of bare particle responses to negative polar questions, and we assume here that they extend to bare particle responses to negative assertions as well. Accounting for these generalizations is an important empirical challenge for theories of polarity particle responses, and has indeed been the main focus of a number of recent proposals (in particular those of Kramer & Rawlins 2009, 2010, 2012 and Holmberg 2013, which we discuss in some detail in §7).

Now let us take a step back from the specific case of negative polar questions (and assertions) and return to the general phenomenon that bare particle responses are sometimes much less felicitous than ones with an explicit prejacent. This phenomenon also manifests itself in responses to open disjunctive questions, that is, disjunctive questions with rising intonation on each of the disjuncts (unlike CLOSED disjunctive questions, also referred to as ALTERNATIVE QUESTIONS, which have falling intonation on the final disjunct; cf. Pruitt & Roelofsen 2013). An additional feature of open disjunctive questions is that they exhibit a puzzling asymmetry between *yes* and *no* responses; that is, while bare *yes* is infelicitous, bare *no* is perfectly acceptable (Roelofsen & van Gool 2010).

(15) [Context: Amalia wants to write a letter to Igor, who is Russian. She doesn't speak Russian, so she would like to know whether Igor speaks any other languages that she could write in.]
Does he speak English↑, or French↑?
a. #Yes./✓Yes, he speaks English./✓Yes, he speaks French.
b. ✓No./✓No, he only speaks Russian.

Intuitively, a bare *yes* response confirms that Igor speaks either English or French, but this is not sufficient to resolve the given issue. This can be overcome by adding an explicit prejacent that confirms one of the disjuncts. In the case of a bare *no* response, the given issue is immediately resolved, even without an explicit prejacent, albeit not in one of the ways the questioner had hoped for.

There are also cases in which the infelicity of a bare particle response cannot be overcome by adding an explicit prejacent. One case in point is that of constituent questions, exemplified in 3 above. Another case is that of closed disjunctive questions. Interestingly, while in form such questions differ from open disjunctive questions only in that they involve falling intonation on the final disjunct, the two question types differ radically in their potential to license polarity particle responses.

(16) [Context: Amalia wants to write a letter to Igor. She knows that he speaks either English or French, but she doesn't remember which.]
Does he speak English↑, or French↓?
a. #Yes./#Yes, he speaks English./#Yes, he speaks French.
b. #No./#No, he doesn't speak either./#No, he speaks both.

These contrasts show that while in some cases bare particle responses may be infelicitous because of underspecification or ambiguity, as in 10 and 15, in other cases there appears to be a stronger reason for their unacceptability, which is not overcome even if the putative ambiguity is resolved by an explicit prejacent, as in 3 and 16.

2.4. Commitments and conversational crises. A fourth aspect of polarity particle responses that needs to be captured concerns the discourse commitments they give rise to, and how these relate to the commitments resulting from the initiatives they target. The main contrast is between responses to assertions and responses to questions. While the former may give rise to a 'conversational crisis', a situation in which two discourse participants have made incompatible commitments, the latter never do.

(17) Amy left.
a. Yes, she did. ⇝ no crisis
b. No, she didn't. ⇝ crisis

(18) Did Amy leave?
a. Yes, she did. ⇝ no crisis
b. No, she didn't. ⇝ no crisis

While in English the distribution of polarity particles does not seem to be sensitive to the distinction between responses that lead to a conversational crisis and those that do not, in other languages we do find that this distinction constrains the distribution of polarity particles in systematic ways. In Romanian, for instance, the particle combination *ba nu* can be used in a negative response to a positive assertion, as in 19b, but not in a negative response to a positive question, as in 20b.

(19) Paul a telefonat. 'Paul called.'
a. Da. 'Yes, he did.'
b. Nu./Ba nu. 'No, he didn't.'

(20) A telefonat Paul? 'Did Paul call?'
  a. Da. 'Yes, he did.'
  b. Nu./*Ba nu. 'No, he didn't.'

2.5. POLARITY PARTICLES CROSSLINGUISTICALLY: COMMON CORE AND CONSTRAINTS ON VARIATION. This brings us to the final fundamental issue, which concerns the crosslinguistic typology of polarity particle systems. What, if anything, is the common core of all these systems, and what are the main constraints on the variation that exists between them? As mentioned in the introduction, our initial focus is on English. However, taking inspiration from Pope (1976), our aim is not just to account for the details of the English polarity particle system as such, but also to distinguish aspects of the system that are likely to be language-specific from those that may be universal. Furthermore, we identify principled constraints on how polarity particle systems may differ from language to language. The typological predictions that these considerations give rise to are tested against data from Romanian, Hungarian, French, and German, a group of languages that contrast with English in that they have three polarity particles, as already illustrated above for Romanian and French, and further contrast with one another in ways that allow us to test our typological predictions in quite some detail.

3. SEMANTICS AND CONTEXTUAL EFFECTS OF DISCOURSE INITIATIVES. The above empirical considerations underline the fact that an account of polarity particle responses can only be given in tandem with an account of the initiatives that they target, and that provide their antecedents. Moreover, the phenomena that we have surveyed place a number of concrete requirements on the general architecture of such an account, which are formulated and discussed in §3.1. In order to meet these requirements, it will be necessary to combine and extend insights from inquisitive semantics, dynamic semantics, and commitment-based discourse models. We do so in §§3.2–3.4, concentrating first on the semantic framework and then on the representation of discourse contexts and the way in which these contexts are updated when an utterance is made.

A brief terminological note: henceforth we use the terms DECLARATIVE and INTERROGATIVE to designate the different sentence types we are concerned with, and ASSERTION and QUESTION to talk about the discourse moves that are typically performed using these types of sentences.

3.1. REQUIREMENTS. Below we formulate four general requirements on the architecture of a suitable account of discourse initiatives, arising from the empirical considerations regarding polarity particles discussed above.

INFORMATIVE AND INQUISITIVE CONTENT. Since polarity particle responses can target both questions and assertions, our account of discourse initiatives needs to be cast within a semantic framework that allows for a uniform analysis of declarative and interrogative sentences, capturing not only the differences, but also the relevant similarities between the two. The framework of INQUISITIVE SEMANTICS (Ciardelli et al. 2013a, among others) is eminently suitable for this purpose. The main features of this framework are reviewed below.[2]

[2] Inquisitive semantics builds on much previous work on the semantics of questions (Hamblin 1973, Karttunen 1977, Groenendijk & Stokhof 1984, Groenendijk 1999, among others) and on disjunction and indefinites in the framework of ALTERNATIVE SEMANTICS (von Stechow 1991, Kratzer & Shimoyama 2002, Simons 2005, Alonso-Ovalle 2006, Aloni 2007, among others). For a detailed discussion of the historical context of inquisitive semantics and its advantages with respect to previous approaches, see Ciardelli & Roelofsen 2011, Ciardelli et al. 2013a,b, Roelofsen 2013a.

Anaphoric potential. Since polarity particle responses require a suitable antecedent, and since their interpretation depends on the nature of this antecedent, our account of discourse initiatives should capture the range of suitable antecedents that is made available by the different kinds of initiatives. To achieve this, we have to give the basic inquisitive semantics framework a dynamic twist. In dynamic semantics, anaphoric dependencies are standardly captured in terms of discourse referents. For instance, in a sentence like *One of the girls lost her raincoat*, the determiner phrase *one of the girls* is taken to introduce a discourse referent, which then serves as the antecedent of the anaphoric pronoun *her*. Similarly, discourse initiatives can be taken to introduce certain propositional discourse referents, which may then serve as the antecedents of subsequent polarity particle responses.

Polarity sensitivity. We have seen that polarity particle responses not only require a suitable antecedent, but also are sensitive to the polarity of their antecedent. Thus, our account of initiatives should not just characterize the discourse referents that each type of initiative introduces, but also characterize these discourse referents as being either positive or negative, depending on the nature of the initiative that introduces them. Notice that, again, this is parallel to what we find with other kinds of anaphoric dependencies. For instance, in many languages anaphoric pronouns are sensitive to the grammatical gender of their antecedents, which means that the relevant discourse referents need to be characterized as being, for example, either masculine or feminine.

Discourse commitments. We have seen that the distribution of polarity particles is, in some languages, sensitive to the distinction between responses that lead to a conversational crisis—that is, incompatible discourse commitments—and those that do not. Thus, a suitable account of discourse initiatives should explicitly characterize the discourse commitments that each kind of initiative gives rise to. Moreover, this characterization should be as general and uniform as possible.

Our aim in the remainder of this section is to develop an account of the semantics and contextual effects of questions and assertions that satisfies the requirements listed above in a minimal way, that is, without adding any unnecessary complexity. We lay out the basic inquisitive semantics framework that we take as our point of departure in §3.2, enrich this framework with discourse referents in §3.3, and specify how discourse contexts are represented and updated in §3.4.

3.2. Inquisitive semantics. Inquisitive semantics starts from the observation that one of the primary functions of language is to enable the exchange of information. That is, language is used both to provide and to request information. This means that sentences in natural language can have both informative and inquisitive potential.

In classical logic, and in most work on natural language semantics, the meaning of a sentence is identified with its informative content. A classical proposition is a set of possible worlds, embodying a piece of information. When asserting a sentence, a speaker is taken to provide the information that the actual world is located in the proposition expressed by the sentence.

In inquisitive semantics, the proposition that a sentence expresses is intended to capture both its informative and its inquisitive content. This means that propositions cannot simply be construed as sets of possible worlds in this framework. However, there is a very natural generalization of the classical notion of propositions. To arrive at this notion, we first introduce two auxiliary notions, that of an information state and that of an issue.

INFORMATION STATES. An information state is, as usual, construed as a set of possible worlds: the set of all worlds that are compatible with the information available in the information state. For brevity, we often simply refer to information states here as STATES. If α and β are states and $\alpha \subseteq \beta$, we say that α is an ENHANCEMENT of β. Furthermore, we say that an information state is TRIVIAL if it consists of all possible worlds; in this case, it does not exclude any candidate for the actual world.

ISSUES. An issue is meant to represent the semantic content of a request for information, that is, a request to locate the actual world more precisely within the current information state. If our current state is α, then a request for information can be characterized by the set of enhancements of α that locate the actual world with sufficient precision to satisfy the request. Thus, an issue over a state α can be modeled as a nonempty set of enhancements of α.

However, a nonempty set I of enhancements of α can only be taken to embody a proper issue over α if it satisfies the following two conditions. First, I has to be DOWNWARD CLOSED. That is, for any $\beta \in I$, and any $\gamma \subseteq \beta$, it must be the case that $\gamma \in I$ as well. After all, if β locates the actual world with sufficient precision to satisfy the request at hand, then γ, which locates the actual world even more precisely, cannot fail to satisfy the given request as well.

Second, the elements of I must together form a COVER of α, that is, $\cup I = \alpha$. This is to guarantee that the request represented by I can be truthfully satisfied in the first place. After all, if $\cup I \neq \alpha$, then there is a world $w \in \alpha$ that is not in any $\beta \in I$. The information available in α does not preclude w from being the actual world. But if it IS the actual world, then it is impossible to truthfully satisfy the request represented by I; that is, it is impossible to truthfully locate the actual world within some $\beta \in I$, because no such state contains the actual world.

These considerations lead to the following notion of issues.

(21) An issue I over a state α is a nonempty, downward-closed set of enhancements of α that together form a cover of α.

Notice that an issue I over a state α may contain α itself. In this case, by downward closure, I also contains all substates of α; in other words, I amounts to the powerset of α, $\wp(\alpha)$. This issue embodies a vacuous request for information, one that is already satisfied by the information available in α. Therefore, $\wp(\alpha)$ is called the TRIVIAL issue over α.

PROPOSITIONS. The proposition expressed by a sentence should determine the basic effect that a speaker brings about when uttering the sentence (to the extent that this effect is determined by the conventions of the language, rather than, for example, by principles of rational communication). Now, returning to the initial observation, we take it that in making an utterance speakers may PROVIDE information, that is, locate the actual world within a certain set of worlds α, but they may also REQUEST information, that is, raise an issue I over α. In order to capture these two potential effects, a proposition may be modeled as a pair $\langle \alpha, I \rangle$, where α is a state, capturing the informative content of the sentence, and I is an issue over α, capturing the inquisitive content of the sentence.

In many cases, speakers actually seem to achieve only one of the two potential effects. For instance, in uttering a simple declarative, such as *We invited Bill*, speakers only provide information, while in uttering a simple polar interrogative, such as *Did he accept?*, they only request information. In view of this, one might want to stick to the classical idea that a declarative sentence does not have any inquisitive content, which means that its meaning can be identified with its informative content and formally modeled by means of a classical proposition, while interrogative sentences do not have any informative content. Such an approach is taken in Karttunen 1977 and Groenendijk & Stokhof 1984, among many others.

Inquisitive semantics takes a different approach. Both the declarative *We invited Bill* and the polar interrogative *Did he accept?* are taken to have informative and inquisitive content; in the case of the declarative, however, the inquisitive content is trivial, and in the case of the interrogative, the informative content is trivial. This allows for a uniform treatment of declarative and interrogative sentences, as well as sentences that are both informative and inquisitive at the same time, such as the conjunction *We invited Bill, but did he accept?*. One may argue that such conjunctions could be treated as two separate utterances, one involving just informative content and the other involving just inquisitive content. Note, however, that declarative and interrogative clauses can also be conjoined in embedded contexts, for example, *Sue only remembers that we invited Bill and whether he accepted*; for such cases, a hybrid notion of meaning capturing both informative and inquisitive content at the same time really seems indispensable.[3]

Now let us take a closer look at semantic objects of the form $\langle \alpha, I \rangle$, where α is a state and I an issue over α. Note that, since I is an issue over α, we always have that $\alpha = \bigcup I$. But this means that α can always be RETRIEVED from I, and it need not appear explicitly in the representation of a proposition. Thus, a proposition is defined in inquisitive semantics simply as a set of states that is nonempty and downward closed, and the informative content of the proposition is then identified with the union of the states that it consists of.

(22) A proposition in inquisitive semantics is a nonempty, downward-closed set of states.

The proposition expressed by a sentence φ is denoted as $[\![\varphi]\!]$. The union of the elements of $[\![\varphi]\!]$, $\bigcup[\![\varphi]\!]$, is referred to as the informative content of φ, and is denoted as $\mathsf{info}(\varphi)$. For any set of states S, $S^{\downarrow}$ denotes the downward closure of S.

(23) $S^{\downarrow} \coloneqq \{\beta \mid \beta \subseteq \alpha \text{ for some } \alpha \in S\}$

Our initial example sentences, 1 and 2, may be taken to express the following propositions in inquisitive semantics (we say more about how to derive this compositionally below).

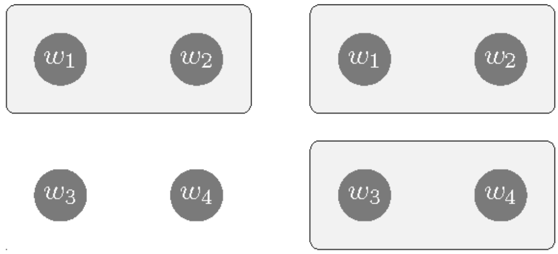
(24) $[\![\text{Amy left}]\!] = \{\{w : \text{Amy left in } w\}\}^{\downarrow}$

(25) $[\![\text{Did Amy leave?}]\!] = \{\{w : \text{Amy left in } w\}, \{w : \text{Amy didn't leave in } w\}\}^{\downarrow}$

These propositions are depicted in Figures 3a and 3b, respectively, where w_1 and w_2 are worlds where Amy left, w_3 and w_4 are worlds where Amy did not leave, and the shaded rectangles are the MAXIMAL elements of the given propositions (by downward closure, all substates of these maximal states are also contained in the given propositions, but to make the pictures easier to read these substates are not explicitly depicted). The maximal elements of a proposition $[\![\varphi]\!]$ are referred to as the POSSIBILITIES for φ, or sometimes as the ALTERNATIVES for φ.

It follows from this semantic treatment that in uttering the declarative *Amy left*, a speaker (i) provides the information that the actual world must be either w_1 or w_2, that is, one where Amy left, and (ii) raises a trivial issue, that is, does not request any further

[3] There are also other arguments for adopting a hybrid notion of meaning, involving, for instance, the treatment of disjunction (Groenendijk 2009, Roelofsen 2013a,b), the division of labor between semantics and discourse pragmatics (Farkas & Roelofsen 2014), and the fact that it allows for a generalized notion of entailment that applies both to declaratives and to interrogatives (Ciardelli & Roelofsen 2011, Ciardelli et al. 2013b). However, going through such arguments would take us too far afield from our main storyline.



a. ⟦Amy left⟧ b. ⟦Did Amy leave?⟧

FIGURE 3. Some simple propositions visualized, depicting only maximal elements.

information. By contrast, in uttering the polar interrogative *Did Amy leave?*, a speaker (i) provides the trivial information that the actual world must be w_1, w_2, w_3, or w_4 (all options are open), and (ii) requests information from other participants in order to locate the actual world more precisely, either within $\{w_1, w_2\}$, establishing that Amy left, or within $\{w_3, w_4\}$, establishing that Amy did not leave.

INFORMATIVE AND INQUISITIVE SENTENCES. A sentence φ is said to be informative just in case its informative content is nontrivial: $\mathsf{info}(\varphi) \neq W$, where W is the set of all possible worlds. Similarly, φ is said to be inquisitive just in case its inquisitive content is nontrivial: $[\![\varphi]\!] \neq \wp(\mathsf{info}(\varphi))$, or equivalently, $\mathsf{info}(\varphi) \notin [\![\varphi]\!]$. For instance, the declarative *Amy left* is informative, but not inquisitive, while the polar interrogative *Did Amy leave?* is inquisitive, but not informative.

If one has a picture of the proposition expressed by a sentence φ, it is straightforward to determine whether φ is inquisitive. This is because, under the assumption that there are only finitely many possible worlds—and this is a safe assumption to make for all of the examples considered in this article—a sentence φ is inquisitive just in case $[\![\varphi]\!]$ contains at least two possibilities (maximal elements). For instance, the proposition in Fig. 3a contains a single possibility, while the one in Fig. 3b contains two possibilities. From this we can immediately conclude that the polar interrogative *Did Amy leave?* is inquisitive, unlike the declarative *Amy left*.

THE SYSTEM $\mathsf{Inq_B}$. We now specify an inquisitive semantics for a simple logical language $\mathcal{L}$, whose formulas are built up from a set of atomic formulas $\mathcal{P}$ using negation (¬), disjunction (∨), and two additional operators (! and ?), which, for reasons to become clear shortly, are referred to as the noninquisitive and the noninformative projection operator, respectively. The semantics that we specify for this simple logical language is considered to be the most basic concrete inquisitive semantics, and is referred to as $\mathsf{Inq_B}$.[4] Once we have laid out this formal system, we indicate how the different types of sentences in natural language that we considered in §2 are to be translated into our logical language.

We assume that every possible world w determines a truth value for every atomic formula $p \in \mathcal{P}$, so that we always have either $w(p) = 1$ or $w(p) = 0$. The proposition expressed by a formula $\varphi \in \mathcal{L}$ in $\mathsf{Inq_B}$ is determined by the recursive definition in 26.

[4] $\mathsf{Inq_B}$ is normally specified for a slightly richer language, which also includes conjunction and implication. We leave these connectives out of consideration because they are not relevant for the types of initiatives considered here. However, we should note that conjunctive and conditional initiatives raise a number of interesting and challenging issues for any account of polarity particle responses, including ours. We hope to address these issues in future work. For in-depth discussion of $\mathsf{Inq_B}$, we refer the reader to Ciardelli 2009, Groenendijk & Roelofsen 2009, AnderBois 2011, Ciardelli & Roelofsen 2011, Ciardelli et al. 2013a, Roelofsen 2013a. For variants and extensions of this basic system, see, for example, Ciardelli et al. 2013b,c, Ciardelli & Roelofsen 2014, Groenendijk & Roelofsen 2014.

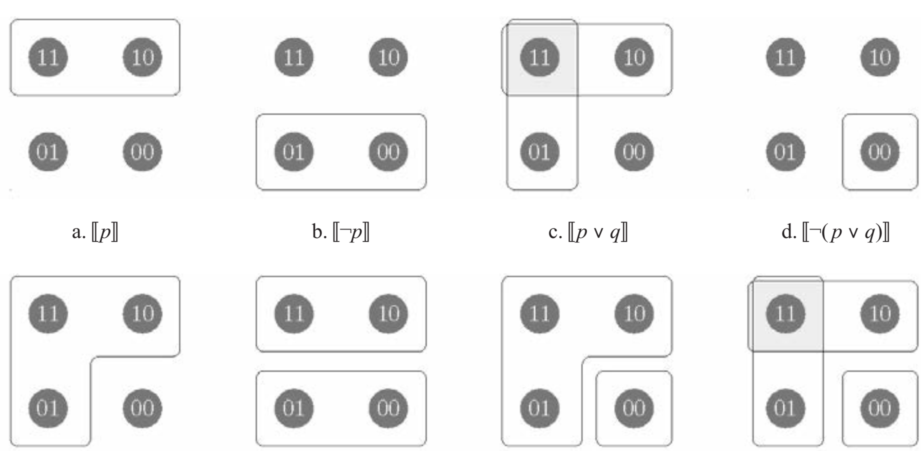
$$
\begin{array}{llll}
(26) & [\![p]\!] & = & \wp\,\{w \mid w(p) = 1\} \\
 & [\![\neg\varphi]\!] & = & \wp\,(\overline{\bigcup[\![\varphi]\!]}) \\
 & [\![!\varphi]\!] & = & \wp\,(\bigcup[\![\varphi]\!]) \\
 & [\![\varphi \vee \psi]\!] & = & [\![\varphi]\!] \cup [\![\psi]\!] \\
 & [\![?\varphi]\!] & = & [\![\varphi]\!] \cup \wp\,(\overline{\bigcup[\![\varphi]\!]})
\end{array}
$$

We briefly go through the clauses of the definition and illustrate it with a number of examples in Figure 4. In doing so, it will be convenient to have a compact notation to refer to the possibilities in a proposition. To this end, for any formula φ in the language of classical propositional logic, we write $|\varphi|$ to denote the classical proposition expressed by φ, that is, the set of worlds in which φ is classically true.

Atomic formulas. The proposition expressed by an atomic formula p contains all states that consist exclusively of worlds where p is true. This proposition is depicted in Fig. 4a. Note that $[\![p]\!]$ contains a single possibility, namely $|p|$, and is therefore not inquisitive.

Negation. The proposition expressed by a negated formula, $\neg\varphi$, again always contains a single possibility, $\overline{\bigcup[\![\varphi]\!]}$, and therefore cannot be inquisitive either. A state is contained in $[\![\neg\varphi]\!]$ if and only if it is inconsistent with any state in $[\![\varphi]\!]$. For instance, $[\![\neg p]\!]$ is the set of states that are inconsistent with any state in $[\![p]\!]$. These are states that consist exclusively of worlds where p is false. Thus, as depicted in Fig. 4b, $[\![\neg p]\!]$ contains a single possibility, namely $|\neg p|$.

Disjunction. The proposition expressed by a disjunction $\varphi \vee \psi$ is obtained by taking the union of $[\![\varphi]\!]$ and $[\![\psi]\!]$. As a concrete example, consider $[\![p \vee q]\!]$. A state α is contained in $[\![p \vee q]\!]$ if and only if $\alpha \in [\![p]\!]$ or $\alpha \in [\![q]\!]$, that is, if and only if all worlds in α make p true, or, alternatively, all worlds in α make q true. Thus, as depicted in Fig. 4c, $[\![p \vee q]\!]$ contains two possibilities, $|p|$ and $|q|$, which means that it is inquisitive. If we apply negation to this sentence, we get a single possibility again, the complement of $|p| \cup |q|$, which is $|\neg p \wedge \neg q|$. This is depicted in Fig. 4d.[5]



a. $[\![p]\!]$ b. $[\![\neg p]\!]$ c. $[\![p \vee q]\!]$ d. $[\![\neg(p \vee q)]\!]$

e. $[\![!(p \vee q)]\!]$ f. $[\![?p]\!]$ g. $[\![?!(p \vee q)]\!]$ h. $[\![?(p \vee q)]\!]$

FIGURE 4. Propositions expressed by some simple formulas in $\mathsf{Inq_B}$; in each picture, 11 is a world where p and q are both true, 10 a world where p is true but q is false, 01 a world where q is true but p is false, and 00 a world where both p and q are false.

[5] There is a very precise sense in which negation and disjunction are treated here just as they are in classical logic. Namely, both in classical logic and in $\mathsf{Inq_B}$, $\neg\varphi$ expresses a proposition that can be characterized al-

The projection operators. As depicted in Figure 5, propositions in inquisitive semantics can be thought of as inhabiting a two-dimensional space. On the horizontal axis, there are propositions that are purely informative, that is, whose inquisitive content is trivial. On the vertical axis, there are propositions that are purely inquisitive, that is, whose informative content is trivial. All other propositions, whose informative and inquisitive content are both nontrivial, are located somewhere in the plane, off the axes.

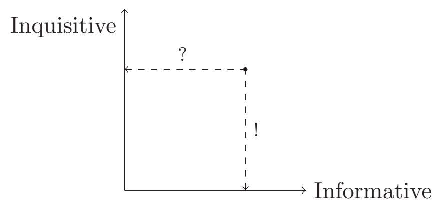


FIGURE 5. ! and ? as projection operators.

Given this picture, it is natural to consider general operations that PROJECT any proposition onto one of the axes, trivializing either its informative or its inquisitive content. ! and ? express such operations, which is why they are called PROJECTION OPERATORS. ! is the noninquisitive projection operator: it trivializes the inquisitive content of a proposition, while leaving its informative content untouched. ? is a noninformative projection operator: it trivializes the informative content of a proposition, while minimally weakening its inquisitive content (inquisitive content cannot be left completely untouched in this case, because then the informative content would also remain intact; see Roelofsen 2013a for discussion).

Let us go through some concrete examples. The proposition expressed by $!\varphi$ always contains a single possibility, namely $\bigcup[\![\varphi]\!]$, the union of all the elements of $[\![\varphi]\!]$. For instance, as depicted in Fig. 4e, the unique possibility for $!(p \vee q)$ is $|p \vee q|$, the union of $|p|$ and $|q|$. This means that $!(p \vee q)$ has the same informative content as $p \vee q$, but, unlike the latter, it is not inquisitive.

Now consider $?\varphi$. The proposition expressed by $?\varphi$ always contains all of the elements of $[\![\varphi]\!]$ itself, plus the complement of $\bigcup[\![\varphi]\!]$ and all subsets thereof. For instance, as depicted in Fig. 4h, the proposition expressed by $?(p \vee q)$ contains three possibilities: $|p|$ and $|q|$, which are the possibilities for $p \vee q$, as well as $|\neg p \wedge \neg q|$, which is the complement of $|p| \cup |q|$. Notice that this indeed ensures that $?\varphi$ is never informative. Two other examples are given in Figs. 4f and 4g. These projection operators play an important role in our analysis of declarative and interrogative sentences in natural language.

FROM NATURAL LANGUAGE TO $\mathsf{Inq_B}$. Now that the basic inquisitive semantics framework is in place, we are ready to specify how the relevant types of sentences in natural language are to be translated into our logical language. Note that the framework as such does not provide any particular analysis of expressions in natural language; it just provides the formal tools to articulate and compare such analyses.

The types of sentences that we are primarily interested in are declaratives and sentential interrogatives (i.e. polar and other non-WH-interrogatives), possibly containing

gebraically as the PSEUDO-COMPLEMENT of $[\![\varphi]\!]$, and $\varphi \vee \psi$ expresses a proposition that can be characterized algebraically as the JOIN of $[\![\varphi]\!]$ and $[\![\psi]\!]$. Thus, from an algebraic perspective the treatment of negation and disjunction in $\mathsf{Inq_B}$ is entirely classical, only now the notion of meaning has an inquisitive dimension. See Roelofsen 2013a for detailed discussion.

negation and/or disjunction. Following Zimmermann (2000), Pruitt (2007), Biezma (2009), Biezma and Rawlins (2012), and Roelofsen (2013b), we think of these types of sentences as LISTS. Lists can be either declarative or interrogative, they can be either open or closed, and they contain either a single item or multiple items.[6]

(27) CLOSED DECLARATIVE LISTS
  a. with a single item: Igor speaks English↓.
  b. with multiple items: Igor speaks English↑, or French↓.

(28) OPEN DECLARATIVE LISTS
  a. with a single item: Igor speaks English↑.
  b. with multiple items: Igor speaks English↑, or French↑.

(29) CLOSED INTERROGATIVE LISTS
  a. with a single item: Does Igor speak English↓?
  b. with multiple items: Does Igor speak English↑, or French↓?

(30) OPEN INTERROGATIVE LISTS
  a. with a single item: Does Igor speak English↑?
  b. with multiple items: Does Igor speak English↑, or French↑?

Open lists characteristically have rising intonation on the final disjunct, while closed lists characteristically have falling intonation on the final disjunct. Semantically, the characteristic property of open lists is that they leave open the possibility that none of the given list items holds. Closed lists, by contrast, signal, roughly speaking, that exactly one of the given items holds.

List items are separated by disjunction, in combination with a prosodic phrase break—indicated by means of a comma—and rising intonation on the left disjunct. When both disjuncts are nonfinal, the disjunction word *or* may optionally be omitted, as long as the prosodic phrase break and the rising intonation on the left disjunct are present.

Disjunction may also occur WITHIN list items, but then it does not come with a prosodic phrase break and rising intonation on the left disjunct. Rather, both disjuncts are pronounced within one prosodic phrase in this case, which we indicate with hyphenation. Thus, the lists in 31–34 all have a single item, containing disjunction, rather than two items separated by disjunction.

(31) Closed declarative: Igor speaks English-or-French↓.
(32) Open declarative: Igor speaks English-or-French↑.
(33) Closed interrogative: Does Igor speak English-or-French↓?
(34) Open interrogative: Does Igor speak English-or-French↑?

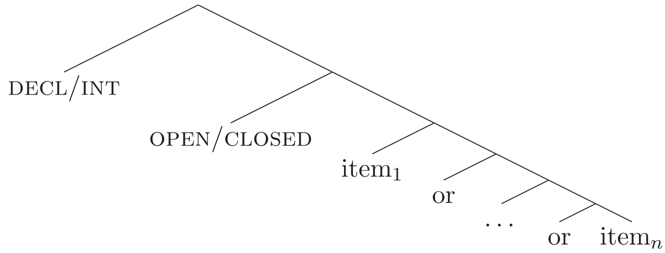
We adopt the semantic analysis of lists outlined in Roelofsen 2013b. Some aspects of the analysis are spelled out here in more detail than in the original proposal, while others are left out of consideration because they are not directly relevant for the licensing of polarity particle responses.

Schematically, we assume that a list with *n* items has the syntactic structure in 35.[7]

[6] Zimmermann (2000) is primarily concerned with nonsingleton declarative lists like 27b and 28b, while Pruitt (2007), Biezma (2009), and Biezma and Rawlins (2012) are primarily concerned with nonsingleton closed interrogative lists like 29b and singleton open interrogative lists like 30a. A uniform analysis of the full range of declarative and interrogative lists exemplified in 27–30 is outlined in Roelofsen 2013b.

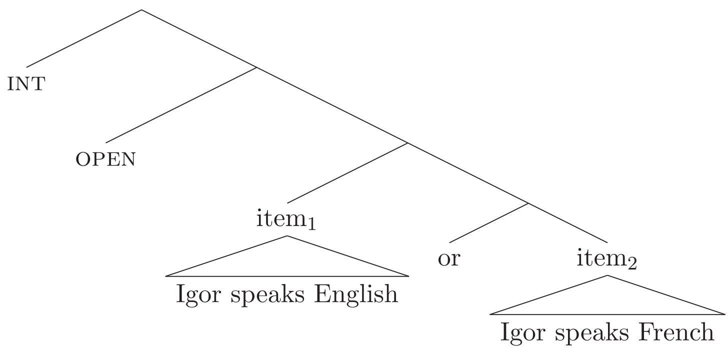
[7] We are abstracting away from a number of syntactic issues that are crucial for a general account of declarative and interrogative disjunctive lists, but do not seem directly relevant for the analysis of polarity particle responses to such sentences (see e.g. Han & Romero 2004, and references therein, for relevant discussion).

(35)



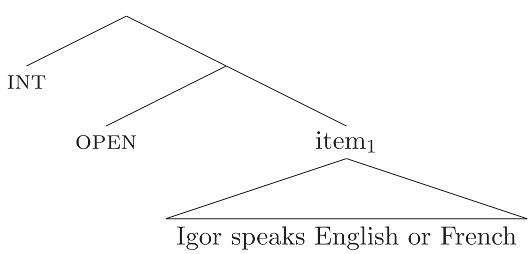
We refer to DECL/INT and OPEN/CLOSED as LIST CLASSIFIERS and to the rest of the structure as the BODY of the list. To give a concrete example, the open interrogative in 30b, which involves two list items, is taken to have the structure in 36.

(36)



The open interrogative in 34, which has a single list item containing disjunction, is taken to have the following structure.

(37)



Now let us turn to the translation of these structures into our logical language. As far as the body of a list is concerned, the translation procedure is almost entirely standard. In particular, negation is translated as ¬, and disjunction is translated as ∨, regardless of whether it separates two list items or occurs within one of the list items. The only nonstandard provision is that the noninquisitive projection operator (!) is applied to every list item. The rationale for this is that every list item is to be seen, intuitively speaking, as one block, that is, as contributing a single possibility to the proposition expressed by the list as a whole. This is ensured by applying !, which, roughly speaking, takes a set of possibilities and returns its union.

Thus, the body of a list is translated according to the rule in 38, where $\varphi_1, \ldots, \varphi_n$ are standard translations of $\text{item}_1, \ldots, \text{item}_n$ into propositional logic.

(38) Rule for translating the body of a list:

$[\text{item}_1 \text{ or } \ldots \text{ or item}_n] \quad \rightsquigarrow \quad !\varphi_1 \vee \ldots \vee !\varphi_n$

Returning to our concrete examples above, if we translate *Igor speaks English* as *p* and *Igor speaks French* as *q*, then we get the following translations for the list bodies of 30b and 34, respectively.

(39) [Igor speaks English]$_{\text{item}_1}$ or [Igor speaks French]$_{\text{item}_2}$ ⇝ $!p \vee !q\ (\equiv p \vee q)$

(40) [Igor speaks English or French]$_{\text{item}_1}$ ⇝ $!(p \vee q)$

Now let us turn to the list classifiers. First, DECL and INT are treated semantically as PROPOSITIONAL MODIFIERS, that is, as functions that take a proposition as their input and deliver another proposition as their output. In type-theoretic terms, they are treated as functions of type $\langle T, T\rangle$, where T is the type of proposition. OPEN and CLOSED, by contrast, are treated as functions that take two inputs, first a proposition and then a propositional modifier, and deliver another proposition as their output. That is, they are treated as functions of type $\langle T, \langle\langle T, T\rangle, T\rangle\rangle$. It will become clear in a moment why OPEN and CLOSED are treated as having this somewhat more complex type, rather than simply $\langle T, T\rangle$, like DECL and INT. First, we need to look at each of the classifiers in somewhat more detail.[8]

First consider DECL. Intuitively, the role of declarativeness is to make a list purely informative—to ELIMINATE INQUISITIVENESS. This effect can be captured straightforwardly in $\mathsf{Inq_B}$ by treating DECL as a function that applies the noninquisitive projection operator ! to its input proposition p, returning $!\mathsf{p}$. Using type-theoretic notation, this can be formulated concisely as follows.

(41) DECL ⇝ $\lambda \mathsf{p}.!\mathsf{p}$

Next, consider INT. The proposal in Roelofsen 2013b is to treat interrogativity as having two effects. First, whenever possible, it ENSURES INQUISITIVENESS. This is done by applying a conditional variant of the ? operator, which we denote here as $\langle ?\rangle$. If the proposition that $\langle ?\rangle$ takes as its input is not yet inquisitive, then ? is applied to it. But if the input proposition is already inquisitive, then it is left untouched. The only case in which this procedure does NOT yield an inquisitive proposition is when the input proposition is a TAUTOLOGY: that is, it contains a single possibility consisting of all possible worlds. In this case, $\langle ?\rangle$ has no effect. In all other cases, it delivers an inquisitive proposition.

The second effect of interrogativity proposed in Roelofsen 2013b is that it ENSURES NONINFORMATIVITY, by introducing a presupposition that the actual world must be contained in at least one of the possibilities in the proposition expressed. This second effect is especially important to account for the presuppositional component of closed interrogatives (see e.g. Karttunen & Peters 1976, Biezma & Rawlins 2012). However, since this presuppositional component is not relevant for our account of polarity particle responses, we simplify the analysis here and restrict ourselves to the first effect of interrogativity described above. Thus, we assume the following treatment of INT.

(42) INT ⇝ $\lambda \mathsf{p}.\langle ?\rangle \mathsf{p}$

Now consider OPEN. As mentioned above, we take the characteristic semantic property of open lists to be that they leave open the possibility that none of the given list items hold. For instance, both the open declarative in 28a and the open interrogative in 30a leave open the possibility that Igor does not speak English. This property of open lists can be captured by treating OPEN as applying the ? operator to the proposition that is generated by the body of the list.

[8] We only use some type-theoretic terminology and notation informally here, in the metalanguage. A more rigorous approach would be to extend the logical framework to an appropriate type-theoretic framework. We leave this step implicit here because, on the one hand, for readers familiar with type theory it will be clear how to execute it, while on the other hand, for readers unfamiliar with type theory, it may obscure the essence of the analysis.

Now, consider the effects of DECL and INT after we have applied ? to the proposition that is generated by the body of the list. On the one hand, applying ! will always yield a tautology in this case, which is clearly not a desirable result, while applying ⟨?⟩, on the other hand, will never have any effect. For this reason, we treat OPEN as DISABLING the further effects that DECL and INT may have. This is achieved by treating OPEN as a function that takes two inputs, a proposition p and a propositional modifier *f*, and returns the proposition ?p, ignoring the modifier *f* (notice that this effect could not be achieved if OPEN were simply treated as a propositional modifier of type $\langle T, T \rangle$; this is why we assigned it a somewhat more complex type).

(43) OPEN ⇝ $\lambda \mathsf{p}.\lambda f.?\mathsf{p}$

Finally, consider CLOSED. The proposal in Roelofsen 2013b is that closed lists characteristically imply that EXACTLY ONE of the given list items holds, where in the case of a declarative this implication is part of the at-issue content, while in the case of an interrogative it is part of the not-at-issue/presupposed content. In order to capture this, CLOSED is treated as an EXCLUSIVE STRENGTHENING operator, that is, an operator that takes a proposition and, roughly speaking, removes the overlap between the possibilities that it consists of.[9] However, since the effects of this exclusive strengthening operator are, as far as we can see, not directly relevant for the licensing of polarity particle responses, we again simplify the analysis here and treat CLOSED as a vacuous operator, taking as input a proposition p and a propositional modifier *f*, and delivering as output the proposition obtained by applying *f* to p.[10]

(44) CLOSED ⇝ $\lambda \mathsf{p}.\lambda f.f(\mathsf{p})$

In total there are four types of lists, each featuring a combination of two classifiers. From the treatment of the individual classifiers given above, it follows that the four types of lists are translated into our logical language as specified in 45, where in each case φ stands for the translation of the body of the list, obtained according to the rule in 38 above.

(45) Rules for translating lists

a. [DECL [CLOSED [list-body]]]	⇝	$!\varphi$
b. [DECL [OPEN [list-body]]]	⇝	$?\varphi$
c. [INT [CLOSED [list-body]]]	⇝	$\langle ? \rangle \varphi$
d. [INT [OPEN [list-body]]]	⇝	$?\varphi$

The rules in 38 and 45 together give a complete specification of how to translate declarative and interrogative lists in natural language into our logical language, and thereby indirectly provide a semantic analysis of such lists.

In Table 1 we provide a number of examples that are representative of the types of sentences we are concerned with. In the translations of these examples, *p* stands for *Igor speaks English* and *q* for *Igor speaks French*. In each case we provide the direct translation and also a simpler formula that is semantically equivalent in $\mathsf{Inq_B}$ to the direct

[9] Operators of this kind have been assumed in earlier work on disjunctive questions as well (e.g. Roelofsen & van Gool 2010, Pruitt & Roelofsen 2011, Biezma & Rawlins 2012), and also in work on free-choice indefinites (Menéndez-Benito 2005, Aloni 2007), imperatives (Aloni & Ciardelli 2013), and implicatures (e.g. Fox 2007, Alonso-Ovalle 2008, Balogh 2009).

[10] Exactly the same effects would be obtained if we treated CLOSED simply as the identity function on propositions, $\lambda \mathsf{p}.\mathsf{p}$. For uniformity, however, we take it to have the same type as OPEN, which means that it should take not just a proposition as its input, but also a propositional modifier.

translation. The propositions expressed by all of these simplified translations are depicted in Fig. 4 above.

	TRANSLATION	SIMPLIFIED
CLOSED DECLARATIVES		
Igor speaks English↓.	$!!p$	p
Igor does not speak English↓.	$!!\neg p$	$\neg p$
Igor speaks English-or-French↓.	$!!(p \vee q)$	$!(p \vee q)$
Igor speaks English↑, or French↓.	$!(!p \vee !q)$	$!(p \vee q)$
OPEN DECLARATIVES		
Igor speaks English↑.	$?!p$	$?p$
Igor does not speak English↑.	$?!\neg p$	$?p$
Igor speaks English-or-French↑.	$?!(p \vee q)$	$?!(p \vee q)$
Igor speaks English↑, or French↑.	$?(!p \vee !q)$	$?(p \vee q)$
OPEN INTERROGATIVES		
Does Igor speak English↑?	$?!p$	$?p$
Does Igor not speak English↑?	$?!\neg p$	$?p$
Does Igor speak English-or-French↑?	$?!(p \vee q)$	$?!(p \vee q)$
Does Igor speak English↑, or French↑?	$?(!p \vee !q)$	$?(p \vee q)$
CLOSED INTERROGATIVES		
Does Igor speak English↓?	$?!p$	$?p$
Does Igor speak English↑, or French↓?	$!p \vee !q$	$p \vee q$
Does Igor speak English↑, or doesn't he↓?	$!p \vee !\neg p$	$?p$
Does Igor speak English-or-French↑, or doesn't he↓?	$!(p \vee q) \vee !\neg(p \vee q)$	$?!(p \vee q)$

TABLE 1. Representative examples of the types of sentences under investigation here, with direct and simplified translations.

This concludes our overview of inquisitive semantics and the basic analysis of declarative and interrogative lists in $\mathsf{Inq_B}$ that we assume. Notice that this analysis captures the informative and inquisitive content of the various types of sentences we are interested in, but it does not yet capture their potential to introduce DISCOURSE REFERENTS, which could serve as the antecedents for subsequent anaphoric expressions. We have seen in §2 that this aspect of meaning is crucial for an account of polarity particle responses. Thus, our next task is to enrich the basic $\mathsf{Inq_B}$ framework, as well as the basic analysis of declarative and interrogative lists laid out above, in order to capture the anaphoric potential of the various types of initiatives.

3.3. DISCOURSE REFERENTS. We saw in §2 that an account of polarity particle responses requires a semantic analysis of declaratives and interrogatives that captures not just their informative and inquisitive content, but also their potential to introduce discourse referents, which may serve as antecedents for subsequent anaphoric expressions. It is important to note that such an analysis of declaratives and interrogatives is required not just for an account of polarity particle responses, but also for a broad class of other anaphoric expressions. To illustrate this, consider the contrast between 46, 47, and 48, involving the anaphoric expression *so*.

(46) A: Is the number of planets even?
B: I don't think so. ⇝ I don't think it's even.

(47) A: Is the number of planets odd?
B: I don't think so. ⇝ I don't think it's odd.

(48) A: Is the number of planets even↑, or odd↓?
B: *I don't think so.

In the framework we have laid out so far, the interrogatives in 46–48 are semantically equivalent. This is as it should be, because these interrogatives have precisely the same inquisitive (and informative) content, and this is all that propositions in $\mathsf{Inq_B}$ are intended to capture. However, the fact that *I don't think so* is interpreted differently in response to 46 and 47, and is even infelicitous in response to 48, shows that there is more to the meaning of these interrogatives than their inquisitive content.[11]

The contrast among examples like 46–48 has sometimes been presented as a general argument against so-called PROPOSITION-SET APPROACHES to the semantics of questions, which include the classical theories of Hamblin (1973), Karttunen (1977), and Groenendijk and Stokhof (1984), as well as the inquisitive semantics framework adopted here, which builds on this classical work. The argument has inspired several alternative approaches to the semantics of questions, such as the categorial approach of von Stechow (1991) and Krifka (2001), among others, and the orthoalgebraic approach of Blutner (2012). We choose not to pursue a full-fledged alternative to the proposition-set approach here, but rather to extend the framework laid out so far in a suitable way, taking inspiration from dynamic semantics.[12]

Once our analysis of declaratives and interrogatives is sufficiently fine-grained to account for the contrast among 46–48, we may expect that it will also allow us to account for parallel contrasts involving polarity particle responses, such as those illustrated in 49–51.

(49) A: Is the number of planets even?
B: Yes, it is. ⇝ it's even
No, it isn't. ⇝ it's odd

(50) A: Is the number of planets odd?
B: Yes, it is. ⇝ it's odd
No, it isn't. ⇝ it's even

(51) A: Is the number of planets even↑, or odd↓?
B: *Yes, it is./*No, it isn't.

We saw in §2, however, that polarity particle responses give rise to additional empirical challenges as well, because, unlike many other anaphoric expressions, they have the special property of being sensitive to the POLARITY of their antecedent. This is witnessed, for instance, by the contrast between 52 and 53.

(52) A: Is the number of planets odd↑?
B: No, it isn't. ⇝ it's not odd

(53) A: Is the number of planets not even↑?
B: No, it isn't. ⇝ it's not even

Thus, our account of declaratives and interrogatives should not only characterize which discourse referents are introduced by a given sentence, but also characterize these discourse referents as having either positive or negative polarity, depending on the nature of the sentence that introduces them.

[11] Note that the argument here is analogous to the classical argument for dynamic semantics based on Partee's 'marble examples' (see Heim 1982:21). Those examples show that there is more to the meaning of declarative sentences than their truth conditions, that is, their informative content. Analogously, the examples given here show that there is more to the meaning of interrogative sentences than their inquisitive content.

[12] It should be noted that Groenendijk and Stokhof's (1984) analysis actually does provide a way to distinguish the interrogatives in 46–48, which already shows that proposition-set approaches to questions are not inherently incapable of dealing with the observed contrast, as has sometimes been claimed (see e.g. Blutner 2012:240). Our approach is especially close in spirit, though quite different in implementation and empirical coverage, to that of Aloni and van Rooij (2002), which integrates elements of the categorial approach with Groenendijk and Stokhof's partition theory in a dynamic setting. For comparison of our approach to this line of work, see §7.

To meet this requirement we define an extension of $\mathsf{Inq_B}$, which we call $\mathsf{Inq_B^{\pm}}$, where each formula φ not only is assigned the proposition $[\![\varphi]\!]$ that it is standardly assigned in $\mathsf{Inq_B}$, but also receives an additional semantic value, $[\![\varphi]\!]^{\pm}$, which determines the discourse referents that are introduced when φ is uttered. For simplicity, we focus on 'propositional' discourse referents here; other types of discourse referents, such as those introduced by nominal expressions, are left out of consideration.

Since positive and negative discourse referents have to be kept apart, we construe $[\![\varphi]\!]^{\pm}$ as a pair $\langle[\![\varphi]\!]^{+}, [\![\varphi]\!]^{-}\rangle$, where both $[\![\varphi]\!]^{+}$ and $[\![\varphi]\!]^{-}$ are sets of possibilities, corresponding to the positive and negative discourse referents that are introduced when φ is uttered. We say that the possibilities in $[\![\varphi]\!]^{+}$ have positive polarity, and those in $[\![\varphi]\!]^{-}$ have negative polarity. Moreover, adopting a piece of terminology from Roelofsen and van Gool (2010), we say that φ HIGHLIGHTS the possibilities in $[\![\varphi]\!]^{+}$ and $[\![\varphi]\!]^{-}$.[13]

In order to arrive at a principled recursive definition of $[\![\varphi]\!]^{\pm}$, we have to address two questions. First, we have to specify, in pretheoretic terms, when exactly a sentence should be taken to highlight a given possibility. And second, given an answer to this first question, we have to say, again in pretheoretic terms, when a highlighted possibility should be taken to have positive polarity, and when it should be taken to have negative polarity.

Let us start with the first question. The general idea is that the possibilities highlighted by φ are those possibilities that are made particularly salient when φ is uttered, and thereby come to serve as highly accessible potential antecedents for subsequent anaphoric expressions. To sharpen this intuition, let us consider a number of examples, using the anaphoric expression *so* as a probe.

First, consider the simplest possible example, the basic declarative in 54A, which is represented in our logical language by the atomic formula *p*. The latter expresses a proposition containing a single possibility $|p|$, the set of all worlds where *p* is true. It is natural to assume that this possibility is made particularly salient when the sentence is uttered, and thereby becomes available as a possible antecedent for subsequent anaphoric expressions. Indeed, the anaphoric expression *so* in 54B is naturally interpreted as making reference to this possibility. Thus, we assume that an atomic sentence *p* highlights the possibility $|p|$.

(54) A: Igor speaks English.
B: I don't think so. ⇝ I don't think he speaks English

Next, consider the polar interrogative in 55A, which is translated into our logical language as $?p$. The latter expresses a proposition containing two possibilities, $|p|$ and $|\neg p|$. It is natural to assume, however, that only $|p|$ is made particularly salient when the sentence is uttered. In an intuitive sense, this possibility is explicitly mentioned, while its complement is only implicitly introduced. This intuition is supported by the fact that *so* in 55B can only be interpreted as making reference to $|p|$, and not to $|\neg p|$. So we assume that $?p$, just like *p*, highlights only the possibility $|p|$.

[13] For transparency, we provide a two-dimensional semantics here, keeping the 'highlighting' dimension apart from the ordinary 'propositional' dimension. In a full-fledged dynamic semantics, these dimensions of the meaning of a sentence would both be determined in an integrated way by the sentence's context change potential. Properly spelling out such a dynamic semantics in this setting, however, would involve certain complications (having to do in particular with the fact that we need to keep track of not just the COMMON GROUND of the discourse, but also the commitments of each individual discourse participant: see §3.4), which would be likely to obscure the essence of our proposal. We therefore present a static, two-dimensional system.

(55) A: Does Igor speak English?
B: I don't think so. ⇝ I don't think he speaks English

Now let us turn to disjunctive lists containing multiple items. There are four cases to consider: closed declaratives, open declaratives, open interrogatives, and closed interrogatives. We consider all four cases at once, because it is in comparing them that we are best able to probe their highlighting potential.

(56) A: Igor speaks English↑, or French↓.
B: I don't think so. ⇝ I don't think he speaks English or French

(57) A: Igor speaks English↑, or French↑.
B: I don't think so. ⇝ I don't think he speaks English or French

(58) A: Does Igor speak English↑, or French↑?
B: I don't think so. ⇝ I don't think he speaks English or French

(59) A: Does Igor speak English↑, or French↓?
B: *I don't think so.

The main question is whether these lists should be taken to separately highlight the two possibilities $|p|$ and $|q|$, corresponding to the two explicitly given list items, or whether they should be taken to highlight just the union of these two possibilities, $|p \vee q|$. To choose between these two options, we have to check which of these possibilities, if any, are made available for subsequent anaphoric reference, using our probe *so*.

Notice that there is a stark contrast between 56–58 on the one hand, and 59 on the other. In the first three cases, the anaphoric expression is interpreted effortlessly, while in the fourth case it is infelicitous. Moreover, notice that in the first three cases, *so* is interpreted as making reference to $|p \vee q|$, rather than to $|p|$ or to $|q|$. These observations are naturally accounted for under the following two assumptions: (i) in order for the anaphoric expression *so* to be interpreted felicitously, there needs to be a UNIQUE most salient suitable antecedent (just like for other anaphoric expressions), and (ii) closed interrogatives with multiple items behave differently in terms of highlighting from other types of lists; in particular, while 56–58 highlight a single possibility, $|p \vee q|$, and thereby license anaphora, 59 highlights both $|p|$ and $|q|$ separately, and therefore does not license anaphora. The next question, then, is why closed interrogatives would behave so markedly differently from the other types of lists in this respect.

Recall that 56 is represented in our logical language as $!(p \vee q)$, 57 and 58 both as $?(p \vee q)$, and 59 as $p \vee q$. That is, the first three involve a projection operator, while the fourth does not. We take it, then, that the projection operators are responsible for collapsing the two highlighted possibilities generated by the disjunction, $|p|$ and $|q|$, into a single possibility, $|p| \cup |q| = |p \vee q|$. Under this assumption, the observed contrast between closed interrogatives and the other types of lists is exactly as expected.

Now let us turn to the second question that we started out with: when should a highlighted possibility be taken to have positive polarity, and when should it be taken to have negative polarity? Here the general idea is that, by default, highlighted possibilities have positive polarity, unless they are introduced by a negative sentence, that is, a sentence that has negation as its highest-scoping sentential operator. Again, let us consider some examples to sharpen this intuition. In the case of atomic sentences, and negations thereof, things are straightforward: p highlights the possibility $|p|$, and since there is no negation involved, this possibility should be taken to have positive polarity; by contrast, $\neg p$ highlights the possibility $|\neg p|$, and since in this case the sentence is clearly negative, the possibility that it highlights should be taken to have negative polarity.

Next, consider $!p$, $!\neg p$, $?p$, and $?\neg p$. In the case of $!p$ and $?p$, the highlighted possibility is $|p|$, which clearly should be marked as positive since the given sentences do not involve negation at all. In the case of $!\neg p$ and $?\neg p$, the highlighted possibility is $|\neg p|$, and this time it should be marked as negative because it is introduced by a negative sentence, $\neg p$. Notice that negation is not the highest-scoping operator in $!\neg p$ and $?\neg p$. In both cases, however, the highlighted possibility $|\neg p|$ is INTRODUCED by $\neg p$ and subsequently left untouched by the projection operators. Therefore, it needs to be marked as negative.

Things are different when a projection operator applies to a sentence that highlights more than just one possibility, for instance in the case of $!(p \vee \neg q)$. In that case, the projection operator collapses the two possibilities highlighted by the disjunction, $|p|$ and $|\neg q|$, into a single possibility, $|p| \cup |\neg q| = |p \vee \neg q|$. Of this possibility we can no longer say that it was introduced by a negative sentence, which means that it should be marked as positive. This is the case even if both disjuncts are negative, as for instance in $!(\neg p \vee \neg q)$.

These considerations lead to the following recursive definition of $[\![\varphi]\!]^{\pm}$.[14]

(60)
$$
\begin{aligned}
[\![p]\!]^{\pm} &= \langle \{|p|\}, \emptyset \rangle \\
[\![\neg\varphi]\!]^{\pm} &= \langle \emptyset, \{\overline{\bigcup [\![\varphi]\!]^{\pm}}\} \rangle \\
[\![\varphi \vee \psi]\!]^{\pm} &= [\![\varphi]\!]^{\pm} \cup [\![\psi]\!]^{\pm} \\
[\![!\varphi]\!]^{\pm} = [\![?\varphi]\!]^{\pm} &= \begin{cases} \langle \emptyset, \{\alpha\} \rangle & \text{if } [\![\varphi]\!]^{\pm} = \langle \emptyset, \{\alpha\} \rangle \\ \langle \{\bigcup [\![\varphi]\!]^{\pm}\}, \emptyset \rangle & \text{otherwise} \end{cases}
\end{aligned}
$$

In Table 2 we list the same range of examples that we provided in Table 1 to illustrate our basic analysis of declarative and interrogative lists in $\mathsf{Inq_B}$. Now, with the added highlighting dimension, some of the simplified translations that were given above no longer preserve the meaning of the direct translations. In Table 2 we provide the simplest translations that do preserve the meaning of the direct translation, and in the highlighting dimension as well. We also list the set of positive and negative highlights for each sentence. The relevant semantic values are depicted in Figure 6, where areas with dashed borders correspond to highlighted possibilities, and ⊕ and ⊖ are used to mark the polarity of these possibilities.

	SIMPLIFIED TRANSLATION	POSITIVE HIGHLIGHTS	NEGATIVE HIGHLIGHTS
CLOSED DECLARATIVES			
Igor speaks English↓.	p	$\|p\|$	
Igor does not speak English↓.	$\neg p$		$\|\neg p\|$
Igor speaks English-or-French↓.	$!(p \vee q)$	$\|p \vee q\|$	
Igor speaks English↑, or French↓.	$!(p \vee q)$	$\|p \vee q\|$	
OPEN DECLARATIVES			
Igor speaks English↑.	$?p$	$\|p\|$	
Igor does not speak English↑.	$?\neg p$		$\|\neg p\|$
Igor speaks English-or-French↑.	$?!(p \vee q)$	$\|p \vee q\|$	
Igor speaks English↑, or French↑.	$?(p \vee q)$	$\|p \vee q\|$	
OPEN INTERROGATIVES			
Does Igor speak English↑?	$?p$	$\|p\|$	
Does Igor not speak English↑?	$?\neg p$		$\|\neg p\|$
Does Igor speak English-or-French↑?	$?!(p \vee q)$	$\|p \vee q\|$	
Does Igor speak English↑, or French↑?	$?(p \vee q)$	$\|p \vee q\|$	
CLOSED INTERROGATIVES			
Does Igor speak English↓?	$?p$	$\|p\|$	
Does Igor speak English↑, or French↓?	$p \vee q$	$\|p\|, \|q\|$	
Does Igor speak English↑, or doesn't he↓?	$p \vee \neg p$	$\|p\|$	$\|\neg p\|$
Does Igor speak English-or-French↑, or doesn't he↓?	$!(p \vee q) \vee \neg(p \vee q)$	$\|p \vee q\|$	$\|\neg(p \vee q)\|$

TABLE 2. Representative examples, with simplified translations and positive and negative highlights.

[14] With slight abuse of notation, we use $[\![\varphi]\!]^{\pm} \cup [\![\psi]\!]^{\pm}$ as shorthand for $\langle [\![\varphi]\!]^{+} \cup [\![\psi]\!]^{+}, [\![\varphi]\!]^{-} \cup [\![\psi]\!]^{-} \rangle$ and $\bigcup [\![\varphi]\!]^{\pm}$ as shorthand for $\bigcup [\![\varphi]\!]^{+} \cup \bigcup [\![\varphi]\!]^{-}$.

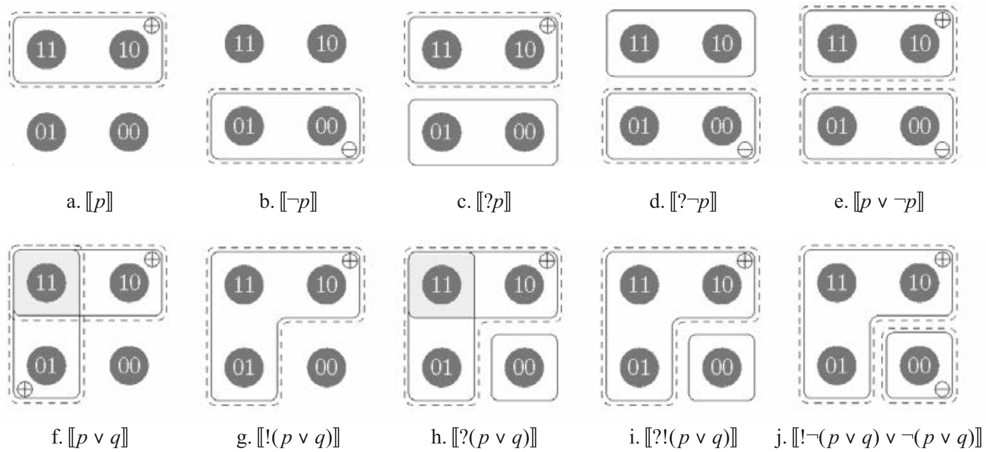


FIGURE 6. The semantic values of some simple formulas in $\mathsf{Inq}_\mathsf{B}^{\pm}$.

This concludes our semantic account of declaratives and sentential interrogatives. Before moving on, let us briefly indicate how the account could be extended to WH-interrogatives. In the case of WH-interrogatives, it would be natural to assume that what is made particularly salient is, instead of one or more possibilities, an *n*-place PROPERTY, where $n \geq 1$ is the number of WH-elements in the interrogative.[15] Anticipating our account of polarity particle responses, this means that the type of objects that are made available by WH-interrogatives as potential antecedents for subsequent anaphoric expressions are not the right type of objects to license polarity particle responses. This, then, will account for the basic contrast between 1–3 noted at the outset of the article.[16]

3.4. DISCOURSE CONTEXTS AND HOW THEY ARE UPDATED. Having spelled out a semantic account for the relevant range of sentence types, our next task is to characterize precisely how utterances affect the discourse context. First, we specify what we take to be the relevant components of a discourse context, drawing primarily on Farkas and Bruce (2010), who in turn build on a rich tradition of previous work on discourse (Hamblin 1971, Stalnaker 1978, Carlson 1983, Clark 1992, Ginzburg 1996, Roberts 1996, Gunlogson 2001, Asher & Lascarides 2003, Büring 2003, among others).

(61) A DISCOURSE CONTEXT is a tuple ⟨participants, table, drefs, commitments⟩, where:
  a. participants is the set of discourse participants;
  b. table is a stack of propositions, expressed in the discourse so far;
  c. drefs is a stack of discourse referents; more precisely, each element of drefs is a set of possibilities, with positive or negative polarity, that were highlighted by one of the utterances made so far; the first element of the stack contains the most salient discourse referents, that is, the ones introduced by the most recent utterance;

[15] This idea is indeed quite common in the literature on the semantics of questions; see, for example, Groenendijk & Stokhof 1984, von Stechow 1991, Krifka 2001, Aloni & van Rooij 2002. For comparison of our proposal to this line of work, see §7.

[16] In the domain of non-WH-interrogatives, there are a number of cases that we have purposely left out of consideration here, including tag interrogatives, high negation polar interrogatives, conditional polar interrogatives, and conjunctions of polar interrogatives. A detailed account of polarity particle responses to such sentences is left for another occasion.

d. commitments is a function that maps every participant $x \in$ participants to a set of possibilities, those possibilities that x has publicly committed to during the discourse so far.

In terms of these basic discourse-context components, several other notions may be defined. For instance, we may define the COMMITMENT SET of a participant x, $cs(x)$, as the set of worlds that are compatible with all of the possibilities that x has publicly committed to so far: $cs(x) = \bigcap \text{commitments}(x)$.

In terms of the commitment sets of all the individual participants, the CONTEXT SET of the discourse may be defined as the smallest set of possible worlds α such that all discourse participants are publicly committed to the actual world w_0 being contained in α. In other words: $cs = \bigcup_{x \in P} cs(x)$. Thus, the standard Stalnakerian notion of a context set can be derived here, but is not taken as a basic component, let alone the defining characteristic, of a discourse context. This is because, as we have seen in §2, in order to account for certain aspects of polarity particle responses it is important to keep track of the commitments of all the individual discourse participants. For additional reasons to keep track of the commitments of all the individual discourse participants, see Farkas & Bruce 2010.

The INITIAL context of every discourse is one in which the table is empty (table = Ø), no discourse referents have been introduced yet (drefs = Ø), and for every discourse participant x, commitments(x) = $\{W\}$, where W denotes the set of all possible worlds. This reflects the fact that the discourse participants do not have any public discourse commitments yet, apart from the trivial commitment that w_0 is contained in W.[17]

We are now ready to specify how utterances AFFECT the discourse context.

(62) An utterance of φ by a participant x has a three-fold effect on the discourse context:
a. $[\![\varphi]\!]$ is added to the table;
b. $[\![\varphi]\!]^{\pm}$ is added to drefs;
c. info(φ) is added to commitments(x).

Recall that info(φ) is defined as $\bigcup[\![\varphi]\!]$. Also recall that if φ is a polar interrogative, then info(φ) is always TRIVIAL, in the sense that it amounts to the set of all possible worlds, W. In this case, adding info(φ) to commitments(x) does not incur any real commitment on x, since clearly the actual world w_0 must be among the set of all possible worlds. By contrast, if φ is a declarative, then info(φ) is typically nontrivial, and as a result adding info(φ) to commitments(x) does incur a real commitment on x. Thus, while the discourse effects of an utterance are characterized in a uniform way, without making reference to the syntactic properties of the uttered sentence (e.g. whether it is declarative or interrogative), differences in discourse effects between sentence types result from differences in their semantics.

In putting a proposition $[\![\varphi]\!]$ on the table, a discourse participant invites a response from other participants that DECIDES on $[\![\varphi]\!]$, that is, a response that determines the location of the actual world w_0 relative to the possibilities in $[\![\varphi]\!]$. We distinguish between responses that decide FAVORABLY on $[\![\varphi]\!]$ and ones that decide UNFAVORABLY on $[\![\varphi]\!]$. A response that decides favorably on $[\![\varphi]\!]$ locates w_0 inside at least one of the possibilities in $[\![\varphi]\!]$, while a response that decides unfavorably on $[\![\varphi]\!]$ locates w_0 outside of all the possibilities in $[\![\varphi]\!]$. We can put this more formally as in 63.

[17] Note that discourse commitments, in our technical sense, do not include general background assumptions. Of course, such assumptions play a crucial role in discourse at large but not for the phenomena considered here.

(63) a. A response ψ decides FAVORABLY on $[\![\varphi]\!]$ if and only if $\mathsf{info}(\psi) \in [\![\varphi]\!]$.
b. A response decides UNFAVORABLY on $[\![\varphi]\!]$ if and only if $\mathsf{info}(\psi) \cap \alpha = \emptyset$ for all $\alpha \in [\![\varphi]\!]$.
c. A response decides on $[\![\varphi]\!]$ if and only if it decides favorably or unfavorably on $[\![\varphi]\!]$.

If there is a possibility $\alpha \in [\![\varphi]\!]$ such that all discourse participants have publicly committed to α (which means that $cs \subseteq \alpha$), or if all discourse participants have committed to the complement of all the possibilities in $[\![\varphi]\!]$ (which means that $cs \subseteq \overline{\bigcup[\![\varphi]\!]}$), then we say that $[\![\varphi]\!]$ has been COMMONLY DECIDED. If the discourse reaches a state where all of the propositions on the table have been commonly decided, we say that the discourse is in a STABLE STATE.

A response that decides unfavorably on $[\![\varphi]\!]$ places the discourse in a state from which a stable state can be reached only if one of the participants retracts one of her commitments or if the participants 'agree to disagree' on $[\![\varphi]\!]$, in which case the proposal is removed from the table without a common decision on it having been reached.

This concludes our discussion of the discourse model that we assume, a slight refinement of the model proposed by Farkas and Bruce (2010) that interfaces naturally with inquisitive semantics. With this framework in place, we are now ready to turn to polarity particle responses.

4. POLARITY PARTICLE RESPONSES IN ENGLISH. The basic insight behind the account of polarity particles that we develop, rooted in the work of Pope (1976), is that polarity particles may fulfill two distinct, though closely related, purposes. Namely, on the one hand, they can be used to mark a response as being either POSITIVE or NEGATIVE, and, on the other, they can be used to signal how the response is related to its antecedent, in particular to signal whether the response AGREES with or REVERSES the content and the polarity of the antecedent.

For the specific case of English, our main hypothesis is that the particles *yes* and *no* do double duty, in the sense that they may fulfill either of the above two purposes: *yes* may be used to signal that the response is positive, or that it agrees with the antecedent possibility in terms of content and polarity, while *no* may be used to signal that the response is negative, or that it reverses the antecedent possibility in terms of content and polarity.

This double-duty hypothesis provides a ready explanation for the basic pattern we find in the distribution of polarity particles in English.

(64)	a. Positive initiative:	Amy left.
	b. Agreement:	Yes, she did./*No, she did.
	c. Reversal:	*Yes, she didn't./No, she didn't.
(65)	a. Negative initiative:	Amy didn't leave.
	b. Agreement:	Yes, she didn't./No, she didn't.
	c. Reversal:	Yes, she DID./No, she DID.

In an agreeing response to a positive initiative, as in 64b, *yes* can be used to mark the response either as being positive or as agreeing with the antecedent, while *no* cannot be used, since the response is neither negative nor does it reverse the antecedent. In a reversing response to a positive initiative, as in 64c, the tables are turned: now *no* can be used to mark the response either as being negative or as reversing the antecedent, while *yes* cannot be used, since the response neither is positive nor does it agree with the antecedent.

Turning now to agreeing responses to a negative initiative, as in 65b, we see that both *yes* and *no* can be used. This is expected on the account sketched above, because *yes* can be used to mark the response as agreeing with the antecedent, while *no* can be used to mark it as being negative. Similarly, in a reversing response to a negative initiative, as in 65c, *no* can be used to mark the response as reversing the antecedent, while *yes* can be used to mark it as being positive.

In the remainder of this section, this informal sketch of our account is worked out in detail, and its predictions with regard to the empirical issues surveyed in §2 are discussed systematically. We also argue that the particular division of labor between the polarity particles that we find in English—that is, having one particle to mark positive and agreeing responses, and another particle to mark negative and reversing responses—is not arbitrary.

In §5, we consider a number of languages other than English. In all of these languages there are three particles rather than two, which means that each particle can fulfill a more restricted purpose—in particular, unlike *yes* and *no*, most particles in these languages do not do double duty, but are specialized for marking the response either as being positive/negative or as being agreeing/reversing.

4.1. Polarity features. Following Farkas & Bruce 2010 and Farkas 2010, which in turn build on Pope 1976, we assume that polarity particles across languages function as the morphological realization of two types of polarity features, called absolute and relative features.[18]

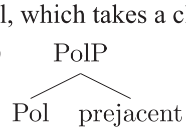
(66) Absolute polarity features: [+], [−]
Relative polarity features: [agree], [reverse]

An absolute polarity feature marks a response as being positive or negative. A relative polarity feature, by contrast, marks a response as either agreeing with or reversing the antecedent possibility, both in terms of content and in terms of polarity. There are four possible combinations of polarity features, given in Table 3.

	relation with antecedent	polarity of response
[agree, +]	agree	+
[agree, −]	agree	−
[reverse, +]	reverse	+
[reverse, −]	reverse	−

Table 3. Possible combinations of polarity features.

Syntactically, we assume that these polarity features are hosted by a left-periphery head called Pol, which takes a clausal argument, called its prejacent, as in the tree in 67.

(67)


We assume that the prejacent may be partially or fully elided, as long as its semantic contribution can be fully recovered (how this can be done will become clear below). In particular, in the case of a bare polarity particle response, the prejacent is fully elided.[19]

[18] In Farkas & Bruce 2010 and Farkas 2010, the first absolute polarity feature is labeled [same] rather than [agree]. We changed the label here because [agree] is more in line with the formal semantic treatment that we provide for this feature. It also stays closer to Pope's (1976) original terminology.

[19] The assumption that polarity particle responses always involve a prejacent, even in the case of a bare particle response, is not crucial for our account of English. Indeed, as far as English is concerned, our account could easily be reformulated in such a way that polarity particles are treated as pure sentential anaphors (cf. Ginzburg & Sag 2000, Krifka 2013). The assumption that polarity particle responses always involve a prejacent does, however, play a role in the analysis of the Romanian data in §5. Thus, in order to facilitate a uni-

Semantically, we take polarity features to be purely presuppositional, in line with the standard treatment of, for example, gender features on pronouns (Cooper 1983, Heim & Kratzer 1998, Sudo 2012, among others). That is, these features perform a test on the semantic value of their prejacent. If the test is successful, they pass the semantic value of the prejacent on to the PolP node. If the test fails, the compositional process gets stuck and unacceptability results.

The absolute polarity features [+] and [−] presuppose that their prejacent expresses a proposition containing a single possibility, which is highlighted and has positive or negative polarity, respectively.

(68) [+] presupposes that its prejacent expresses a proposition containing a single possibility α, which is highlighted and has positive polarity:

$$[\![\text{prejacent}]\!] = \{\alpha\}^{\downarrow} \qquad \text{and} \qquad [\![\text{prejacent}]\!]^{\pm} = \langle\{\alpha\}, \emptyset\rangle$$

(69) [−] presupposes that its prejacent expresses a proposition containing a single possibility α, which is highlighted and has negative polarity:

$$[\![\text{prejacent}]\!] = \{\alpha\}^{\downarrow} \qquad \text{and} \qquad [\![\text{prejacent}]\!]^{\pm} = \langle\emptyset, \{\alpha\}\rangle$$

These features are called ABSOLUTE precisely because they are sensitive purely to the properties of their prejacent. Their presupposition is therefore checked internally to the response.

Relative polarity features, by contrast, connect the response to the foregoing discourse move. They presuppose that their prejacent highlights a unique possibility α, and that the discourse context contains a unique most salient antecedent possibility β such that α agrees with/reverses β, both in terms of content and in terms of polarity.

(70) [AGREE] presupposes that its prejacent highlights a unique possibility α, and that the context provides a unique most salient antecedent possibility β such that α and β contain precisely the same possible worlds and have the same polarity.

(71) [REVERSE] presupposes that its prejacent highlights a unique possibility α, and that the context provides a unique most salient antecedent possibility β such that α is the complement of β and has the opposite polarity.

From this semantic treatment of the individual polarity features, it follows that the four possible feature COMBINATIONS are interpreted as follows.

(72) [AGREE, +] presupposes that the context provides a unique most salient antecedent possibility α with positive polarity such that:

$$[\![\text{prejacent}]\!] = \{\alpha\}^{\downarrow} \qquad \text{and} \qquad [\![\text{prejacent}]\!]^{\pm} = \langle\{\alpha\}, \emptyset\rangle$$

(73) [AGREE, −] presupposes that the context provides a unique most salient antecedent possibility α with negative polarity such that:

$$[\![\text{prejacent}]\!] = \{\alpha\}^{\downarrow} \qquad \text{and} \qquad [\![\text{prejacent}]\!]^{\pm} = \langle\emptyset, \{\alpha\}\rangle$$

(74) [REVERSE, −] presupposes that the context provides a unique most salient antecedent possibility α with positive polarity such that:

$$[\![\text{prejacent}]\!] = \{\overline{\alpha}\}^{\downarrow} \qquad \text{and} \qquad [\![\text{prejacent}]\!]^{\pm} = \langle\emptyset, \{\overline{\alpha}\}\rangle$$

(75) [REVERSE, +] presupposes that the context provides a unique most salient antecedent possibility α with negative polarity such that:

$$[\![\text{prejacent}]\!] = \{\overline{\alpha}\}^{\downarrow} \qquad \text{and} \qquad [\![\text{prejacent}]\!]^{\pm} = \langle\{\overline{\alpha}\}, \emptyset\rangle$$

Note that it does not matter in which order any given feature combination is taken to apply, that is, whether we first apply the absolute feature and then the relative feature or the other way around. The result is always the same.

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form crosslinguistic account, we adopt the assumption in general, even if it does not seem to be strictly necessary for English.

This concludes our semantic account of the polarity features.[20] Next, we need to specify (i) which particles can be used to realize which features, and (ii) given a certain feature combination, which features are most likely to be realized. The answer to the first question is bound to be language-specific. The answer to the second, however, ideally rests on universal principles. In the next subsection we approach these two questions from the perspective of English.

4.2. Realization rules. We conceive of polarity particles as lexical items that morphologically realize polarity features, in line with distributed morphology (Halle & Marantz 1993). Thus, we assume that syntax generates a certain combination of polarity features in the head of a Polarity Phrase, and morphological vocabulary insertion rules insert lexical items, namely polarity particles, that realize these features. We give two realization rules below, specifying which features can be realized by which particles. Further, we assume that different features and feature combinations need to be overtly realized to various degrees, depending on the nature of the features involved. We refer to the pressure for overt realization of a feature or feature combination as its realization needs.

The polarity particle inventory is language-specific and so are the rules connecting particular particles to particular features or feature combinations, though we propose general principles that delimit this variation. In English, there are two polarity particles, *yes* and *no*. The realization potential of these two particles is as follows.

(76) Realization potential of English polarity particles
  a. [agree] and [+] can be realized by *yes.*
  b. [reverse] and [−] can be realized by *no*.

These rules capture the sense in which polarity particles in English do double duty: each particle is used to realize both an absolute feature and a relative feature.

As a consequence of 76, the connection between the four possible feature combinations and the two polarity particles in English is as follows.

(77) Feature combinations and particles in English
  a. [agree, +] can only be realized by *yes*.
  b. [reverse, −] can only be realized by *no*.
  c. [agree, −] can be realized by *yes* or *no*.
  d. [reverse, +] can be realized by *yes* or *no*.

An interesting question that these realization rules for English give rise to is whether the particular clustering that they embody—that is, having one particle for [agree] and [+], and another for [reverse] and [−]—is arbitrary or has a deeper explanation. In a lexicalist approach, the rules in 76 essentially amount to positing that *yes* is ambiguous between an [agree] interpretation and a [+] interpretation, while *no* is ambiguous between a [reverse] interpretation and a [−] interpretation. In lexicalist terms, then, the question is whether this is a case of arbitrary ambiguity or of motivated polysemy. Our answer to this question rests on general considerations about the various realization needs of particular features and feature combinations, to which we now turn.

4.3. Realization needs and markedness scales. Given a certain feature combination, what factors determine which features are to be realized? We base our answer to this question on two traditional observations, namely, that features are distinguished with respect to markedness, and that the more marked a feature is, the stronger the pressure is for it to be overtly realized. The overall system we have in mind could be ex-

[20] Note that, even though our account of the polarity features is made formally precise in a specific semantic framework here, its conceptual core could be imported into other frameworks as well.

pressed in optimality-theoretic terms making use of an interplay between economy constraints, which militate for leaving features implicit, and faithfulness constraints sensitive to markedness considerations, which militate for overt expression of features. We stay here at an informal level for the sake of simplicity, and talk about markedness affecting the 'realization needs' of features.

The markedness distinctions within and across polarity features we propose below are rooted in insightful observations in Pope 1976. We start with markedness contrasts between polarity features that are of the same type, that is, either absolute or relative, and propose the scales in 78, where < separates a less marked feature from a more marked one.

(78) Absolute and relative markedness scales
  a. [+] < [−]
  b. [AGREE] < [REVERSE]

The feature [−] is more marked than [+] because it marks the prejacent as being negative, and negative expressions are more marked than positive ones (see Horn 2001, among others, for discussion). The feature [REVERSE] is more marked than [AGREE] because complementation is a more complex relation than identity.

Given the assumption we made above about the connection between markedness and overt realization of features, the scales in 78 give rise to the following typological predictions.

(79) a. Languages may have a specialized [−] particle in the absence of a specialized [+] particle. The opposite situation is less likely to occur.
  b. Languages may have a specialized [REVERSE] particle in the absence of a specialized [AGREE] particle. The opposite situation is less likely to occur.

Latin and Irish are examples of languages that lack a dedicated particle expressing either [AGREE] or [+] but have a particle expressing [REVERSE] or [−]. We see in the next section that Romanian and Hungarian have a dedicated [REVERSE] particle but no dedicated [AGREE] particle.

Another immediate consequence of the markedness scales in 78 is that the features [AGREE] and [+] form a natural class, as do the features [REVERSE] and [−]. This is so because [AGREE] and [+] are the two unmarked features on their respective scales, while [REVERSE] and [−] are the two marked features. We thus have the two natural classes in 80.

(80) a. Unmarked polarity features: [AGREE], [+]
  b. Marked polarity features: [REVERSE], [−]

Another reason that [AGREE] and [+] form one natural class, and [REVERSE] and [−] another, has to do with the unmarked nature of positive initiatives. An [AGREE] response to such an initiative is [+], while a [REVERSE] response is [−].

Returning now to the issue of the two features that can be realized by each hardworking polarity particle in English, we see that the fact that *yes* realizes [AGREE] and [+], while *no* realizes [REVERSE] and [−], is not an arbitrary fact. This is precisely what we expect if a language decides to make do with two polarity particles to encode a four-way contrast: one particle realizes the two unmarked features, the other the two marked ones. This provides a rationale for the realization rules we proposed for English, and leads us to expect that other languages with double-duty polarity particle systems would exhibit the same pattern.[21] In lexicalist terms, *yes* and *no* are polysemous in our view rather than arbitrarily ambiguous.

[21] Of course, we do not rule out a language like Japanese, for instance, which has two polarity particles realizing the two relative polarity features, and no particles realizing the absolute polarity features.

Now let us return to the factors that determine the relative markedness of particular features or feature combinations. Besides the scales in 78, there are various other such factors. First, we consider the relative markedness of [REVERSE] responses depending on whether they target an assertion or a question. A [REVERSE] response to an assertion is more marked than a [REVERSE] response to a question because, as discussed in §2, the former, unlike the latter, is bound to lead to a conversational crisis.

(81) Reversal scale: assertion reversal > question reversal

As foreshadowed by the empirical discussion in §2, this scale will be crucial in accounting for the details of polarity particle distribution in Romanian, and also in Hungarian.

Next, we note that absolute polarity features in [REVERSE] responses have a special status in that they always CONTRAST with the polarity of their antecedent possibility. We therefore posit 82.

(82) CONTRASTIVE MARKEDNESS: Absolute polarity features in [REVERSE] responses are marked because they contrast with the polarity of their antecedent.

One important consequence of these observations is that [REVERSE, +] responses involve two sources of markedness: [REVERSE] is marked relative to [AGREE], and [+] is marked because it is contrastive in the presence of [REVERSE]. Thus, both features have high realization needs. In addition, because the combination of these two features does not form a natural class, languages like English cannot use one of their double-duty particles to realize both features at once. The most natural way to express a [REVERSE, +] response in English is as in 83, with an explicit prejacent that carries verum focus on the verb, encoding the contrastive absolute polarity of the response, combined with either *yes*, realizing the contrastive [+] feature, or *no*, realizing [REVERSE].

(83) A: Peter didn't call.
B: Yes, he DID./No, he DID.

The three markedness factors specified in 78, 81, and 82 together result in the following overall markedness scale for the four possible polarity feature combinations.

(84) Overall markedness scale: [AGREE, +] < [REVERSE, −] < [AGREE, −] < [REVERSE, +]

[AGREE, +] and [REVERSE, −] are less marked than [AGREE, −] and [REVERSE, +] because the former involve feature combinations that form a natural class. [AGREE, +] is less marked than [REVERSE, −] because [AGREE] and [+] are both relatively unmarked and [+] is not contrastive in the presence of [AGREE], while [REVERSE] and [−] are both relatively marked and [−] is contrastive in the presence of [REVERSE]. Finally, [AGREE, −] is less marked than [REVERSE, +] because [AGREE] is relatively unmarked and [−] is noncontrastive in the presence of [AGREE], while [REVERSE] is relatively marked and [+] is contrastive in the presence of [REVERSE]. We therefore expect [REVERSE, +] responses to have a special status. We have already seen that they do in English, where such responses require an overt prejacent bearing contrastive focus on the verb, marking the contrastive absolute polarity of the response. In §5 we will see that other languages employ different strategies to satisfy the high realization needs of the [REVERSE, +] feature combination and present further support for the typological predictions made here.

4.4. BACK TO THE DATA. We now show that our semantic treatment of polarity features, the realization rules in 76, and the markedness scales discussed above account for the distribution and interpretation of polarity particle responses in English, addressing in particular the issues that were raised in §2.

BASIC CASES. We start with responses to simple assertions and polar questions. In [AGREE, +] responses to such initiatives, exemplified in 85, *yes* is licensed while *no* is unacceptable.

(85) A: Peter called./Did Peter call?
B: Yes, he did./*No, he did. [AGREE, +]

This is predicted because *yes* can realize either [AGREE] or [+], while *no* cannot realize either of these two features. The opposite pattern is found, and predicted, in [REVERSE, −] responses, where *no* can realize both features while *yes* cannot realize either.

(86) A: Peter called./Did Peter call?
B: *Yes, he didn't./No, he didn't. [REVERSE, −]

In [AGREE, −] responses, both *yes* and *no* are licensed.[22]

(87) A: Peter didn't call./Did Peter not call?
B: Yes, he didn't./No, he didn't. [AGREE, −]

This is predicted because *yes* can realize [AGREE] and *no* can realize [−]. Moreover, given our markedness considerations, we expect that, other things being equal, there will be a preference for *no* in such responses, given that [−] is a marked feature and [AGREE] is not. This prediction has been confirmed experimentally, at least for simple cases like 87, in Brasoveanu et al. 2013.

In [REVERSE, +] responses, again both *yes* and *no* are licensed.

(88) A: Peter didn't call./Did Peter not call?
B: Yes, he DID./No, he DID. [REVERSE, +]

This is predicted, because *no* can realize [REVERSE] and *yes* can realize [+]. Moreover, the obligatory contrastive stress on the auxiliary verb in the prejacent is explained by the special contrastive nature of the absolute polarity feature in this type of response.

Now consider a case in which *yes* and *no* come with an explicit continuation that agrees with the antecedent possibility in content but not in polarity. In this case, only *yes* is licensed.

(89) A: Susan failed the exam./Did Susan fail the exam?
B: Yes, she did not pass./*No, she did not pass.

Note that the given continuation CANNOT be construed as the prejacent of the polarity particles in this case. This is because it would be impossible to satisfy the presuppositions of any feature combination taking the given continuation as its prejacent, since the continuation agrees with the antecedent possibility in CONTENT but not in POLARITY. So, for the responses in 89 to be felicitous at all, the particles must be construed as having a fully elided prejacent, and the explicitly given continuation must be taken to form a separate clause.

Now, since the antecedent possibility has positive polarity, the only possible feature combinations for the response are [AGREE, +] and [REVERSE, −]. The former would confirm that Susan failed the exam and would therefore be compatible with the explicitly given continuation. The latter, however, would convey that Susan passed the exam and would therefore not be compatible with the given continuation. Thus, assuming that the responder does not intend to contradict himself, the only possible feature combination for the response is [AGREE, +], and therefore it is predicted that the only possible particle is *yes*.

[22] It seems that, at least for some speakers, *yeah* is more natural than *yes* in this type of response, and the particle combination *yeah no* is also acceptable. Further empirical work is needed, however, to corroborate this.

By contrast, if the antecedent possibility has negative polarity, it is correctly predicted that both *yes* and *no* are licensed.

(90) A: Susan did not pass the exam./Did Susan not pass the exam?
B: Yes, she failed./No, she failed.

Finally, we note that polarity particle responses to WH-questions are correctly predicted to be unacceptable, given that such questions do not highlight one or more possibilities, but rather an *n*-place property, where $n \geq 1$ is the number of WH-elements. As such, WH-questions do not provide the type of antecedent that is needed to license polarity particle responses.

BARE PARTICLE RESPONSES TO NEGATIVE INITIATIVES. Now let us consider bare particle responses to negative initiatives.

(91) A: Peter didn't call./Did Peter not call?
B: ?Yes./?No.

Recall the experimental results from Kramer and Rawlins (2012) that we discussed in §2. For convenience, we repeat from above the main generalizations that these results give rise to.

(92) Generalizations from felicity judgments
F1: Bare particle responses to negative polar questions are less felicitous than truthful bare particle responses to positive polar questions.
F2: In response to negative polar questions, bare *yes* and bare *no* are both less felicitous when the context is positive than when the context is negative.

(93) Generalizations from truth-value judgments
T1: Bare particle responses to negative polar questions are ambiguous. They are interpreted much more equivocally than bare particle responses to positive polar questions.
T2: In response to a negative polar question, schematically of the form $?\neg p$, both *yes* and *no* are more often interpreted as confirming $\neg p$ than as rejecting $\neg p$.

Our theory accounts for these generalizations as follows. First, notice that a positive polar question, $?p$, licenses [AGREE, +] and [REVERSE, −] responses, while a negative polar question, $?\neg p$, licenses [AGREE, −] and [REVERSE, +] responses. Our realization rules say that *yes* can realize [AGREE] and [+], while *no* can realize [REVERSE] and [−]. This means that bare particle responses to positive polar questions are predicted to be unambiguous: *yes* can only be interpreted as an [AGREE, +] response, confirming p, while *no* can only be interpreted as a [REVERSE, −] response, rejecting p. However, bare particle responses to negative polar questions are predicted to be ambiguous: *yes* may be interpreted as an [AGREE, −] response, confirming $\neg p$, but it may also be interpreted as a [REVERSE, +] response, rejecting $\neg p$. And the same is true for *no*. This explains the fact that bare particle responses to negative polar questions are less felicitous than bare particle responses to positive polar questions, as well as the mixed truth-value judgments in the case of negative polar questions (generalizations F1 and T1).

Second, in a positive context the CORRECT response to a negative polar question is a [REVERSE, +] response. In this case an explicit prejacent is needed in order to signal the contrastive absolute polarity of the response. So there is additional pressure for an explicit prejacent, independent from the need to disambiguate. In a negative context, by contrast, the correct response to a negative polar question is an [AGREE, −] response. In this case there is no pressure for an explicit prejacent, apart from the need to disambiguate. This explains why, in response to negative polar questions, both bare *yes* and bare *no* are less felicitous when the context is positive than when the context is negative (generalization F2).

Finally, the fact that [REVERSE, +] responses come with additional pressure for an explicit prejacent, unlike [AGREE, −] responses, also implies that if the responder does NOT provide an explicit prejacent, then, other things being equal, it is more likely that her response is to be interpreted as an [AGREE, −] response than as a [REVERSE, +] response. This explains why bare *yes* and bare *no* responses to a negative polar question $?\neg p$ are more often interpreted as an [AGREE, −] response, that is, as confirming $\neg p$, than as a [REVERSE, +] response, that is, as rejecting $\neg p$ (generalization T2).

DISJUNCTIVE LISTS. Now let us consider polarity particle responses to declarative and interrogative disjunctive lists. There are four types of lists to consider: closed declaratives, open declaratives, open interrogatives, and closed interrogatives. As far as polarity particle responses are concerned, closed declarative lists with multiple list items behave exactly the same as ones with a single list item, which amount to simple declarative sentences like the ones in 85–88 above. Moreover, open declarative lists behave exactly the same as open interrogative lists in this respect. For this reason we do not exemplify the predictions of our account for these two types of lists explicitly, and focus on the remaining two types: open and closed interrogatives.

Let us first consider cases where both disjuncts are positive; after that we look at the case where one of the disjuncts is negative (cases where both disjuncts are negative behave just like ones where both disjuncts are positive). We start with the following well-known contrast.[23]

(94) A: Does Igor speak English-or-French↑? $?!(p \vee q)$
B: Yes./Yes, he speaks English./No./No, he doesn't.

(95) A: Does Igor speak English↑, or French↓? $p \vee q$
B: *Yes./*Yes, he speaks English./*No./*No, he doesn't.

The propositions that these interrogatives are taken to express on our account and the possibilities that they are taken to highlight are depicted in Fig. 6 above. The contrast is explained as follows. The interrogative in 94 highlights a single possibility, $|p \vee q|$, with positive polarity. Therefore, it licenses an [AGREE, +] response and a [REVERSE, −] response. In the former type of response, *yes* can be used to realize either of the two features, while in the latter type of response, *no* can be used to do so. This explains the fact that both *yes* and *no* are licensed, and also that they are interpreted as confirming or disconfirming, respectively, that Igor speaks English or French.

The interrogative in 95, by contrast, highlights two possibilities, $|p|$ and $|q|$, both with positive polarity. This means that it does not provide a unique positive antecedent possibility, nor a unique negative antecedent possibility, which would be needed to satisfy the presuppositions of any of the four possible feature combinations in responses. This explains why neither *yes* nor *no* is licensed in this case.

Next, consider an open interrogative list with two list items, still both positive.

(96) [Context: Amalia wants to write a letter to Igor, who is Russian. She doesn't speak Russian, so she would like to know whether Igor speaks any other languages that she could write in.]
A: Does Igor speak English↑, or French↑? $?(p \vee q)$
B: #Yes./Yes, he speaks English./No./No, he doesn't.

[23] This contrast has been accounted for in several ways in previous work (see e.g. Krifka 2001, Aloni & van Rooij 2002, Roelofsen & van Gool 2010, Pruitt & Roelofsen 2011). However, these proposals do not satisfactorily account for the other disjunctive cases to be discussed below, nor do they account for the basic contrasts between positive and negative initiatives exemplified in 85–88 above.

Roelofsen and van Gool (2010) observe that, while a bare *yes* response is not satisfactory in reaction to this type of interrogative, a bare *no* response is fine. We added the observation that, even though *yes* is not acceptable as a bare particle response, it is fine when accompanied by a sentence that explicitly confirms one of the given disjuncts, an observation not accounted for in the previous literature. Notice that there is a two-way contrast between the open interrogative in 96 and the closed interrogative in 95. First, while the former licenses a *no* response, the latter does not. And second, while the former licenses a *yes* response provided that the particle is accompanied by a sentence that explicitly confirms one of the given disjuncts, the latter does not license *yes* responses at all, even if the particle is accompanied by a sentence explicitly confirming one of the disjuncts.

How can all this be explained? First of all, the interrogative in 96, translated into our logical language as $?(p \vee q)$, highlights a single possibility, $|p \vee q|$, with positive polarity. This means that it licenses an [AGREE, +] response and a [REVERSE, −] response. In the first case, *yes* can be used to realize either of the polarity features, and in the second case, *no* can be used to do so. However, there is an asymmetry between these two responses. To see this, we need to consider the proposition expressed by $?(p \vee q)$, which is $\{|p|, |q|, |\neg(p \vee q)|\}^{\downarrow}$. This proposition embodies an issue that can be resolved by locating the actual world in either one of the three given possibilities, $|p|$, $|q|$, and $|\neg(p \vee q)|$. Now, on the one hand, a bare *no* response conveys, by virtue of the semantics of the [REVERSE, −] feature combination, that the actual world is located in the third possibility, $|\neg(p \vee q)|$. A bare *yes* response, on the other hand, conveys, by virtue of the semantics of the [AGREE, +] feature combination, that the actual world is located in $|p \vee q|$. It does not determine whether the actual world is located in $|p|$ or in $|q|$, however, and therefore it does not resolve the issue that is raised by the interrogative. This is why a bare *yes* response, in contrast to a bare *no* response, is not satisfactory.

However, if *yes* is accompanied by a sentence that explicitly locates the actual world either in $|p|$ or in $|q|$, then the response does become satisfactory. Crucially, while a plain *yes* response is ruled out both in 96 and in 95, it is ruled out in these two cases for DIFFERENT REASONS. In the case of 96, it is unsatisfactory because it does not resolve the issue expressed by the interrogative, a shortcoming that can be overcome by appending a sentence providing suitable additional information. In the case of 95, however, it is ruled out because its presuppositions are not met, and this cannot be overcome by appending a sentence providing additional information.

Now let us turn to closed interrogatives with one positive and one negative disjunct.

(97) A: Does Igor speak English↑, or doesn't he↓? $p \vee \neg p$
B: *Yes./Yes, he does./?Yes, he doesn't.
*No./No, he doesn't./?No, he DOES.

Krifka (2001) observes, without providing an account, that such interrogatives do not license bare polarity particle responses, but that they do license particle responses with a suitable explicit prejacent, like *Yes, he does* and *No, he doesn't*. We add the observation that responses like *No, he* DOES and *Yes, he doesn't* also seem to be marginally acceptable, though less natural than the ones considered by Krifka.[24]

This is accounted for as follows. The interrogative highlights two possibilities, $|p|$ and $|\neg p|$, the first with positive polarity and the second with negative polarity. Now, first

[24] It seems that *Yeah, he doesn't* is somewhat more natural than *Yes, he doesn't* in this context, just like in response to a simple negative declarative or interrogative; see n. 22. More in-depth empirical work on the apparent subtle differences between *yeah* and *yes* must be left for future work.

consider a bare *no* response. Such a response could involve any of the following feature combinations.

(98) a. [AGREE, −] ⇝ interpretation: 'Igor doesn't speak English'
b. [REVERSE, −] ⇝ interpretation: 'Igor doesn't speak English'
c. [REVERSE, +] ⇝ interpretation: 'Igor does speak English'

Thus, depending on the feature combination involved, the response may be intended to signal either that Igor does speak English or that he does not. This pernicious ambiguity accounts for the infelicity of a bare *no* response. But if the particle is accompanied by an explicit prejacent that resolves the ambiguity, then the response is predicted to be felicitous. Notice that our account also predicts that in the case of a [REVERSE, +] response—that is, if the prejacent of *no* signals that Igor does speak English—then it has to come with verum focus: *No, he DOES* (**does*).

Now consider a bare *yes* response. Such a response could involve any of the following feature combinations.

(99) a. [AGREE, +] ⇝ interpretation: 'Igor does speak English'
b. [AGREE, −] ⇝ interpretation: 'Igor doesn't speak English'
c. [REVERSE, +] ⇝ interpretation: 'Igor does speak English'

Again, the different possible feature combinations result in different interpretations, and this pernicious ambiguity accounts for the infelicity of a bare *yes* response. If the particle is accompanied by an explicit prejacent that resolves the ambiguity, then the response is again predicted to be felicitous. In this case, if the prejacent signals that Igor does speak English, it does not necessarily have to come with verum focus. This is because, given that the particle is *yes* rather than *no* in this case, such a response can be taken to involve the feature combination [AGREE, +], whose absolute feature does not contrast with the polarity of the antecedent possibility.

Finally, let us consider the fact that the responses *No, he DOES* and *Yes, he doesn't* seem less natural than the ones considered by Krifka. This does not follow from anything we have said explicitly so far, but we do think that our framework provides a natural explanation. Namely, given our markedness considerations, it is reasonable to make the following assumption.

(100) MARKEDNESS AND CHOICE OF FEATURE COMBINATION: If a response is in principle compatible with several polarity feature combinations, then the default preference is to assume the least marked feature combination.

A response to 97 to the effect that Igor does speak English could in principle be characterized either as an [AGREE, +] response, confirming the positive disjunct, or as a [REVERSE, +] response, reversing the negative disjunct. [AGREE, +] is less marked than [REVERSE, +]; in fact, these two feature combinations are on opposite sides of the overall markedness scale in 84. Thus, the default preference is to characterize the response as an [AGREE, +] response, which means that *yes* is the preferred particle in this case. This explains the marginal status of *No, he DOES*.

Similarly, a response to 97 to the effect that Igor does NOT speak English could in principle be characterized either as a [REVERSE, −] response, reversing the positive disjunct, or as an [AGREE, −] response, confirming the negative disjunct. Since [REVERSE, −] is less marked than [AGREE, −], the default preference is to characterize the response as a [REVERSE, −] response, which means that *no* is the preferred particle in this case. This explains the marginal status of *Yes, he doesn't*.[25]

[25] We would like to mention an interesting empirical contrast here, between interrogatives like the one in 97 and ones where the second disjunct is simply *or not*. It seems to us that the latter, unlike the former, generally do license bare polarity particle responses, as in (i).

Summary and outlook. This concludes our account of polarity particle responses in English. We have argued that, at the morphosyntactic level, the role of polarity particles is to realize two types of polarity features, absolute and relative, which are hosted by the head of a polarity phrase. Crucial to our account is the semantics of these features, which we take to be universal. The absolute features, [+] and [−], presuppose that their prejacent is either positive or negative. The relative features, [agree] and [reverse], presuppose that their prejacent either agrees with or reverses its antecedent, both in terms of content and in terms of polarity. What we take to be language-specific is the polarity particle repertoire and the rules that govern which particles can be used to realize which features. Finally, we argued that certain polarity features or feature combinations are semantically/pragmatically more marked than others. These markedness considerations, together with the assumption that morphological markedness tends to parallel semantic/pragmatic markedness, yield certain predictions, concerning not only the distribution and interpretation of polarity particles within a particular language, but also more generally the kind of polarity particle systems that we expect to find crosslinguistically.

Thus, in addition to providing a concrete account of polarity particle responses in English, our analysis brings out: (i) what we take to be the common core of polarity particle systems across languages, namely the two types of polarity features and their semantics; (ii) what we take to be the source of variation across languages, namely the particle inventory and the realization rules; and (iii) how we expect this variation to be constrained across languages, namely by the general principle that more marked features or feature combinations are more likely than less marked features or feature combinations to be overtly realized and to be associated with a specialized particle, that is, a particle that can realize that feature or feature combination and no others.

In §5, we turn to a preliminary exploration of these typological predictions, by considering a number of languages that differ from English in interesting ways. After that, in §6, we briefly return to English to show that our markedness considerations not only shed light on polarity particle responses as such, but also help to explain certain contextual restrictions on the felicitous usage of discourse initiatives that elicit such responses.

5. Polarity particles crosslinguistically: a preliminary exploration. We have argued that, in English, the two polarity particles *yes* and *no* do double duty, in that each is called upon to realize both an absolute and a relative polarity feature. On our account, then, English uses the strategy of economizing on the inventory of polarity particles by endowing them with strong expressive power. An alternative strategy is to

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(i) A: Does Igor speak English↑, or not↓?
B: Yes./No.

One way to account for this contrast would be to assume that interrogatives of the form ‘φ *or not*’ are like tag interrogatives in that they highlight only the possibility highlighted by φ itself. At first sight, it indeed seems quite plausible to treat *or not* as a kind of tag. Two immediate challenges would arise under this assumption, however: namely, to explain why *or not* interrogatives, unlike run-of-the-mill tag interrogatives, (i) exhibit auxiliary inversion and (ii) can be embedded.

(ii) a. Does Igor speak English, or not?
b. *Does Igor speak English, doesn’t he?

(iii) a. Mary knows whether Igor speaks English or not.
b. *Mary knows that/whether Igor speaks English, doesn’t he.

We must leave a detailed analysis of tag interrogatives, *or not* interrogatives, and the polarity particle responses that they license for future work.

utilize a larger particle inventory, allowing more specialization for each particle. Such a strategy would reduce polysemy at the expense of particle inventory. A minimally different system from this point of view would be one with three polarity particles rather than two, and in this section we consider a number of languages that exhibit precisely such a system, namely Romanian, Hungarian, French, and German.

Given our general markedness principle, we expect that such languages divide the labor among their richer particle inventory in such a way that polarity features or feature combinations that are relatively marked are most likely to be realized by a specialized particle. In line with this expectation, three of the four languages that we consider, Romanian, Hungarian, and French, have a designated particle for one of the marked features, [−]. Moreover, two of the four languages, Romanian and Hungarian, also have a designated particle for the other marked feature, [REVERSE]. The other two languages, French and German, have a designated particle for the most marked feature COMBINATION, [REVERSE, +].

Given our 'compositional' characterization of [REVERSE, +] responses as involving the two basic polarity features [REVERSE] and [+], we expect that in languages with a dedicated [REVERSE, +] particle, this particle could be based either on an adversative morpheme connected to expressing a [REVERSE] move, or on an emphatic [+] particle expressing contrastive [+]. We indeed find these two possibilities instantiated in French and German. The former has a dedicated [REVERSE, +] particle that is based on an emphatic [+] marker, while the latter has a [REVERSE, +] particle that is based on an adversative discourse particle.[26]

Besides these general characteristics, the polarity particle systems found in Romanian, Hungarian, French, and German also have a number of more specific properties that are of interest in light of our markedness considerations. We provide a more in-depth discussion of the two languages that have a dedicated [REVERSE] particle, Romanian and Hungarian, in §5.1, and then turn to the languages that have a dedicated [REVERSE, +] particle, French and German, in §5.2.

5.1. A DEDICATED [REVERSE] PARTICLE: ROMANIAN AND HUNGARIAN. We first present the Romanian data in some detail, and then summarize the relevant Hungarian facts, focusing on the areas where the two languages contrast. The discussion here is based on Farkas 2009, 2010, 2011.

ROMANIAN. The polarity particle inventory of Romanian contains a positive particle *da* (a morpheme of Slavic origin), a negative particle *nu* (from the older Latin vocabulary), which is identical to verbal negation, and a third particle *ba* (of South Slavic origin), which, we claim, realizes [REVERSE].

As a first step toward determining which features each of these particles is called upon to realize, note that in [AGREE, +] responses *da* is possible, and *nu* is not.

(101) [AGREE, +]
A: Paul a telefonat. 'Paul called.'
B: Da/*Nu(, a telefonat). 'Yes/*No(, he called).'

In [REVERSE, +] responses we see the third particle in action, followed by *da*; *nu* cannot occur in such responses.

[26] Swedish and Danish are like French in that they have a [REVERSE, +] particle based on a positive polarity particle.

(102) [REVERSE, +]
A: Paul nu a telefonat. ‘Paul did not call.’
B: Ba da/*Nu(, a telefonat). ‘Yes, he DID.’

In 103 and 104 we give the relevant data for [−] responses, where we see *nu* used.

(103) [AGREE, −]
A: Paul nu a telefonat. ‘Paul did not call.’
B: Nu/*Da(, nu a telefonat). ‘No(, he didn’t call).’

(104) [REVERSE, −]
A: Paul a telefonat. ‘Paul called.’
B: (Ba) nu(, nu a telefonat)./*Da, nu a telefonat. ‘No(, he didn’t call).’

Based on what we have seen so far, we conclude that the realization potential of the polarity particles in Romanian is as follows.

(105) Realization potential of Romanian polarity particles
a. [+] is realized by *da*.
b. [−] is realized by *nu*.
c. [REVERSE] is realized by *ba*.

The rules above capture the observed distribution of the particles: *da* occurs only in [+] responses, *nu* occurs only in [−] responses, and *ba* occurs only in [REVERSE] responses. The similarity between Romanian *da* and English *yes* on the one hand, and Romanian *nu* and English *no* on the other, is that the first pair is used to realize [+], and the second to realize [−]. The contrast between the two pairs in each language is that the Romanian particles are specialized for realizing absolute polarity features, while their English counterparts are used to realize relative features as well. Thus, in Romanian [AGREE, −] responses, only *nu* is possible, while we have seen that in English both *yes* and *no* are allowed in such responses, realizing [AGREE] and [−], respectively.

Borrowing terminology from morphology, Romanian uses an ‘analytic’ strategy when it comes to the expression of polarity features, while English uses a ‘synthetic’ one. Thus, the polarity particle inventory in Romanian is richer than in English, and this richness allows each particle to be more narrowly specialized for the polarity feature it realizes, thereby avoiding polysemy. This is the type of give and take between lexicon size and semantic specialization within a narrow semantic field that we also see elsewhere in languages, for instance in the realm of kinship terms.

Let us now turn to the more complex question of which features need to be realized in Romanian. In 106 we see that the [REVERSE] particle *ba* is not acceptable as a bare particle response, unlike *da* and *nu*. This particle must be accompanied either by the appropriate polarity particle or by a prejacent whose verb phrase expresses whether the response is positive or negative.

(106) A: Paul nu a telefonat. ‘Paul did not call.’
B: *Ba./Ba da(, a telefonat)./Ba, a telefonat. ‘Yes, he DID.’

(107) A: Paul a telefonat. ‘Paul called.’
B: *Ba./Ba nu(, nu a telefonat)./Ba, nu a telefonat. ‘No, he didn’t.’

We can capture these facts by adopting the following realization rule.

(108) REALIZATION NEEDS OF ABSOLUTE POLARITY FEATURES IN ROMANIAN: Absolute polarity features have to be overtly realized in Romanian, either by an appropriate polarity particle or by an explicit prejacent.

Note that this rule is stated most naturally under the assumption, adopted here, that polarity phrases always involve a prejacent, which may or may not be elided.

We now turn to the details of the realization of [reverse] in different types of responses. First, we note that in [reverse, +] responses, [reverse] is obligatorily realized, whether the initiative is an assertion or a question.

(109) [reverse, +]
A: Paul nu a telefonat./Nu a telefonat Paul? 'P did not call./Did P not call?'
B: Ba (da)/*Da/*Nu(, a telefonat). 'Yes, he did.'

In [reverse, −] responses, by contrast, [reverse] is optionally realized if the response targets an assertion, and never realized if the response targets a question.

(110) [reverse, −] in responses to assertions
A: Paul a telefonat. 'Paul called.'
B: (Ba) nu(, nu a telefonat). 'No, he didn't.'

(111) [reverse, −] in responses to questions
A: A telefonat Paul? 'Did Paul call?'
B: *Ba nu/Nu(, nu a telefonat). 'No, he didn't.'

These observations reveal that [reverse] has the following realization needs in Romanian.

(112) Realization needs of [reverse] in Romanian
a. [reverse] is always realized in [reverse, +] responses.
b. [reverse] is optionally realized in [reverse, −] responses to assertions.
c. [reverse] is never realized in [reverse, −] responses to questions.

Note that these realization needs are in line with our markedness principle, since [reverse, +] responses are more marked than [reverse, −] responses, and assertion reversal is more marked than question reversal.

In 113 we put together the rules that characterize the realization needs of absolute and relative polarity features in Romanian.

(113) Realization needs of absolute and relative polarity features in Romanian
a. Absolute features are always realized.
b. [agree] is never realized.
c. [reverse] is always realized in [reverse, +] responses.
d. [reverse] is optionally realized in [reverse, −] responses to assertions.
e. [reverse] is never realized in [reverse, −] responses to questions.

Summarizing the contrasts between Romanian and English, what we found is that Romanian has a dedicated [reverse] particle, *ba*, which allows the other two particles, *da* and *nu*, to perform the single duty of realizing the absolute polarity feature of the response, something that has high priority in Romanian. Whether [reverse] is realized in a response depends on what the absolute feature is, as well as on whether the response targets an assertion or a question, in line with our markedness principle. Note that both English and Romanian have a special strategy for marking [reverse, +] responses: in English we have verum focus on the prejacent, while in Romanian we have the obligatory use of *ba* even in case of question reversals.

We conclude our discussion of Romanian by pointing out what we may expect to find in a minimally different polarity particle system. Given the relative markedness of [−] versus [+], it would not be surprising to find a language just like Romanian except that the rule in 113a is relaxed to the effect that it only requires obligatory realization of [−], allowing optional realization of [+]. Next we summarize the Hungarian polarity particle system and show that it differs from Romanian in precisely this way.

Hungarian. We provide a brief overview of the Hungarian polarity particle data, concentrating on the narrow area where it contrasts with Romanian. For further details on Hungarian, see Farkas 2009. Just like in Romanian, Hungarian has three polarity particles: *igen*, *nem*, and *de*, where *de* is connected to an adversative morpheme. The realization potential of the Hungarian particles parallels what we proposed for Romanian.

(114) Realization potential of Hungarian polarity particles
- a. [+] is realized by *igen*.
- b. [−] is realized by *nem*.
- c. [REVERSE] is realized by *de*.

The pattern supporting these rules for Hungarian is analogous to what we found in Romanian, as shown in Farkas 2009. The realization needs of [REVERSE] in Hungarian are also the same as in Romanian. The only area of contrast concerns the realization needs of absolute polarity features.

(115) Realization needs of absolute polarity features in Hungarian
- a. [−] is always realized by a polarity particle, an explicit prejacent, or both.
- b. [+] is optionally realized.

These two rules predict that in [REVERSE, −] responses, *de* must be followed by *nem*, while in [REVERSE, +] responses, *igen* is optional, as exemplified in 116 and 117.

(116) [REVERSE, −]
A: Pali telefonált. ‘Paul called.’
B: De nem./De nem telefonált./*De. ‘No, he didn’t.’

(117) [REVERSE, +]
A: Pali nem telefonált. ‘Paul did not call.’
B: De igen./De (igen), telefonált./De. ‘Yes, he DID.’

Recall that in Romanian the bare [REVERSE] particle is not acceptable in either [REVERSE, +] or [REVERSE, −] responses, because the absolute polarity feature must always be realized. The fact that in Hungarian the absolute feature [−] is realized obligatorily, while the other absolute feature [+] is only realized optionally, is in line with our assumption that [−] is more marked than [+].

5.2. A DEDICATED [REVERSE, +] PARTICLE: FRENCH AND GERMAN. We now briefly show that French and German have a ternary polarity particle system where one of the particles is specialized to realize the most marked feature combination, [REVERSE, +]. In French, this particle is a special [+] particle, while in German it is an adversative particle.

The French polarity particle inventory consists of *oui*, *non*, and *si*. Elsewhere in Western Romance languages, such as Italian and Spanish, *si* is a positive polarity particle, used where French uses *oui*. The basic rules specifying the realization potential of each particle are as follows.

(118) Realization potential of French polarity particles
- a. [+] is realized by *oui*.
- b. [−] is realized by *non*.
- c. [REVERSE, +] is realized by *si*.

Thus, in an [AGREE, +] response the only possible particle is *oui*.

(119) [AGREE, +]
A: Claude est à la maison. ‘Claude is at home.’
B: Oui/*Non/*Si, elle y est. ‘Yes, she is.’

In an [AGREE, −] response, by contrast, the only possible particle is *non*.

(120) [AGREE, −]
A: Claude n’est pas à la maison. ‘Claude is not at home.’
B: Non/*Oui/*Si, elle n’y est pas. ‘No, she isn’t.’

In a [reverse, +] response, the only possible particle is *si*.

(121) [reverse, +]
A: Claude n'est pas à la maison. 'Claude is not at home.'
B: Si/*Non/*Oui, elle y est. 'Yes, she is.'

That *si* is a [reverse, +] particle rather than simply a [reverse] particle is shown by the fact that it cannot be used in [reverse, −] responses. In such responses, the only possible particle is *non*.

(122) [reverse, −]
A: Claude est à la maison. 'Claude is at home.'
B: Non/*Si/*Oui, elle n'y est pas. 'No, she isn't.'

Thus, the crucial difference between French on the one hand and Romanian and Hungarian on the other is that French *si* is a dedicated [reverse, +] particle, while Romanian *ba* and Hungarian *de* are dedicated [reverse] particles. Otherwise, the three languages are very similar: French *non* behaves just like Romanian *nu* and Hungarian *nem*, while French *oui* behaves much like Romanian *da* and Hungarian *igen*, although *oui*, unlike *da* and *igen*, cannot be used in [reverse, +] responses, because it is blocked in this case by the dedicated [reverse, +] particle *si*.

Finally, the German polarity particle inventory consists of *ja*, *nein*, and *doch*. The third particle, *doch*, is also used as an adversative discourse particle (see Rojas-Esponda 2014 and references therein). The realization potential of the three particles is as follows.

(123) Realization potential of German polarity particles
a. [agree] and [+] are realized by *ja*.
b. [reverse] and [−] are realized by *nein*.
c. [reverse, +] is realized by *doch*.

Thus, in an [agree, +] response, the only possible particle is *ja*.

(124) [agree, +]
A: Katharina ist zu Hause. 'Katharina is at home.'
B: Ja/*Nein/*Doch, sie ist zu Hause. 'Yes, she is at home.'

In an [agree, −] response, both *ja* and *nein* are possible.

(125) [agree, −]
A: Katharina ist nicht zu Hause. 'Katharina is not at home.'
B: Ja/Nein/*Doch, sie ist nicht zu Hause. 'Yes, she is not at home.'

In a [reverse, +] response, only *doch* can be used.

(126) [reverse, +]
A: Katharina ist nicht zu Hause. 'Katharina is not at home.'
B: Doch/*Nein/*Ja, sie ist zu Hause. 'Yes, she is.'

And finally, in a [reverse, −] response, the only possible particle is *nein*.

(127) [reverse, −]
A: Katharina ist zu Hause. 'Katharina is at home.'
B: Nein/*Ja/*Doch, sie ist nicht zu Hause. 'No, she is not at home.'

This shows that *doch* is a dedicated [reverse, +] particle, like French *si*, rather than a dedicated [reverse] particle like Romanian *ba* and Hungarian *de*.[27] The other two Ger-

[27] Tania Rojas-Esponda pointed out to us that, although the most typical use of *doch* is indeed in responses that reverse an explicitly introduced negative antecedent, there are also cases where *doch* is used in responses that go against a negative expectation. A good example of this use of *doch* is given in (i), from Karagjosova (2006).

man particles, *ja* and *nein*, are assumed to have the same realization potential as English *yes* and *no*. However, both of them are blocked in [REVERSE, +] responses by the dedicated particle *doch*. In English, such a dedicated [REVERSE, +] particle does not exist. Therefore, both *yes* and *no* are licensed in [REVERSE, +] responses, unlike their German counterparts *ja* and *nein*.[28]

To sum up, in this subsection we have seen data from languages with three polarity particles, which differ from one another in a number of interesting ways. The crosslinguistic variation that we found, however, is within the limits of what our markedness principle leads us to expect. Obviously, more crosslinguistic investigation is needed; for now we conclude that our approach seems to provide a useful framework for such investigation and that thus far its predictions are borne out.

6. REPERCUSSIONS OF MARKEDNESS BEYOND POLARITY PARTICLE RESPONSES. We now briefly return to English to show that our markedness considerations not only shed light on polarity particle responses as such, but also help explain certain contextual restrictions on the felicitous usage of polar interrogatives, which have received considerable attention in the recent literature (see Büring & Gunlogson 2000, van Rooij & Šafářová 2003, Romero & Han 2004, AnderBois 2011, Roelofsen et al. 2012, among others).

Let us first consider the empirical generalizations to be captured. In the literature, there are several mutually inconsistent generalizations about the connection between interrogative form and contextual factors. While we believe that further experimental work is needed to firm up the empirical ground, we suggest that there is a core generalization that is quite robust. In formulating it, we use α_φ to denote the unique possibility that is highlighted by a polar interrogative φ.

(128) FELICITY CONDITION FOR POLAR INTERROGATIVES: A polar interrogative φ is felicitous only if there is no compelling contextual evidence against α_φ.

This condition encompasses a number of earlier generalizations. For instance, Büring and Gunlogson (2000) suggest the following generalization about POSITIVE polar interrogatives (rephrased here using our own terminology).

(i) A: Das war sehr freundlich von ihm. 'That was very friendly of him.'
B: Doch, das muss man schon sagen. 'Yes, that needs to be admitted.'

What we take this example to show is that, given sufficient contextual support, a suitable antecedent for polarity particle responses can in principle be accommodated. This is not surprising, given that such a mechanism needs to be assumed for other kinds of anaphora as well, as illustrated by the following examples (in each case, the anaphoric pronoun whose antecedent needs to be accommodated is displayed in boldface).

(ii) There was not a man, a woman or child within sight; only a small fishing boat, standing out to sea some distance away. Harriet waved wildly in its direction, but **they** either didn't see her or supposed that she was merely doing some kind of reducing exercises.
(Gundel et al. 1993, quoting from a novel by Dorothy Sayers)

(iii) Maxine was kidnapped but **they** didn't hurt her. (Bolinger 1977)

(iv) If I get pregnant, I'll definitely keep **it**. (Roelofsen 2008)

An explicit account of the nature of this accommodation mechanism is beyond the scope of this article.

[28] For some speakers of German, the particle combination *ja doch* is (marginally) acceptable in [REVERSE, +] responses. We may assume that for these speakers, the use of *ja* to realize the [+] feature in a [REVERSE, +] response is not (fully) blocked by the dedicated [REVERSE, +] particle *doch*. We should emphasize, however, that judgments about *ja doch* seem to vary considerably across speakers, and also across responses to different types of initiatives, for example, questions versus assertions, or initiatives involving sentential negation versus initiatives involving negative quantifiers or adverbs. Further empirical investigation is needed before any definite conclusions can be drawn.

(129) FELICITY CONDITION FOR POSITIVE POLAR INTERROGATIVES (Büring & Gunlogson 2000): A positive polar interrogative φ is felicitous only if there is no compelling contextual evidence against α_φ.

Clearly, 129 is a special case of 128, specifically concerned with positive polar interrogatives. Büring and Gunlogson motivate 129 with the following two examples.

(130) [Scenario: A enters S's windowless computer room wearing a dripping wet raincoat.]
a. S: What's the weather like out there? Is it raining?
b. S: #What's the weather like out there? Is it sunny?

(131) [Scenario: A and S have conducted a psycholinguistic experiment in which the subjects have all certified that they are right-handed. They encounter Carl, who they recognize as one of their subjects, cutting bread with his left hand.]
a. S: Is Carl left-handed?
b. S: #Is Carl right-handed?

The example in 131 shows that immediate contextual evidence overrules previous beliefs of the speaker and the addressee in determining whether a polar interrogative is felicitous.

As for negative polar interrogatives, Büring and Gunlogson (2000) propose the generalization in 132.

(132) FELICITY CONDITION FOR NEGATIVE POLAR INTERROGATIVES (Büring & Gunlogson 2000): A negative polar interrogative φ is felicitous only if there is compelling contextual evidence for α_φ.

This condition is not a special instance of our generalization in 128. According to 128, a negative polar interrogative φ is felicitous only if there is NO compelling contextual evidence AGAINST α_φ. But this does not mean that there must be contextual evidence FOR α_φ, as required by 132. Büring and Gunlogson motivate their generalization with the following examples.[29]

(133) [Scenario: S is visiting A in his home town. S and A want to have dinner.]
a. A: Since you are vegetarian, we can't go out in this town, where it's all meat and potatoes.
S: Is there no vegetarian restaurant around here?
b. A: I bet we can find any type of restaurant that you can think of in this city. Make your choice!
S: #Is there no vegetarian restaurant around here?
c. A: Where would you like to go for dinner?
S: #Is there no vegetarian restaurant around here?

Notice that in 133a there is evidence FOR α_φ, and in 133b there is evidence AGAINST α_φ, while 133c involves a NEUTRAL context relative to α_φ. These examples, then, indeed point in the direction of Büring and Gunlogson's generalization.

However, van Rooij and Šafářová (2003) argue that 132 is too strong, based on the following examples.

(134) Have you not been able to receive credit from your financial institution to back up your business activities? Then click this button.

[29] In these examples it is assumed that *no* is an indefinite determiner that occurs in the scope of a covert sentential negation operator (see e.g. Zeijlstra 2004, Penka 2011, Brasoveanu et al. 2013 for theoretical and experimental work supporting this assumption). Thus, the polar interrogative seen in these examples is taken to be a negative polar interrogative.

(135) [Scenario: A visits her doctor with her son.]
Doctor: Has he not been eating properly?

In both of these cases, the context is presumably neutral relative to α_φ. Thus, it appears that negative polar interrogatives are not always infelicitous in a neutral context, which means that Büring and Gunlogson's generalization is too strong. Notice, however, that the generalization in 128 is NOT contradicted by van Rooij and Šafářová's examples. This, then, is the generalization that we aim to account for.[30]

Our account of the generalization in 128 relies on the assumption that a speaker's choice between the various interrogative forms is partly determined by the type of responses that the context leads her to anticipate. The crucial contrast here, we suggest, is the marked nature of [REVERSE] responses relative to the unmarked nature of [AGREE] responses. So far, we have discussed some expectations that this markedness contrast gives rise to regarding the realization of polarity features and combinations thereof. These expectations concern the form of RESPONSES. However, the same markedness contrast also gives rise to certain expectations about the preferred form of initiatives. In particular, it may be expected that in formulating an initiative, a cooperative speaker always tries to maximize her interlocutor's chances to give a relatively unmarked response. In other words, whenever possible, a speaker will avoid a situation where her interlocutor has to give a [REVERSE] response. We formulate this as a maxim constraining the form of the initiative that a speaker chooses to utter.

(136) AVOID [REVERSE]: Other things being equal, formulate your initiative in such a way as to minimize the chance of eliciting a [REVERSE] response.

This maxim directly accounts for the generalization in 128. To see this, consider a polar interrogative φ and a context in which there is compelling evidence against α_φ. In this case, if a speaker would ask φ, he would, in view of the available evidence, force his interlocutor to give a [REVERSE] response. Thus, a speaker who adheres to the maxim in 136 will not choose to ask φ, but rather, a polar interrogative that highlights the complement of α_φ. For instance, if a speaker wants to raise the issue of whether Carl is left- or right-handed, and if there is compelling contextual evidence that he is left-handed, then asking whether Carl is left-handed is less likely to elicit a [REVERSE] response than asking whether Carl is right-handed. The former is therefore preferred in this context, and the latter perceived as infelicitous, as we saw in example 131.

7. COMPARISON WITH PREVIOUS APPROACHES. Before concluding, we briefly compare our proposal to previous work on polarity particle responses. Broadly speaking, one can distinguish three relevant lines of work, each focusing on a different set of empirical and conceptual issues. The first is part of the more general enterprise of characterizing the interpretation of answers to questions, in particular so-called TERM ANSWERS, that is, ones that do not form complete sentences on their own and whose in-

[30] We do not pursue a detailed account of the variable felicity of negative polar interrogatives in neutral contexts, since this is an area where more empirical data is needed. But one factor that plausibly plays a role here is the COMPETITION between positive and negative polar interrogatives. If both types of interrogatives are in principle licensed, then we expect a general preference for positive polar interrogatives, simply because they are less marked in form than negative polar interrogatives (see also AnderBois 2011). This general preference may be overruled by several more specific considerations. For instance, the reason why a negative rather than a positive polar interrogative is used in 134 may be that it highlights the negative alternative and thereby makes this alternative available for subsequent anaphoric reference by *then*. The reason why a negative polar interrogative is used in 135 may be that this interrogative highlights the alternative that has the highest UTILITY with regard to the speaker's goals in the given context, as suggested by van Rooij and Šafářová (2003).

terpretation therefore eminently depends on the given question (e.g. *Who called? John*). Bare polarity particle responses can be seen as a specific instance of term answers. One central issue in this line of work, then, is to give a uniform treatment of polarity particle responses and other kinds of term answers (see e.g. Groenendijk & Stokhof 1984, Krifka 2001, Aloni & van Rooij 2002).

A second line of work focuses on issues arising from the contrast between polarity particle responses to positive and negative initiatives, and the crosslinguistic variation that is found in this respect (see e.g. Pope 1976, Ginzburg & Sag 2000, Holmberg 2001, 2007, 2013, Farkas 2009, 2010, 2011, Kramer & Rawlins 2009, 2010, 2012, Farkas & Bruce 2010).[31]

Finally, a third line of work focuses on issues arising from contrasts between polarity particle responses to various types of disjunctive initiatives (Roelofsen & van Gool 2010, Pruitt & Roelofsen 2011; see also Krifka 2001 and Aloni & van Rooij 2002 for relevant discussion).

The present article combines and refines insights from these three traditions, and also connects the treatment of polarity particles to previous work on other kinds of anaphora; recall in particular our discussion in §4.1 of polarity features as compared to, for example, gender features on pronouns.

We first discuss, in rather general terms, how our proposal refines earlier work in the first tradition distinguished above (§7.1), and then do the same with regard to the second tradition (§7.2).

7.1. Polarity particle responses as term answers. An idea that is common to a large body of work on the semantics of questions (see e.g. Hull 1975, Hausser & Zaefferer 1978, Tichy 1978, Groenendijk & Stokhof 1984, von Stechow & Zimmermann 1984, von Stechow 1991, Krifka 2001, Aloni & van Rooij 2002) is that one of the main discourse effects of a wh-question is to make salient an n-place property, where n is the number of wh-elements in the question, and that this property plays an important role in the interpretation of answers to the given question, in particular term answers.

For concreteness, we say a bit more about how this idea is implemented in the partition semantics of Groenendijk and Stokhof (1984), although our remarks apply, mutatis mutandis, to the other works cited above just as well. In partition semantics, the n-place property that is made salient by a question is called the abstract of the question. We illustrate how these abstracts are used in the interpretation of term answers in 129.

(137) a. Who likes Mary? abstract: $\lambda x[likes(x, m)]$
b. John. interpretation: $\lambda P[P(j)](\lambda x[likes(x, m)]) = likes(j, m)$
c. Everyone. interpretation: $\lambda P[\forall y.P(y)](\lambda x[likes(x, m)]) = \forall y.likes(y, m)$

Notice that the interpretation of the term answers is obtained by applying the interpretation of the terms themselves—in both cases a generalized quantifier—to the abstract of the question.[32]

Now, in the case of a polar interrogative, Groenendijk and Stokhof assume that the abstract is a zero-place property, which, in our terms, amounts to a possibility. Polarity

[31] After the present article had been submitted for publication, another interesting account of polarity particle responses that would fall into this category was proposed by Krifka (2013). We must leave a detailed comparison with this account for future work.

[32] We leave out of consideration here Groenendijk and Stokhof's (1984) exhaustivity operator, which is taken to apply to the interpretation of the term before the latter is applied to the abstract of the question, resulting in an exhaustive interpretation—for example, only John likes Mary in the case of 137b.

particle responses are then treated as special instances of term answers. As exemplified in 138 below, *yes* is taken to express the identity function mapping every possibility to itself, while *no* maps every possibility to its complement. This gives correct results for polarity particle responses to simple polar interrogatives.

(138) a.	Does John like Mary?	abstract: $likes(j, m)$
b.	Yes.	interpretation: $\lambda p[p](likes(j, m)) = likes(j, m)$
c.	No.	interpretation: $\lambda p[\neg p](likes(j, m)) = \neg likes(j, m)$

Thus, the possibility that we take to be highlighted by a polar interrogative corresponds precisely to the zero-place abstract that is associated with such an interrogative on Groenendijk and Stokhof's approach. However, our account refines their approach in several ways. First, it uniformly applies to declaratives and interrogatives, including various types of disjunctive interrogatives. Related to this, interrogatives are not always taken to highlight a single possibility, but, rather, they may highlight several possibilities. Moreover, highlighted possibilities are taken to have positive or negative polarity, which we have seen is crucial for an adequate theory of polarity particle responses to positive and negative initiatives. And finally, our account distinguishes absolute and relative polarity features, which allows for more fine-grained predictions about English, as well as a characterization of the commonalities and differences between polarity particle systems crosslinguistically.

Importantly, these refinements are compatible with Groenendijk and Stokhof's overall perspective and that of other work in this area. That is, we can still think of interrogatives as introducing n-place abstracts in general, where $n = 0$ in the limit case of a polar interrogative, and we can still think of these abstracts as generally playing a crucial role in the interpretation of responses to the given interrogative, in particular polarity particle responses. The picture has just become a bit more general. On the one hand, it is not just interrogatives that introduce abstracts; declaratives do so as well, in exactly the same way. And on the other hand, sentences do not necessarily introduce just one abstract, but may also introduce multiple abstracts.

7.2. Contrasting polarity particle responses to positive and negative initiatives. Next, we discuss a number of proposals that fall within the second tradition distinguished above, namely those of Pope (1976), Ginzburg and Sag (2000), Kramer and Rawlins (2009), and Holmberg (2013). Within the scope of this article we cannot do full justice to the details of all these analyses, but we give an overview of the main commonalities and differences. Since these accounts all focus on the contrast between positive and negative initiatives and do not deal with the additional puzzles that arise when disjunctive initiatives are taken into consideration, our discussion in this section is also restricted to nondisjunctive cases.

Pope (1976). Our analysis of polarity particles builds on and refines several fundamental insights from Pope (1976). In particular, Pope distinguishes four basic types of responses to polar questions: positive agreement, negative agreement, positive disagreement, and negative disagreement, which in our terms correspond to [agree, +], [agree, −], [reverse, +], and [reverse, −], respectively.[33] She also argues that these response types differ in markedness and, in particular, recognizes [reverse, +] (posi-

[33] Another early discussion of the distinction between positive/negative and agreeing/disagreeing responses, although much more concise than that of Pope, can be found in Sadock & Zwicky 1985.

tive disagreement) as being the most marked response type. She points out that this leads to the expectation that, across languages, [REVERSE, +] responses are typically realized in special ways, and she shows that this expectation is borne out in English, German, French, Swedish, Hebrew, Japanese, and Tigrinya (for the latter, she uses data from Leslau 1962). We have seen that Romanian and Hungarian provide further support for the special status of [REVERSE, +] responses.

Our account of polarity particles differs in at least three important ways from that of Pope. First, whereas we take it that polarity particles may realize individual features, Pope associates polarity particles, in our terms, with feature COMBINATIONS. That is, she assumes that a particular particle in a particular language is connected to [AGREE, +], [AGREE, −], [REVERSE, +], or [REVERSE, −] responses (with possible overlap). Languages like Romanian and Hungarian show that this assumption is too restrictive, and that particles must be associated, at least in some cases, with individual features. Another phenomenon that is more naturally accounted for on our approach is that certain response types may be marked by more than one polarity particle. For instance, [AGREE, −] responses in English may be marked either with *yes* or with *no*. On our account, this follows straightforwardly from the assumption that *yes* can be used to realize [AGREE] while *no* can be used to realize [−]. Pope's analysis predicts that [AGREE, −] responses in English can only be marked with *no*.

A second important difference is that our semantic treatment of relative polarity features requires (dis)agreement between the prejacent and the antecedent, BOTH IN TERMS OF POLARITY AND IN TERMS OF CONTENT. Pope only requires (dis)agreement in terms of polarity. This is problematic for cases like 139.

(139) A: Is the door open?
B: *Yes, it is closed.

Pope's analysis wrongly predicts that the response in 139 is felicitous, since the prejacent agrees in polarity with the antecedent. Our account correctly predicts that the response is infelicitous.

Finally, our markedness considerations are more fine-grained than those of Pope, in that they concern both individual features and feature combinations, whereas Pope only compares feature combinations. This means, for instance, that our markedness considerations lead us to expect that languages are more likely to have a special [REVERSE] particle than a special [AGREE] particle (as in Romanian and Hungarian), and that they are more likely to have a special [−] particle than a special [+] particle (as in Latin and Irish). Furthermore, the connection between [+] and [AGREE] on the one hand, and [−] and [REVERSE] on the other, can be explained on our account as a case of harmonic alignment: [+] and [AGREE] are the two unmarked features, while [−] and [REVERSE] are both marked. Pope notes the existence of the connection, but has no explanation for it.

GINZBURG AND SAG (2000). Ginzburg and Sag's account focuses on polarity particle responses to positive and negative polar questions, but could be extended to cover responses to positive and negative assertions as well. The account is formulated within the framework of situation semantics, which allows for a very fine-grained semantic treatment of polar interrogatives.[34] In particular, the polar interrogatives in 140 can all be assigned a different semantic value.

[34] Cooper and Ginzburg (2012) recently recast the account of Ginzburg & Sag 2000 within the framework of TYPE THEORY WITH RECORDS (Cooper 2005), which is even richer than situation semantics.

(140) a. Is the number of planets even?
b. Is the number of planets odd?
c. Is the number of planets not even?

We concur with the view that the semantic ontology needs to be fine-grained enough to semantically distinguish these types of interrogatives. Instead of formulating our account in the framework of situation semantics, we started out with the most basic implementation of inquisitive semantics and refined it so as to be able to make precisely those distinctions that are needed to account for the phenomena at hand. The advantage of this approach is that the semantic framework does not become more fine-grained than necessary, and clearly brings out which features are essential to deal with the phenomena under consideration.

Now let us turn to Ginzburg and Sag's concrete analysis of polarity particles. Syntactically, polarity particles are treated as 'propositional lexemes', words that form a complete clause on their own. Semantically, they are treated as anaphoric expressions, which retrieve their propositional content from the most salient question under discussion. In our view, any account with these two basic characteristics has three important shortcomings. First, since it analyzes polarity particles as stand-alone syntactic objects, and not as elements of larger syntactic constructions, it cannot, or at least not straightforwardly, account for phenomena that exhibit interaction between polarity particles and their prejacent. Recall, for instance, that absolute polarity features in Romanian have to be realized either by a particle or by an explicit prejacent (see example 106). Such phenomena are unproblematic for approaches like ours, in which polarity particles are seen as elements of larger syntactic constructions.

A second disadvantage of this type of account relative to ours is that in this set-up no connection can be made between the different polarity particle systems that we find across languages. On Ginzburg and Sag's account, each individual particle in each individual language must be treated separately. On our account, by contrast, the polarity features and their semantics are universal; moreover, while the realization of these features varies crosslinguistically, this variation is constrained in a principled way. In this approach, then, it is clear how the different linguistic systems are connected and what their common core is.

Third, Ginzburg and Sag's account cannot derive general markedness-related expectations concerning the type of polarity particle systems found across languages. Moreover, within the confines of any particular language, the phenomena that we accounted for in terms of markedness remain unexplained.

These problems relate to Ginzburg and Sag's treatment of polarity particles as atomic propositional lexemes. The specific account they proposed also encounters some additional problems. In particular, *yes* is analyzed as confirming the propositional content of the question under discussion (in our terms, the possibility that the question highlights). Thus, in response to *Did Sue pass the exam?*, it conveys that Sue did pass the exam, and in response to *Did Sue not pass the exam?*, it conveys that Sue did not pass the exam. This, however, is incompatible with the use of *yes* in [REVERSE, +] responses to negative questions or assertions, as illustrated in 141.

(141) A: Did Sue not pass the exam?/Sue did not pass the exam.
B: Yes, she DID.

KRAMER AND RAWLINS (2009) AND HOLMBERG (2013). There are several recent accounts of polarity particles whose main theoretical point is to argue for an ellipsis-based account of bare polarity particle responses, and therefore against the type of propositional lexeme approach in Ginzburg & Sag 2000. Kramer and Rawlins (2009) and Holmberg (2013) develop two such accounts, focusing on bare particle responses to negative polar questions. Recall that the experimental data from Kramer and Rawlins (2012) discussed in §2 show that such responses are ambiguous and not fully felicitous. However, the experimental results also show that in response to a negative polar question $?\neg p$, both bare *yes* and bare *no* are predominantly interpreted as confirming $\neg p$, as exemplified in 142.

(142) Is Mary not going to the party?
  a. Yes. $\rightsquigarrow$ preferred interpretation: she is not going
  b. No. $\rightsquigarrow$ preferred interpretation: she is not going

The phenomenon that bare *yes* and bare *no* have the same preferred interpretation in response to negative polar questions has been dubbed NEGATIVE NEUTRALIZATION by Kramer and Rawlins (2009). Their account, which focuses on negative neutralization but is meant as a general theory of polarity particle responses, relies on the following three assumptions. First, syntactically, polarity particles are adverbials that adjoin to ΣP. This means that bare polarity responses like those in 142 are taken to have an elided prejacent. Following Merchant (2001) and many others, Kramer and Rawlins assume that ellipsis is licensed only if the elided constituent is semantically equivalent to some constituent in the immediately preceding discourse. This accounts for the preferred interpretation of *yes* and *no* in 142.[35]

Second, following Farkas and Bruce (2010), Kramer and Rawlins take polarity particles to mark utterances as RESPONDING ASSERTIONS, which are felicitous only if, in our terms, (i) there is a unique most salient antecedent possibility, and (ii) the assertion commits its speaker either to this antecedent possibility, or to the complement thereof. This accounts for the fact that polarity particles cannot be used in response to constituent questions.

Third, Kramer and Rawlins assume that *no* carries an uninterpretable [NEG] feature, which must form a negative concord chain with the Σ head of the prejacent ΣP and possibly other elements deeper inside the prejacent that also carry [NEG] features. Furthermore, exactly one of the [NEG] features in the concord chain must be interpretable. This rules out the option of marking a positive response with *no*, as in 143a. It also ensures that a solitary *no* response to a positive polar question, as in 143b, is interpreted as rejecting the possibility highlighted by the question. The assumed syntax of such a response is given in 143c. Note that the interpretable [NEG] feature is assumed to be located in Σ, which makes it possible for the complement TP to elide under semantic identity with the TP of the question.

(143) Is Mary going to the party?
  a. *No, she is.
  b. No.
  c. No$_{[\text{uNeg}]}$ [$_{\Sigma\text{P}}$ $\Sigma_{[\text{iNeg}]}$ ~~[$_{\text{TP}}$ Mary is$_{[\text{uNeg}]}$ going to the party]~~]

Thus, Kramer and Rawlins's (2009) analysis accounts for negative neutralization, as well as additional facts about polarity particles in English. There are, however, several

[35] Note that an ellipsis account of polarity particles is not NECESSARY to account for negative neutralization. After all, Ginzburg and Sag (2000) provide a nonellipsis account of polarity particles that straightforwardly deals with the phenomenon. Also note that, while Kramer and Rawlins's account straightforwardly derives the preferred interpretation of bare particle responses to negative polar questions, it does not directly account for the (arguably more basic) fact that such responses are ambiguous and not fully felicitous.

empirical challenges that remain problematic for this account. We briefly discuss two of them.

First, as illustrated in 144, the distribution of *yes* and *no* in response to plain positive polar questions is not sufficiently restricted.

(144) Is the number of planets odd?
   a. *Yes, it is even. (wrongly predicted to be okay)
   b. *Yes, it is not odd. (wrongly predicted to be okay)
   c. *No, it is not even. (wrongly predicted to be okay)

The only constraint on the distribution of *yes* in Kramer and Rawlins's account is that it has to occur in a responding assertion. This constraint is not sufficient, as witnessed by 144a,b. The particle *no* is subject to a further requirement—namely, it has to be part of a negative concord chain. This effectively means that its prejacent has to have sentential negation. This additional constraint is still not sufficient, however, as witnessed by 144c.

The source of this last problem is that in constraining the distribution of *no*, Kramer and Rawlins take only the relation between the particle and its prejacent into account. In our terms, their theory makes reference only to ABSOLUTE polarity. The example in 144c shows that in order to capture the distribution of *no*, it does not suffice to look at the relation between the particle and its prejacent. The relation between the prejacent and the antecedent also plays a crucial role. In other words, an account of polarity particles cannot be formulated just in terms of ABSOLUTE polarity; it also needs to make reference to RELATIVE polarity.

A second problem is that *no* is wrongly ruled out in positive responses to negative questions.

(145) A: Is Mary not going to the party?
   B: No, she IS. (wrongly predicted not to be okay)

Kramer and Rawlins (2009) recognize this second problem. They do not address it in depth, but suggest that 'the *no* here is not really a negative *no*'. Rather, they conjecture, it is a reverse particle, much like German *doch* and French *si*. However, an analysis of such reverse particles is not provided and extending this account to the crosslinguistic data involving what we call [REVERSE] particles is problematic. The problem is addressed in more depth in Kramer & Rawlins 2010, where [REVERSE] responses, in our terms, are treated as 'bias corrections'. However, the solution sketched there does not cover all of the complications needed for a full account of the Romanian, Hungarian, French, or German data. Note also that treating [REVERSE] particles as 'bias corrections' does not account for the occurrence of such particles in negative rhetorical questions in Romanian, where the bias of the question is positive and the response agrees with the bias but reverses the possibility that the question highlights, as discussed in Farkas 2009, 2011 and exemplified in 146.

(146) A: Nu e cel mai frumos copil din lume?
      'Isn't he the most beautiful child in the world?'
   B: Ba da, este.
      'Yes, he is.'

We conclude that a crosslinguistic perspective strongly suggests that a suitable account of polarity particles must make reference to both absolute and relative polarity.

We now turn to Holmberg's (2013) account. One way in which it differs from that of Kramer and Rawlins (2009) is that it requires the prejacent of *yes* to be positive. On this account, then, bare *yes* is felicitous only in response to a polar question that involves negation, like 142, to the extent that the question can be construed as a POSITIVE polar question involving constituent negation rather than sentential negation. If this is possible, then the elided prejacent of *yes* can also be construed as a positive sentence involving constituent negation.

Holmberg differentiates his account from that of Kramer and Rawlins by considering examples like 147.

(147) Does John sometimes not show up for work?
a. Yes. ⇝ John sometimes does not show up for work
b. *No. intended meaning: John sometimes does not show up for work

Holmberg points out that bare *yes* is fully acceptable in 147, whereas, as we saw, it is only marginally acceptable in 142. This contrast is explained on Holmberg's (2013) account under the assumption that the adverb in 147 forces the negation to be construed as constituent negation (under this assumption, the contrast is also explained on our account).

Note, however, that examples like 148 are problematic for Holmberg's account.

(148) A: You cannot not go to church and call yourself a good Christian.
B: Yes, you cannot do that.

The initiative in 148 is given by Holmberg himself as an example of a sentence in which sentential and constituent negation cooccur. Thus, the account wrongly predicts that a *yes* response is not possible here. Moreover, taking a step back from the particular case of negative neutralization, we note that Holmberg's account, just like that of Kramer and Rawlins, relies on absolute polarity only. This means that the problems listed above in our discussion of Kramer and Rawlins's account apply here as well.[36]

We conclude that in order to capture the details of polarity particle distribution and interpretation, both in English and crosslinguistically, the distinction between absolute and relative polarity features is essential.

8. Conclusion. We have provided a detailed account of polarity particle responses, as well as the initiatives that they target. We started out by laying out the main empirical issues that need to be addressed in this area, and extracted from these issues a number of general requirements that need to be satisfied by a theory of the semantics and discourse effects of declarative and interrogative sentences, in order to serve as a suitable basis for an account of polarity particle responses.

In developing a theory that meets these requirements, we combined insights and techniques from inquisitive semantics, dynamic semantics, and commitment-based discourse models. The main novelty of the resulting framework is that it captures, in a uniform and compositional way, the potential of various types of declarative and interrogative sentences to introduce the type of antecedents that are necessary to license polarity particle responses. Crucially, such antecedents must be characterized as having either positive or negative polarity, just like in many languages the potential antecedents of pronominal anaphora must be characterized as having grammatical gender.

As for polarity particle responses proper, our point of departure was the idea, rooted in the work of Pope (1976), that there are two types of polarity features, absolute and relative, and that the role of polarity particles is to realize these features, or combinations thereof. We provided a presuppositional semantics for polarity features, in line with, for example, the semantics of gender features on anaphoric pronouns. The absolute features, [+] and [−], presuppose that their prejacent is either positive or negative.

[36] Recall that we restricted our discussion here to nondisjunctive initiatives. If disjunctive initiatives are taken into consideration as well, several additional issues arise for the accounts discussed here.

The relative features, [AGREE] and [REVERSE], presuppose that their prejacent either agrees with or reverses its antecedent, both in terms of content and in terms of polarity.

We take the two types of polarity features and their semantics to be the common core of polarity particle systems crosslinguistically. What we take to be language-specific is the polarity particle repertoire and the rules that determine which particles can be used to realize which features or feature combinations. Furthermore, we propose that this crosslinguistic variation is constrained by the general principle that more marked features or feature combinations are more likely than less marked features or feature combinations to be overtly realized and to be associated with a specialized particle. We showed that the variation found across the polarity particle systems of English, Romanian, Hungarian, French, and German is compatible with this hypothesis, though evidently more wide-range crosslinguistic investigation is needed to further test and refine our account.

A host of open issues remain, the most acute of which, in our opinion, is that of extending the account to embedded contexts (see e.g. Kramer & Rawlins 2009, Authier 2013, Krifka 2013 for discussion). There are similarities but also important differences between polarity particles in responses and their close relatives in embedded contexts, which await further empirical and theoretical investigation. We hope that this article will prove a useful stage on the road toward a comprehensive account of polarity particle responses and their embedded relatives across languages.

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