Chapter 8

The meaning of Czech response particles

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This article deals with the semantics and interpretation of Czech response particles *ano* 'yes' and *ne* 'no'. Based on two experiments involving responses to negative polar questions, we argue that *ano* 'yes' encodes the relative feature [AGREE] and *ne* 'no' encodes the absolute feature [−], adopting the parlance of Roelofsen & Farkas's (2015) feature model. This contrasts with the proposal of Gruet-Skrabalova (2016), who argues, following previous work on English, that both of the Czech response particles are ambiguous between a relative and an absolute reading. We also find some tentative evidence for context affecting the interpretation of response particles, in line with the predictions of Krifka (2013).

1 Introduction

Response particles like *yes* and *no* are a common way to respond to polar questions. They exhibit anaphoric behavior in that their interpretation crucially depends on previous context and, more specifically, on the form and interpretation of the polar question they respond to. While responses to affirmative questions are largely unproblematic, responses to negative questions give rise to ambiguities (Kramer & Rawlins 2011, Espinal & Tubau 2019, Roelofsen & Farkas 2015, Krifka 2013; etc.); see (1) and (2), respectively. (The translations in (2B) are tentative and will be rectified in view of the experimental results.)

(1) A: Zalil Petr květiny?
watered Petr flowers
'Has Petr watered flowers?'

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B: Ano. (= Zalil.) / Ne. (= Nezalil.)
yes watered no NEG.watered
'Yes. (= He has.) / No. (= He hasn't.)'

(2) A: Nezalil Petr květiny?
NEG.watered Petr flowers
'Hasn't Peter watered flowers?'

B: Ano. (= Zalil / Nezalil.) / Ne. (= Zalil / Nezalil.)
yes watered NEG.watered no watered NEG.watered
'Yes. (= He has. / He hasn't.) / No. (= He has. / He hasn't.)'
(translations tentative; to be rectified)

If the polar question is negative, as in (2), both *ano* 'yes' and *ne* 'no' can in principle correspond to a positive or a negative answer. They can, however, differ in naturalness and likelihood. To give an example from German, Claus et al. (2017) found out that it is more natural to confirm negative questions by *ja* 'yes' than by *nein* 'no'.

Using a version of the truth-value judgment task, we investigate the meaning of the two Czech response particles *ano* 'yes' and *ne* 'no', hoping to contribute to related recent literature on Slavic languages (e.g. Gruet-Skrabalova 2016, Esipova 2021, Geist & Repp 2023). A more specific goal is to evaluate the adequacy of two types of existing accounts of response particle meaning: the feature model of Roelofsen & Farkas (2015), in which response particles have a lexically specified range of meanings, and the saliency account of Krifka (2013), in which the meaning is expected to be more context-dependent. We also discuss our results in the light of Gruet-Skrabalova's (2016) analysis of Czech response particles, which is couched in the feature model. We conclude that our data primarily support a particular version of the feature model, though not the one proposed by Gruet-Skrabalova (2016). More specifically, we see a very clear tendency for *ano* 'yes' to express agreement (the feature [AGREE]) with its antecedent, be it positive or negative, and *ne* 'no' to express a negative proposition (the feature [−]), independently of the polarity of the antecedent. What counts as the "antecedent" is crucially modulated by the interrogative strategy used: negative polar questions with an interrogative syntax (verb-first) primarily contribute a positive antecedent (i.e., the negation is, by hypothesis, "pleonastic"), while negative polar questions with a declarative syntax (non-verb-first) contribute a negative antecedent (negation is semantic/propositional). Even though the feature model appears to be more suitable for modelling our results, we also observe – in a subset of our data – a statistically significant result predicted by Krifka's (2013) saliency theory.

The article is structured as follows. Section 2 briefly introduces the two approaches under consideration – the feature model (Roelofsen & Farkas 2015) and the saliency theory (Krifka 2013). We also discuss Gruet-Skrabalova's (2016) particular application of the feature model to Czech. Section 3 reports on the experiments we have conducted: experiment 1, in which we investigated responses to negative polar questions with interrogative syntax (V1), and experiment 2, in which we looked at negative polar questions with declarative syntax. In Section 4 we discuss the results and propose a new implementation of the feature model which is consistent with the results. Finally, Section 5 concludes the paper.

2 Approaches to response particle meaning

2.1 Feature model

2.1.1 Roelofsen & Farkas (2015)

The influential FEATURE MODEL of Roelofsen & Farkas (2015) is based on the assumption that a response particle like 'yes' or 'no' has a lexically specified range of meanings, defined in terms of two types of features – absolute and relative polarity features. The ABSOLUTE FEATURES [+] and [−] correspond to the polarity of the response. The relative features [AGREE] and [REVERSE] indicate a relation between the response and its propositional antecedent (derived from a polar question or an assertion that antecedes the response): the former expresses agreement with the polarity of the antecedent, the latter reverses its polarity. The semantics of the features is presuppositional (see Roelofsen & Farkas 2015: 385f. for details). In the lexicon, a response particle can either be specified for a single feature or for a combination of features. Additional complexity may arise in the process of feature realization (spellout), where Roelofsen & Farkas (2015) assume that a feature bundle can be realized by a particle which matches only its proper subset.[1]

Table 1 shows the assumed lexical entries and corresponding realization patterns of the English particles *yes* and *no* and the German particle *doch*. By hypothesis, the English particles encode single features, but are lexically ambiguous – they either encode the respective absolute or relative features. If a feature bundle is generated in the syntax (and interpreted in the semantics), it is realized by a particle whose lexical makeup matches a proper subset of that bundle. In two cases – [AGREE, −] and [REVERSE, +] – both *yes* and *no* provide a good match,

[1]For a recent experimental evaluation of Roelofsen & Farkas's (2015) model, see Maldonado & Culbertson (2023).

giving rise to an ambiguity which must be resolved pragmatically.[2] An example of a bundle-encoding particle is German *doch*, which responds to negative antecedents and at the same time reverses their polarity, whence [REVERSE, +].

Table 1: Feature bundles in the feature model

	Lexically encoded by	Realized by
[+]	*yes*	*yes*
[−]	*no*	*no*
[AGREE]	*yes*	*yes*
[REVERSE]	*no*	*no*
[AGREE, +]	n.a.	*yes*
[AGREE, −]	n.a.	*yes* or *no*
[REVERSE, +]	*doch*	*yes* or *no* / *doch*
[REVERSE, −]	n.a.	*no*

Thus, the English *yes* can signal that the answer has a positive polarity [+] or it can agree with its propositional antecedent [AGREE]. In contrast, *no* can serve either to signal negative polarity [−] or to reverse the polarity of its antecedent [REVERSE]. These double properties of *yes* and *no*, according to Roelofsen & Farkas (2015: 383), explain why response particles are generally clear after a positive question / positive statement (3), while a double interpretation is possible after a negative question / negative statement (4).

(3) Amy left. (positive antecedent)
Agreement: Yes, she did. / *No, she did.
Reversal: *Yes, she didn't. / No, she didn't.

(4) Amy didn't leave. (negative antecedent)
Agreement: Yes, she didn't. / No, she didn't.
Reversal: Yes, she did. / No, she did.

2.1.2 The feature model applied to Czech: Gruet-Skrabalova (2016)

Gruet-Skrabalova (2016) adopts Roelofsen & Farkas's (2015) feature model and adapts it to Czech. Gruet-Skrabalova assumes that Czech response particles *ano*

[2] Roelofsen & Farkas (2015) employ a set of additional markedness-based rules which nudge the likelihood in one or the other direction.

'yes' and *ne* 'no' exhibit the same ambiguity as the English particles *yes* and *no*, i.e., they can either realize the absolute features ([+] and [−], respectively) or the relative features ([AGREE] and [REVERSE], respectively).

Gruet-Skrabalova (2016) further modulates her analysis relative to the form of the question which antecedes the response. She assumes that in interrogative questions, i.e., questions with the verb in clause-initial position (V1), the polarity is neutralized. Response particles used in reaction to V1 questions therefore realize their absolute features. This is illustrated for the case of negative V1 questions in (5), where there is no ambiguity in the response: *ano* 'yes' indicates positive polarity and *ne* 'no' negative polarity. In declarative questions, i.e., questions with the verb in a non-initial position (non-V1), the polarity is salient and the response particles realize their relative features. As a result, response particles are also not ambiguous in this case, but have opposite truth-conditions; see (6).

(5) Negative interrogative question (with V1)
A: Nenapsala Jitka esej?
NEG.wrote Jitka essay
'Hasn't Jitka written an essay?'
B: Ano. (= Napsala.) / Ne. (= Nenapsala.)
yes wrote no NEG.wrote
'Yes. (= She has.) / No. (= She hasn't.)'

(6) Negative declarative question (with non-V1)
A: Jitka esej nenapsala?
Jitka essay NEG.wrote
'Hasn't Jitka written an essay?'
B: Ano. (= Nenapsala.) / Ne. (= Napsala.)
yes NEG.wrote no wrote
'Yes. (= She hasn't.) / No. (= She has.)'

2.2 Saliency account: Krifka (2013)

Krifka's (2013) SALIENCY ACCOUNT takes an additional factor into account, namely the role of contextual and more generally pragmatic considerations, co-determining which proposition is selected as the antecedent for the response particle.

In Krifka's (2013) theory, response particles are propositional anaphors, not unlike pronouns.[3] If a response particle is preceded by a question which con-

[3] In this respect, Roelofsen & Farkas's (2015) and Krifka's (2013) theories are similar. Both crucially build on an analogy with pronouns – the former via pronominal-like presuppositions (not discussed here), the latter via the anaphoric potential of pronouns.

tains negation, there are in principle two possible antecedents for the response particle: either the negative proposition or the negation's prejacent, i.e., the corresponding positive proposition. This is illustrated in (7) (adapted from Krifka 2013: 14).[4]

(7) $[_{\text{ActP}}$ did REQUEST $[_{\text{NegP}}$ Ede not $[_{\text{TP}}$ t_{Ede} t_{did} steal the cookie]]]?
$\hookrightarrow d$ $\hookrightarrow d'$

Response particles used in reaction to a question like (7) can thus be interpreted as in (8), capturing the ambiguity discussed above.

(8) a. *Yes.* $\rightsquigarrow$ ASSERT(d') $\approx$ *Yes, he did!* (rejecting accent, with clause)
b. *Yes.* $\rightsquigarrow$ ASSERT(d) $\approx$ *Yes, he didn't.* (natural, but with clause)
c. *No.* $\rightsquigarrow$ ASSERT($\neg d'$) $\approx$ *No (he didn't).* (natural, clause not necessary)
d. *No.* $\rightsquigarrow$ ASSERT($\neg d$) $\approx$ *Well, he did!* (rejecting accent, with clause)

What is of interest to us is how the antecedent of the response particle is selected, i.e., whether the response particle denotes d (the negative proposition) or d' (the positive proposition). Krifka (2013) assumes that the saliency of the propositions – and hence the likelihood of their antecedent status – can be modulated contextually. Example (9) (adapted from Krifka 2013: 14) and the matching example (10) (created by us) illustrate this point. These examples differ in the question under discussion put on the table by A: in (9), the issue is negatively defined, in (10), the issue is positively defined. Although the default antecedent for the response particles in both cases will be the negative proposition asserted by B, the context is assumed to modulate the availability of the positive antecedent, which leads to an increased likelihood of the truth-conditionally opposite responses in (10).[5]

(9) Negative context (italicized)
A: Which of the mountains on this list *did Reinhold Messner not climb*?
B: Well, let's see… He did not climb Mount Cotopaxi in Ecuador.

[4]For questions with high negation (*Didn't Ede steal the cookie?*), Krifka (2013: 14) assumes only one possible antecedent, namely the positive d'. The negation in this case is applied outside of the scope of the proposition, making it unavailable for anaphoric pickup.

[5]An anonymous reviewer points out that the positive interpretation ('He climbed it') of response ($10A_1$) might be contingent on *yes* being pronounced with a specific intonation. This is indeed what Goodhue & Wagner (2018) confirmed experimentally; they call the fall rise intonation used in these cases "contradiction contour", following Liberman & Sag (1974).

A_1: Yes.
Likely: 'He didn't climb it.'
Unlikely: 'He climbed it.'

A_2: No.
Likely: 'He climbed it.'
Unlikely: 'He didn't climb it.'

(10) Positive context (italicized)

A: Which of the mountains on this list *did Reinhold Messner climb*?

B: Well, let's see…He did not climb Mount Cotopaxi in Ecuador.

A_1: Yes.
Likely: 'He didn't climb it.'
More likely than in (9): 'He climbed it.'

A_2: No.
Likely: 'He climbed it.'
More likely than in (9): 'He didn't climb it.'

One of our experiments (experiment 1) will tap not only into the basic meaning of Czech response particles, which can be formulated in terms of the feature model, but also into the influence of the context in determining the antecedent of the response particles.

3 Experiments

The aim of our experiments was to find out the preferred meaning of *ano* 'yes' and *ne* 'no' in response to polar questions and test the above-mentioned approaches, in particular Gruet-Skrabalova's (2016) version of the feature-based analysis and Krifka's (2013) idea that the choice of the response particle antecedent is context-dependent. The experimental design was inspired by Kramer & Rawlins (2012) and Claus et al. (2017), who investigate the meaning of response particles in English and German.

Our results suggest a relative ([AGREE]-based) semantics for *ano* 'yes' and absolute ([−]-based) semantics for *ne* 'no'. This can be easily modeled using the feature model. The particular predictions of Gruet-Skrabalova (2016) were, however, not borne out: we do not see evidence for relative ([REVERSE]-based) semantics for *ne* 'no'. In addition, in a particular corner of our data, we see a pattern which is predicted by Krifka's (2013) saliency account.

We used 2 experiments combined in a single setup, such that each of the two experiments provided fillers for the other one. This setup makes it possible to draw inferences cross-experimentally. The more complex and powerful experiment 1 uses a $2 \times 2 \times 2$ design and investigates responses to syntactically interrogative negative polar questions. Experiment 2 uses a 2×2 design and investigates responses to syntactically declarative negative polar questions.

We first describe aspects common to the two experiments (see Section 3.1) and then turn to the individual experiments (Section 3.2–Section 3.3).

3.1 Aspects common to both experiments

As detailed in Table 2, our experimental setup consisted of two experiments with 16 and 8 items, respectively, and an additional set of 16 filler items, giving a total of 40 items. The number matches the number of stimuli seen by each participant.

Table 2: Overall experimental setup

Experiment 1	16
Experiment 2	8
Fillers	16
Total	40

3.1.1 Task, procedure, and dependent variables

The participants were exposed to written stimuli which consisted of a short narrative (a few sentences) followed by a short dialogue between two people (A and B for ease of reference), in which A opens the dialogue with an assertion associated with the narrative, B asks a relevant polar question, and A responds by saying either 'yes' or 'no'. The narrative and the dialogues contained mildly colloquial elements, in order to simulate an informal setting – a dialogue between two friends. The participant's task was twofold: (i) to determine whether A's 'yes'/'no' response is consistent with the information provided in the narrative (i.e., a truth-value judgment task) and (ii) to rate the naturalness of that response given the preceding narrative and dialogue (on a scale from 1 = completely unnatural to 7 = completely natural). In this paper, we analyze the responses from task (i) and leave (ii) aside. This is mainly because there was a strong correlation between the two in the sense that responses which were judged as consistent with

the information provided were also rated as natural and conversely – responses judged as inconsistent were rated as unnatural.

3.1.2 Participants

Data from 66 adult native speakers of Czech (43 women, 23 men) entered the analyses. We used convenience sampling, recruiting participants from an extended social network of the first author. Most of the participants (44) were 18–29 years old and most (43) had university education. All participants were informed about the purpose of the experiment and all gave informed consent to participate in the experiment and the subsequent processing and anonymous publication of the collected data.

The analyzed sample consists of participants who have passed a preset quality measurement, namely scoring in the expected way on variable (i) in at least 75 % of the 8 filler items, where the relation between the information provided (in the narrative) and the 'yes'/'no' response was particularly transparent.

3.1.3 Software and administration

The experiments were prepared and administered using the L-Rex software (Starschenko & Wierzba 2023). The stimuli from each experiment were distributed on lists using the Latin Square design, so that one participant saw only a single stimulus from each item. The lists from each experiment were then combined and the order of presentation was pseudo-randomized in such a way that two stimuli from a single experiment never directly followed one another and two stimuli from a single condition were always interspersed by at least one stimulus from a different condition.

The experiment was distributed online by sending a link. Participants took part at their own personal computers and most of them needed 25–40 minutes to complete the experiment.

3.2 Experiment 1: Syntactically interrogative negative polar questions

3.2.1 Design and manipulated variables

This experiment focuses on the most complex and problematic case: responses to negative polar questions which are syntactically interrogative, which means that the finite verb is located in the clause-initial position (V1 for short); see (11). Since negation is obligatorily prefixed to the verb in Czech, there is no reliable formal

difference between high and low negation (cf. Ladd 1981) and its semantic correlate outer (extra-propositional) vs. inner (propositional) negation (AnderBois 2019, Goodhue 2022). Yet there is a general consensus that negation in V1 polar questions in Czech corresponds to high negation, which is either pleonastic (expletive) or applies at an illocutionary level (Repp 2013; for a discussion on Czech, see Staňková 2023, Staňková & Šimík forthcoming, and the references cited therein).

(11) Neprodala Jitka ty staré boty?
NEG.sold Jitka DEM old shoes
'Didn't Jitka / Did Jitka not sell the old shoes?'

In a factorial 2 × 2 × 2 design, we manipulated three variables (all within items and subjects): INFORMATION, CONTEXT, and RESPONSE. The INFORMATION variable, with values positive (i_pos) and negative (i_neg) is manipulated in the lead-in narrative and fixes the factual state of affairs relative to which the participant judges the consistency of the response. The CONTEXT variable, likewise with values positive (c_pos) and negative (c_neg), was manipulated in the first utterance of the dialogue, which is then followed by the polar question. Finally, the RESPONSE variable has the values *ano* (yes) and *ne* (no) and is manipulated in the final utterance of the dialogue. For purposes of visualization and statistical analysis, we have found it useful to include an auxiliary variable, namely the ACCORDANCE between INFORMATION and RESPONSE, yielding the value accord for the cases where the positive information is matched by a yes response and negative information by a no response, and the value discord where this is not so. Table 3 provides an overview of all the 8 unique conditions of experiment 1.

3.2.2 Materials

Example (12) provides an example of an item (particularly item 14) in all eight conditions. The values of the INFORMATION variable is set in small caps, the CONTEXT in italics, and the RESPONSE in boldface. The parts that remained constant across the manipulations – including the negative polar question – are set in ordinary typeface. The value of the INFORMATION variable was located in the lead-in narrative, specifically in the position indicated by [...].[6]

[6]All the experiment materials, results, and outputs of statistical models are available at Open Science Framework under the following link: https://doi.org/10.17605/OSF.IO/9VXJS.

Table 3: Conditions in the factorial design of experiment 1

	INFORMATION	CONTEXT	RESPONSE	ACCORDANCE
a	i_pos	c_pos	yes	accord
b	i_pos	c_pos	no	discord
c	i_pos	c_neg	yes	accord
d	i_pos	c_neg	no	discord
e	i_neg	c_pos	yes	discord
f	i_neg	c_pos	no	accord
g	i_neg	c_neg	yes	discord
h	i_neg	c_neg	no	accord

(12) Eva a Lída se zúčastnily vánočního plesu ve svém rodném městě.
Eva and Lída REFL took.part Christmas ball in their birth town
Lída, která se velmi zajímá o společenský život ve svém rodišti, […]
Lída who REFL a.lot interest in social life in her birthplace
Když se po nějaké době potkají, probírají spolu proběhlý ples.
when REFL after some time meet discuss together passed ball
'Eva and Lída attended a Christmas ball in their hometown. Lída, who is interested in the social life in her hometown very much, […] When Eva and Lída meet after a while, they discuss the ball together.'

a. ví, že HLAVNÍ ORGANIZÁTORKOU BYLA JEJICH BÝVALÁ
knows that main organizer was their former
SPOLUŽAČKA A ZKUŠENÁ ORGANIZÁTORKA PLESŮ ALICE.
classmate and experienced organizer balls Alice
'knows that the main organizer was their former classmate and an experienced ball organizer Alice.'

Lída: *Ten ples se jim moc povedl.*
DEM ball REFL them much worked.out
'The ball worked out really well.'

Eva: Neorganizovala ho Alice?
NEG.organized it Alice
'Didn't Alice organize it?'

Lída: **Ano.**
yes
'Yes.'

b. VÍ, ŽE HLAVNÍ ORGANIZÁTORKOU BYLA JEJICH BÝVALÁ
knows that main organizer was their former
SPOLUŽAČKA A ZKUŠENÁ ORGANIZÁTORKA PLESŮ ALICE.
classmate and experienced organizer balls Alice
'knows that the main organizer was their former classmate and an experienced ball organizer Alice.'

Lída: *Ten ples se jim moc povedl.*
DEM ball REFL them much worked.out
'The ball worked out really well.'

Eva: Neorganizovala ho Alice?
NEG.organized it Alice
'Didn't Alice organize it?'

Lída: **Ne.**
no
'No.'

c. VÍ, ŽE HLAVNÍ ORGANIZÁTORKOU BYLA JEJICH BÝVALÁ
knows that main organizer was their former
SPOLUŽAČKA A ZKUŠENÁ ORGANIZÁTORKA PLESŮ ALICE.
classmate and experienced organizer balls Alice
'knows that the main organizer was their former classmate and an experienced ball organizer Alice.'

Lída: *Ten ples se jim moc nepovedl.*
DEM ball REFL them much NEG.worked.out
'The ball worked out really well.'

Eva: Neorganizovala ho Alice?
NEG.organized it Alice
'Didn't Alice organize it?'

Lída: **Ano.**
yes
'Yes.'

d. VÍ, ŽE HLAVNÍ ORGANIZÁTORKOU BYLA JEJICH BÝVALÁ
knows that main organizer was their former
SPOLUŽAČKA A ZKUŠENÁ ORGANIZÁTORKA PLESŮ ALICE.
classmate and experienced organizer balls Alice
'knows that the main organizer was their former classmate and an experienced ball organizer Alice.'

Lída: *Ten ples se jim moc nepovedl.*
DEM ball REFL them much NEG.worked.out
'The ball worked out really well.'

Eva: Neorganizovala ho Alice?
NEG.organized it Alice
'Didn't Alice organize it?'

Lída: **Ne.**
no
'No.'

e. VÍ, ŽE JEJICH BÝVALÁ SPOLUŽAČKA A ZKUŠENÁ
knows that their former classmate and experienced
ORGANIZÁTORKA PLESŮ ALICE SE TENTOKRÁT NA ORGANIZACI
organizer balls Alice REFL this.time in organization
NEPODÍLELA.
NEG.was.involved
'knows that their former classmate and an experienced ball organizer Alice wasn't involved in the organization this time.'

Lída: *Ten ples se jim moc povedl.*
DEM ball REFL them much worked.out
'The ball worked out really well.'

Eva: Neorganizovala ho Alice?
NEG.organized it Alice
'Didn't Alice organize it?'

Lída: **Ano.**
yes
'Yes.'

f. VÍ, ŽE JEJICH BÝVALÁ SPOLUŽAČKA A ZKUŠENÁ
knows that their former classmate and experienced
ORGANIZÁTORKA PLESŮ ALICE SE TENTOKRÁT NA ORGANIZACI
organizer balls Alice REFL this.time in organization
NEPODÍLELA.
NEG.was.involved
'knows that their former classmate and an experienced ball organizer Alice wasn't involved in the organization this time.'

Lída: *Ten ples se jim moc povedl.*
DEM ball REFL them much worked.out
'The ball worked out really well.'

Eva: Neorganizovala ho Alice?
neg.organized it Alice
'Didn't Alice organize it?'

Lída: **Ne.**
no
'No.'

g. ví, že jejich bývalá spolužačka a zkušená
knows that their former classmate and experienced
organizátorka plesů Alice se tentokrát na organizaci
organizer balls Alice refl this.time in organization
nepodílela.
neg.was.involved
'knows that their former classmate and an experienced ball organizer Alice wasn't involved in the organization this time.'

Lída: *Ten ples se jim moc nepovedl.*
dem ball refl them much neg.worked.out
'The ball worked out really well.'

Eva: Neorganizovala ho Alice?
neg.organized it Alice
'Didn't Alice organize it?'

Lída: **Ano.**
yes
'Yes.'

h. ví, že jejich bývalá spolužačka a zkušená
knows that their former classmate and experienced
organizátorka plesů Alice se tentokrát na organizaci
organizer balls Alice refl this.time in organization
nepodílela.
neg.was.involved
'knows that their former classmate and an experienced ball organizer Alice wasn't involved in the organization this time.'

Lída: *Ten ples se jim moc nepovedl.*
dem ball refl them much neg.worked.out
'The ball worked out really well.'

Eva: Neorganizovala ho Alice?
neg.organized it Alice
'Didn't Alice organize it?'

Lída: **Ne.**
no
'No.'

16 items like (12) were created, meaning that each participant was exposed to each unique condition twice (following the Latin Square distribution we used; see Section 3.1). This number – admittedly not great judging by current standards (Häussler & Juzek 2017) – resulted from a compromise between statistical power considerations and the significant cognitive load imposed by the task on the participants. The introductory narrative was always presented in stylistically neutral language and the dialogues occasionally contained colloquial expressions. The information at issue (above: whether Alice organized the ball) is known to the first dialogue participant (above: Lída), but not to the second one (above: Eva). The first participant makes a claim relevant to the information at issue (above: how the ball worked out), but does not reveal its value. The first participant's utterance stands in a particular relation to the information: it makes it more likely or less likely. The second participant asks a question about the information, followed by a response from the first participant.

Consider (12a) for illustration. In this condition it is the case that Lída (the first dialogue participant) knows that Alice organized the ball. Also, as the narrative implies, both Lída and Eva (the second dialogue participant) are aware that Alice is a good ball organizer. Lída's first utterance in the dialogue – that the ball worked out really well – implies that the ball was organized by Alice (a case of evidential bias). Eva then asks a polar question, in order to verify or falsify the implication. Lída responds *ano* 'yes'. Setting the naturalness rating aside, the participant had the option of either saying that Lída's response is consistent with the information provided (i.e., the response is true), or saying that Lída's response is not consistent with the information provided (i.e., the response is false). In the former case, we assume that the participant either interprets the response absolutely (feature [+] / positive polarity = 'Alice organized the ball.') or relatively (feature [AGREE] / agreement with the antecedent 'Alice organized the ball' – made available by the prejacent of the negative polar question asked). In the latter case, the participant interpreted Lída's response as involving the relative feature [AGREE], agreeing with the negative antecedent – 'Alice didn't organize the ball' – made available by the prejacent of the polar questions, including the negation. Whether the positive or the negative form of the antecedent is more salient (and hence whether the response is considered as true or false, provided it is interpreted relatively) is, by hypothesis (Krifka 2013), co-determined by the context – Lída's first utterance (more technically: evidential bias).

3.2.3 Results

Figure 1 shows the raw results of experiment 1, in particular of the ratings of consistency between the RESPONSE (yes vs. no) and the INFORMATION provided (i_pos vs. i_neg). Figure 2 provides the corresponding 95% confidence intervals (computed with the emmeans function of the emmeans package of R; Lenth 2024). The results are visualized – and also statistically analyzed – using the auxiliary ACCORDANCE variable. The value accord combined with the value i_pos equals the value yes, combined with the value i_neg equals no, and conversely for discord. The values of the response variable (yes vs. no) are indicated in the top left corner of each of the four panes for clarity. The reason for using ACCORDANCE rather than RESPONSE is that from the perspective of the results, the levels of the former variable form more of a natural class than the levels of the latter variable. The results are thus easier to evaluate and interpret.[7]

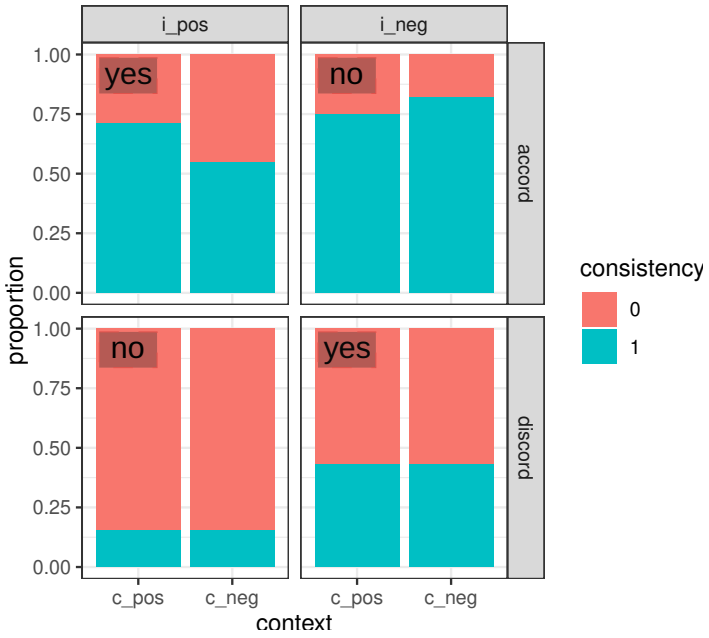

Figure 1: Experiment 1: Response–information consistency ratings

Looking at the dependent variable, we note that consistency value 1 indicates that the participant considered the response to be consistent with the information provided, or, in other words, true relative to the information provided. Consistency value 0 indicates a judgment of falsity.

[7]See the general discussion (Section 4) for a visualization using the RESPONSE variable.

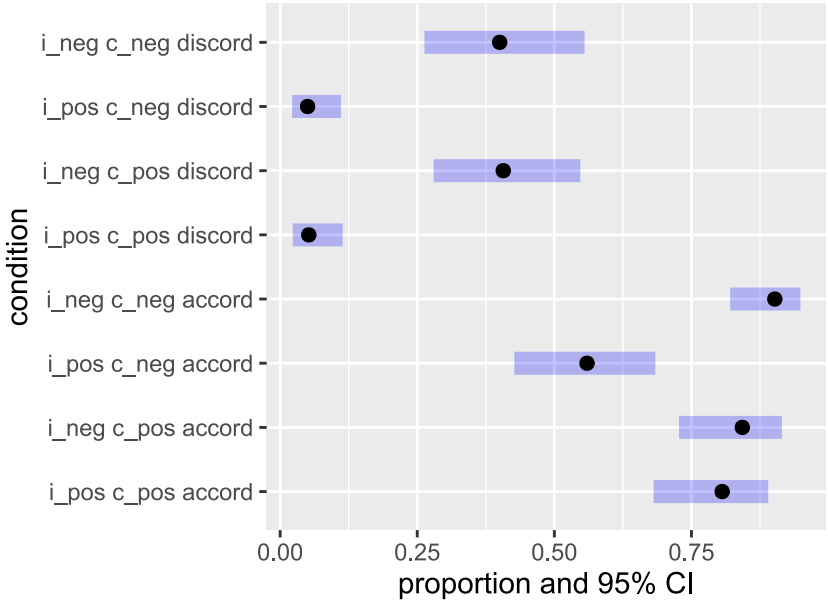

Figure 2: Experiment 1: 95% confidence intervals of consistency ratings

To give a particular example, the top right panel shows that a no response after negative information (corresponding to accord / conditions f/g of our design; see Table 3 and (12f/g)) was considered consistent with the information in about 78 % of the cases; on the other hand, the bottom left panel shows that a no response after positive information (corresponding to discord / conditions b/d) was considered consistent with the information in only about 15 % of the cases.

We fitted a generalized linear mixed model, using the glmer function of the lme4 package (Bates et al. 2015) of the R software (R Core Team 2021), to estimate the effect of INFORMATION, CONTEXT, ACCORDANCE, and their mutual interactions on the consistency rating. We included random intercepts and slopes for both items and participants; INFORMATION and CONTEXT were sum-coded, ACCORDANCE treatment-coded (using accord as the reference level).[8] The model confirms the naked-eye-visible effect of ACCORDANCE: responses which were

[8]The particular formula used was: CONSISTENCY RATING ~ INFORMATION * CONTEXT * ACCORDANCE + (1 + INFORMATION + CONTEXT + ACCORDANCE | participant) + (1 + INFORMATION + CONTEXT + ACCORDANCE | item). Treatment coding was used for ACCORDANCE because it has a natural reference level (accord) at which we expected high consistency (as compared to the discord level). Such a clear relationship was absent in the other factors, for which reason we applied sum coding to them.

in accord with the information (the top row in Figure 1) were rated as true much more often than responses which were in discord with the information ($z = -6.580, p < .001$). For instance, a positive response after positive information (see (12a)) was rated as more consistent than after negative information (see (12e)). In addition, the model revealed a significant main effect of INFORMATION ($z = -3.660, p < .001$; not easily interpretable), an interaction between INFORMATION and ACCORDANCE ($z = -3.849, p < .001$), between INFORMATION and CONTEXT ($z = 3.627, p < .001$), and a three-way interaction between all factors ($z = -2.399, p = .016$). The interaction between INFORMATION and ACCORDANCE indicates that the effect of INFORMATION is more pronounced in the discord level of ACCORDANCE. The interaction between INFORMATION and CONTEXT is only visible if the response was in accord with the information (the top pane in Figure 1), which is also indicated by the significant three-way interaction. In order to see the effect CONTEXT in a clearer way, we fitted a model onto the accord data subset, including random intercepts and slopes for both items and participants and sum-coding for both predictors – INFORMATION and CONTEXT.[9] This model confirmed the aforementioned interaction ($z = 3.584, p < .001$), and a further statistical analysis (nesting CONTEXT within the levels of INFORMATION) revealed that its source is both in i_pos and i_neg: if the information was positive, responses were rated as true more often if the context was also positive, as in (12a) as opposed to (12c) (simple effect of CONTEXT within i_pos; $z = 1.999, p = .046$), and if the information was negative, responses were rated as true more often if context was also negative, as in (12h) as opposed to (12f) (simple effect of CONTEXT within i_neg; $z = -3.389, p < .001$).[10]

3.2.4 Discussion

Experiment 1 clearly reveals that particle responses to negative syntactically interrogative questions are judged to be true if their polarity is in accordance with the polarity of the information provided: *ano* 'yes' is judged as true if the information is positive and *ne* 'no' is judged as true if the information is negative. This result is consistent with the absolute feature analysis, under which *ano* 'yes' encodes [+] and *ne* 'no' encodes [−]. If the negation is pleonastic, as is commonly assumed for interrogative (V1) questions (Gruet-Skrabalova 2016), then the results also follow under the relative feature analysis, under which *ano* encodes [AGREE] and *ne* [REVERSE], because in both cases the antecedent is positive.

[9]The formula used was: CONSISTENCY RATING ~ INFORMATION * CONTEXT + (1 + INFORMATION * CONTEXT | participant) + (1 + INFORMATION * CONTEXT | item).

[10]The formula used for the last model was: CONSISTENCY RATING ~ INFORMATION / CONTEXT + (1 + INFORMATION * CONTEXT | participant) + (1 + INFORMATION * CONTEXT | item).

That said, we should also note that there is a difference in the behavior of *ano* 'yes' and *ne* 'no'. While the effect of ACCORDANCE is very clear for *ne* (numerical difference of 63 % between accord and discord), it is much less pronounced for *ano* (numerical difference of 20 %). The ratings for *ano* 'yes' are closer to chance in both accord and discord, indicating a greater degree of uncertainty in the consistency ratings. This pattern would be expected under the conjunction of the following two premises: the negative polar question makes the negative proposition available as an antecedent (i.e., negation is not pleonastic) and *ano* 'yes' encodes [AGREE], i.e., its semantics is relative and agrees either with the positive antecedent ('yes, she did') or with a negative antecedent ('yes, she didn't'). The fact that agreement with the positive antecedent is judged as true significantly more often than agreement with the negative antecedent would then reflect on the relative availability of the two antecedent types. This explanation would further be consistent with the fact that the availability of the positive antecedent is modulated by the context (simple effect of CONTEXT), in line with Krifka (2013): if the context is positive, the positive antecedent is available more (71 %) than if the context is negative (56 %). What is unexpected is that there is no analogous simple effect of CONTEXT if *ano* 'yes' is in discord with the information provided, i.e., if the information provided is negative. In this latter case, we could expect the negative context to make the negative antecedent more accessible and hence increase the consistency judgment relative to the positive context condition. This expectation is not met: *ano* 'yes' is judged as consistent in 43 % of the cases irrespective of the value of the CONTEXT variable.

Turning to the interpretation of *ne* 'no', the overall results are consistent with the absolute semantics ([−]). What is unexpected under this view, however, is the simple effect of context in the accord condition, i.e., that *ne* 'no' is judged true in more cases if the context is negative (79 %) than if it is positive (75 %). While this effect is numerically smaller than for 'yes' responses, it is statistically stronger. A [REVERSE]-based semantics would get a handle on this effect, but would leave the very low consistency ratings in the discord condition unexplained.

3.3 Experiment 2: Syntactically declarative polar questions

3.3.1 Design and manipulated variables

This experiment focuses on responses to negative syntactically declarative polar questions, i.e., questions in which the verb is located after the subject (V2); see (13).

(13) Jitka neprodala ty staré boty?
Jitka NEG.sold DEM old shoes
'Jitka didn't sell the old shoes?'

We only used two crossed factors in this experiment – INFORMATION and RESPONSE. Context was always negative because negative declarative questions only sound natural in contexts indicating negative evidential bias (Gunlogson 2002, Staňková 2023) and our primary interest was the interpretation (not so much naturalness) of response particles. The overview of the individual conditions is provided in Table 4. The materials were parallel to those in experiment 1; we do not include a token set here in the interest of space.

Table 4: Conditions in the factorial design of experiment 2

	INFORMATION	RESPONSE	ACCORDANCE
a	i_pos	yes	accord
b	i_pos	no	discord
c	i_neg	yes	discord
d	i_neg	no	accord

3.3.2 Results

Figure 3 shows the raw results of experiment 2, in particular the ratings of consistency between the RESPONSE (yes vs. no) and the INFORMATION provided (i_pos vs. i_neg). The values of the auxiliary ACCORDANCE variable are provided as labels, for completeness. Figure 4 provides the corresponding 95% confidence intervals. We fitted a generalized linear mixed model to estimate the effect of INFORMATION, RESPONSE, and their interaction on the consistency rating. Both factors were sum-coded. Random intercepts and slopes for both items and participants were included.[11] The model confirms the visually clear main effect of INFORMATION: responses are judged as more consistent with negative information (i_neg) than with positive information (i_pos) ($z = -9.191$, $p < .001$). Furthermore, there is an interaction between INFORMATION and RESPONSE: the effect of INFORMATION is more pronounced with *ne* than with *ano* ($z = 4.091$, $p < .001$).

[11]The formula used was: CONSISTENCY RATING ~ INFORMATION * RESPONSE + (1 + INFORMATION + RESPONSE | participant) + (1 + INFORMATION + RESPONSE | item).

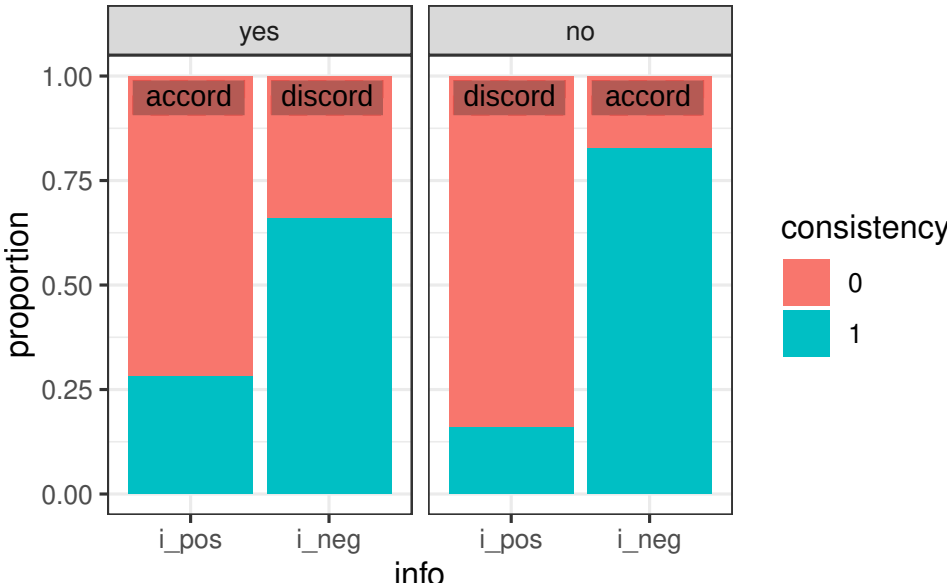

Figure 3: Experiment 2: Response–information consistency ratings

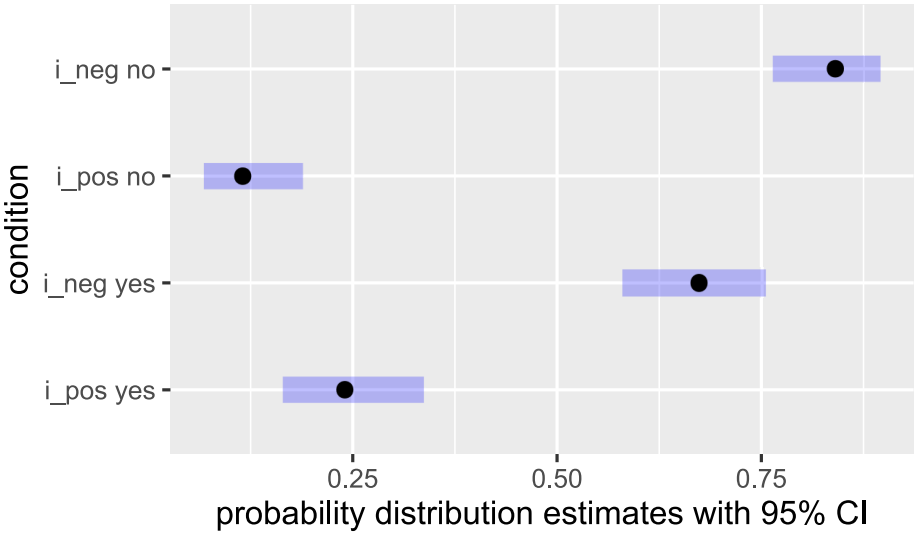

Figure 4: Experiment 2: 95% confidence intervals of consistency ratings

3.3.3 Discussion

The most significant result of experiment 2 is that both *ano* 'yes' and *ne* 'no' have the same truth conditions when responding to negative declarative polar questions: they are both judged as true if the information provided is negative (main effect of INFORMATION). This result follows from the premise that (i) *ano* 'yes' has relative semantics (encodes [AGREE]) and agrees with the negative antecedent ('yes, she didn't'), and, (ii) *ne* 'no' has absolute semantics (encodes [−]) and negative polarity ('(no,) she didn't').

The fact that the effect of INFORMATION is stronger for negative than for positive responses is consistent with this view. The relative semantics of *ano* 'yes' leaves some room for uncertainty as to which antecedent functions as the particle's prejacent. While the declarative form of the negative question makes the negative antecedent highly salient (making the 'yes, she didn't' interpretation true in 66 % of the cases in the i_neg/discord condition and 72 % in the i_pos/accord condition), the positive antecedent can also be accessed, at least when compared to the corresponding interpretations in the no condition (the 'yes, she did' interpretation is judged as true in 28 % of the cases in the i_pos/accord condition and 34 % in i_neg/discord condition). Compared to that, the hypothetical 'no, she did' interpretation is rather exceptional (only evident in about 17 % of the no responses overall).

4 General discussion

The results of our two experiments lend solid support to (i) relative, [AGREE]-based semantics of *ano* 'yes' and (ii) absolute, [−]-based semantics of *ne* 'no'. The proposed lexical encoding and the corresponding realization possibilities are represented in Table 5, an updated version of Table 1. The Czech particles *ano* 'yes' and *ne* 'no' are framed for clarity. The last column indicates where the evidence for the realization (im)possibilities stems from and whether the evidence is positive (judgment of truth) or negative (judgment of falsity).

In order to aid the discussion visually, we insert Figure 5, which includes data from both experiments: the top pane visualizes results of experiment 1 (aggregating over both levels of the CONTEXT variable), in which the question was interrogative (verb-first), and the bottom pane visualizes the results of experiment 2, in which the question was declarative (non-verb-first). For ease of reference, we label the individual stacked bars with capital letters.

Let us go through Table 5 step-by-step. If *ano* encoded [+] alone, we would expect the yes response in experiment 2 to be judged as consistent with the

Table 5: Feature bundles in the feature model (updated)

	Lexically encoded by	Realized by	(Positive/ Negative) evidence from
[+]	*yes*	*yes*, ~~*ano*~~	exp 2 (neg)
[−]	*no*, *ne*	*no*, *ne*	exp 1, 2 (pos)
[AGREE]	*yes*, *ano*	*yes*, *ano*	exp 1, 2 (pos)
[REVERSE]	*no*	*no*, ~~*ne*~~	exp 1, 2 (neg)
[AGREE, +]	n.a.	*yes*, *ano*	exp 1 (pos)
[AGREE, −]	n.a.	*yes* or *no*, *ano* or *ne*	exp 1, 2 (pos)
[REVERSE, +]	*doch*	*yes* or *no*/*doch*, ~~*ano*~~ / ~~*ne*~~	exp 1, 2 (neg)
[REVERSE, −]	n.a.	*no*, *ne*	exp 1 (pos)

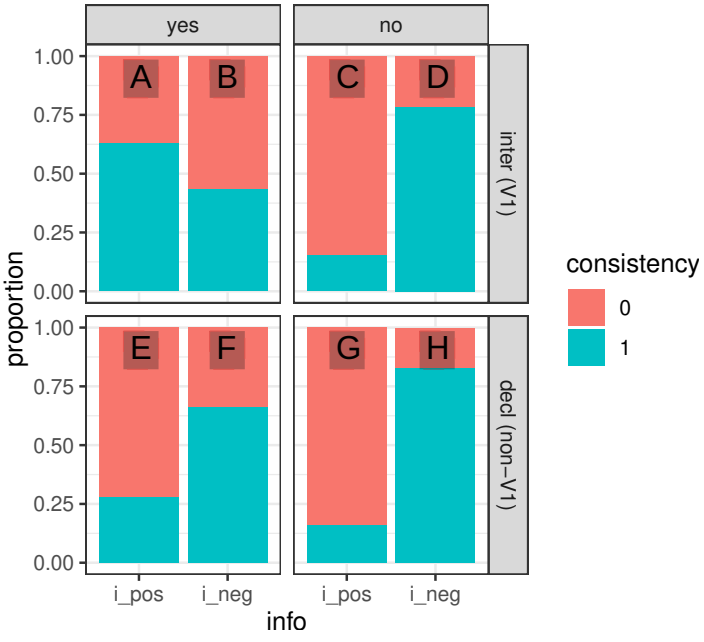

Figure 5: Both experiments: Response–information consistency ratings

positive information (bar E in Figure 5). The fact that it cannot "ignore" the negative antecedent (i.e., agrees with it; bar F), strongly supports its relative (rather than absolute) semantics.

The assumption that *ne* encodes the absolute feature [−] is supported by the stability of its consistency with the negative information, independently of the question type preceding it (bars D and H).

That *ano* encodes [AGREE] is witnessed primarily by the differential behavior of this particle in experiment 1 and experiment 2. In the former, *ano* is judged more consistent with positive information (bar A, vs. B), and in the latter, *ano* is judged more consistent with negative information (bar F, vs. E). This follows if *ano* agrees with its antecedent and if interrogative (V1) questions make the positive antecedent more salient (cf. pleonastic negation), while declarative (non-V1) questions make the negative antecedent more salient. The fact that the effect of the INFORMATION variable is less pronounced in the yes condition, as compared to the no condition, is – or so we hypothesize – also consistent with the relative vs. absolute semantics of *ano* vs. *ne*, respectively. While the absolute semantics of *ne* remains largely insensitive to the polarity of its antecedent (being sensitive merely to the polarity-free prejacent), the relative semantics of *ano* leaves room for pragmatic and contextual considerations as to which antecedent – whether positive or negative – is selected as the prejacent of *ano*, which in turn leads to a greater variance in the consistency judgments and their overall centering around chance. This is especially evident in the results of experiment 1 (see A vs. B), where we also observed the effect of the CONTEXT variable predicted by Krifka (2013): positive context (as compared to negative context) supports the selection of a positive prejacent (see Section 3.2.3).

The fact that *ne* does not encode [REVERSE] is supported by the results of both experiments, but especially of experiment 2: while *ano* switched its truth conditions between experiment 1 and experiment 2, the truth conditions of *ne* remain stable. This clearly indicates that the differential availability of the two polar antecedents in these experiments had no effect on the meaning of *ne*, militating against its relative semantics. What supports the relative semantics, and is unexpected under our analysis, is that the consistency of the *ne* response with the negative information (bar D) is modulated by context: the consistency is higher if the context is negative – a mirror image of what happens in A. This effect is numerically small (only about 4 %), but statistically significant.

Let us now turn to the realization of the four logically possible feature combinations. The [AGREE, +] bundle is realized by *ano*, which, by the subset principle employed in the feature model, spells out [AGREE] (leaving [+] unrealized). This

case is instantiated by bar A, where agreement is with a positive antecedent (supported by the tendentially pleonastic nature of the negation) and where the polarity of the response is, accordingly, positive ('yes, she did'). The [REVERSE, −] bundle is realized by *ne*, which spells out the subset [−]. This case is instantiated by bar D, where the polarity of the response is negative ('she didn't') and is reversed as compared to the primarily positive polarity of the antecedent. The [AGREE, −] bundle can in principle be realized in two ways – either by *ano,* which spells out [AGREE], or by *ne,* which spells out [−]. That precisely this is the case is witnessed by the identical truth conditions of the two particles in experiment 2 or, more specifically, by the analogous consistency ratings in bars F and H. In this case, the response agrees with the negative antecedent (≈ *ano*) and thus conveys a response of negative polarity (≈ *ne*). The most problematic case is represented by the bundle [REVERSE, +], which finds no suitable match in the lexical meanings of *ano* or *ne.* This scenario is represented by bars E and G and, as is evident from the consistency ratings, neither *ano* nor *ne* are capable of reliably conveying it. It follows that a response with positive polarity reacting to a clearly negative antecedent (contributed in experiment 2 by the negative declarative question) cannot be expressed by a standalone particle in Czech. Instead, a more complex structure is warranted, such as a fragment (elliptical) response containing a verb explicitly specified for polarity (Gruet-Skrabalova 2015, 2016) or the positive particle *ano* 'yes' preceded by *ale* 'but'; see (14). We hypothesize that the particle *ale* 'but' reverses the salience of the two polar alternatives, making the positive one, which is otherwise only latently present, more salient and hence available as an antecedent of the relative particle *ano* 'yes'.

(14) A: Jitka neprodala ty staré boty?
Jitka NEG.sold DEM old shoes
'Did Jitka not sell the old shoes?'

B_1: #Ano. / #Ne.
yes no
Intended: 'She sold the old shoes.'

B_2: Prodala.
sold
'She did.'

B_3: Ale ano.
but yes
'She did.'

This latter point brings us to a discussion of the predictions made by Gruet-Skrabalova (2016). Gruet-Skrabalova proposes that both of the Czech response particles can realize both the relative features and the absolute features. Our experimental results do not lend support to this claim. More particularly, we see only little evidence for [REVERSE] being realized by *ne* 'no' or for [+] being realized by *ano* 'yes'. The infelicity of the response ($14B_1$), which reflects our experimental results, is an example of this.

Our experimental results and the analysis we offer bear implications for the interpretation of Czech negative polar questions. Negative polar interrogatives (V1) are often considered to contain pleonastic negation, i.e., a negation which does not contribute propositional negation (see Staňková 2023 and the references therein). Such questions can thus be expected to only contribute positive propositions as antecedents available for anaphoric pick-up by the relative particle *ano* 'yes'. Counter to this expectation, we see that the negative proposition is not completely unavailable. In experiment 1, *ano* 'yes' is considered to be consistent with negative information in 43 % of the cases (bar B), a proportion which is hardly negligible (esp. when compared to the no+i_pos condition; see bar C). We take this to indicate that negation attached to a fronted verb in polar interrogatives is not necessarily pleonastic; it can either be marginally read as propositional negation or contributes an illocutionary negation (called FALSUM by Repp 2013), which can (marginally) participate in forming an antecedent – possibly a speech act – which can in turn function as the prejacent of *ano* 'yes'. While a more detailed investigation of the interactions between the semantics of negative polar interrogatives and the semantics of polar responses is still missing, the experimental results reported in Staňková (2023) are consistent with the view just suggested.

Negative declarative questions, on the other hand, primarily contribute a negative antecedent, witnessed by the high consistency of *ano* 'yes' with negative information in experiment 2 (bar F). While this is, *prima facie*, an expected result, we also know from Staňková's (2023) results that negative declarative questions readily contribute not only inner negation (licensing negative concord items) but also outer ("pleonastic") negation (compatible with positive polarity items). If this is the case, we would expect the positive proposition to be more readily available for anaphoric pickup by *ano* 'yes'. Yet this is only possible in 28 % of the cases (bar E). Admittedly, however, the salience of the positive proposition is reduced by two factors in our experimental design (of experiment 2): the absence of any polarity item indicating outer negation and the contextual negative evidence (bias). It is an open issue whether the manipulation of these factors would have an impact on the availability of the positive interpretation of the particle

ano (matched by an increased consistency in what would correspond to the E bar).

5 Conclusion

Our paper contributes the first experimental data pertaining to the semantics and interpretation of the two Czech polar response particles – *ano* 'yes' and *ne* 'no'. Building on the feature model of Roelofsen & Farkas (2015) and based on the results of our two experiments, we have argued that *ano* 'yes' lexically encodes the relative feature [AGREE] and *ne* 'no' encodes the absolute feature [−]. This stands in contrast to what has been proposed for Czech by Gruet-Skrabalova (2016) or for English by Roelofsen & Farkas (2015), namely that response particles are ambiguous between the relative and the absolute meaning. In addition, the results of experiment 1 reveal tentative evidence in favor of Krifka's (2013) proposal that context can affect the choice of the antecedent for relative response particles. More specifically, we saw that the relative particle *ano* 'yes' is resolved to a positive antecedent more often in cases in which it is preceded by a positive context, as compared to a negative context. What is puzzling is that an inverse effect is observed for the particle *ne* 'no', which otherwise exhibits a pattern consistent with absolute lexical semantics (which in turn should be insensitive to contextual manipulations). The effect is numerically much smaller, but statistically stronger.

Finally, we have drawn some implications for the semantics of polar questions. Counter to the common assumption that negation on the fronted verb in interrogative questions is pleonastic (e.g., Gruet-Skrabalova 2016), i.e. not interpreted, we have seen some tentative evidence for the availability of a negative structure being contributed by such questions. Whether it is a negative proposition or a negative speech act (as assumed e.g. by Staňková 2023) remains an open question. Likewise, it remains open how negative declarative questions (non-V1) in which negation is interpreted as outer negation (Staňková 2023) are responded to. The prediction is that the positive interpretation of *ano* 'yes' should be available to a greater extent in these cases.

Abbreviations

DEM demonstrative
NEG negation
REFL reflexive

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References

AnderBois, Scott. 2019. Negation, alternatives, and negative polar questions in American English. In Klaus von Heusinger, Edgar Onea & Malte Zimmermann (eds.), *Questions in discourse – Volume 1: Semantics* (Current Research in the Semantics / Pragmatics Interface 35), 118–171. Leiden: Brill. DOI: 10.1163/9789004378308_004.

Bates, Douglas, Martin Maechler, Ben Bolker & Steve Walker. 2015. Fitting linear mixed-effects models using lme4. *Journal of Statistical Software* 67(1). 1–48. DOI: 10.18637/jss.v067.i01.

Claus, Berry, A. Marlijn Meijer, Sophie Repp & Manfred Krifka. 2017. Puzzling response particles: An experimental study on the German answering system. *Semantics and Pragmatics* 10(19). 1–51. DOI: 10.3765/sp.10.19.

Esipova, Masha. 2021. Polar responses in Russian across modalities and across interfaces. *Journal of Slavic Linguistics* 29(FASL 28 issue). 1–11. DOI: 10.1353/jsl.2021.a923057.

Espinal, M. Teresa & Susagna Tubau. 2019. Response systems: The syntax and semantics of fragment answers and response particles. *Annual Review of Linguistics* 5. 261–287. DOI: 10.1146/annurev-linguistics-011718-012613.

Geist, Ljudmila & Sophie Repp. 2023. Responding to negative biased questions in Russian. In Petr Biskup, Marcel Börner, Olav Mueller-Reichau & Iuliia Shcherbina (eds.), *Advances in formal Slavic linguistics 2021* (Open Slavic Linguistics 8), 145–177. Berlin: Language Science Press. DOI: 10.5281/zenodo.10123641.

Goodhue, Daniel. 2022. Isn't there more than one way to bias a polar question? *Natural Language Semantics* 30(4). 379–413. DOI: 10.1007/s11050-022-09198-2.

Goodhue, Daniel & Michael Wagner. 2018. Intonation, *yes* and *no*. *Glossa: a journal of general linguistics* 3(1). 5. 1–45. DOI: 10.5334/gjgl.210.

Gruet-Skrabalova, Hana. 2015. Verbs and particles in minimal answers to *yes-no* questions in Czech. In Gerhild Zybatow, Petr Biskup, Marcel Guhl, Claudia Hurtig, Olav Mueller-Reichau & Maria Yastrebova (eds.), *Slavic grammar from a formal perspective: The 10th anniversary FDSL conference*, 197–215. Frankfurt am Main: Peter Lang.

Gruet-Skrabalova, Hana. 2016. Yes or no, or how to answer a negative question. *Linguistica* 56(1). 127–142. DOI: 10.4312/linguistica.56.1.127-142.

Gunlogson, Christine. 2002. Declarative questions. In Brendan Jackson (ed.), *SALT 12: Proceedings from the 12th Conference on Semantics and Linguistic Theory*, 124–143. Ithaca: CLC Publications. DOI: 10.3765/salt.v12i0.2860.

Häussler, Jana & Tom Juzek. 2017. Hot topics surrounding acceptability judgment tasks. In Sam Featherston, Robin Hörnig, Reinhild Steinberg, Birgit Umbreit & Jennifer Wallis (eds.), *Proceedings of Linguistic Evidence 2016: Empirical, theoretical, and computational perspectives*. Tübingen: University of Tübingen. DOI: 10.15496/publikation-19039.

Kramer, Ruth & Kyle Rawlins. 2011. Polarity particles: An ellipsis account. In Suzi Lima, Kevin Mullin & Brian W. Smith (eds.), *NELS 39: Proceedings of the Thirty-Ninth Annual Meeting of the North East Lingusitic Society*, vol. 2, 479–492. Amherst: GLSA Publications.

Kramer, Ruth & Kyle Rawlins. 2012. An ellipsis approach to answer particles in positive and negative contexts. Presented in the Workshop on the Syntax of Answers to Polar Questions (Newcastle University).

Krifka, Manfred. 2013. Response particles as propositional anaphors. In Todd Snider (ed.), *SALT 23: Proceedings from the 23rd conference on Semantics and Linguistic Theory*, 1–18. Ithaca: CLC Publications. DOI: 10.3765/salt.v23i0.2676.

Ladd, D. Robert. 1981. A first look at the semantics and pragmatics of negative questions and tag questions. In Roberta Hendrick, Carrie Masek & Mary Frances Miller (eds.), *CLS 17: Papers from the Seventeenth Regional Meeting of the Chicago Linguistics Society*, 164–171. Chicago: Chicago Linguistic Society.

Lenth, Russell V. 2024. emmeans: Estimated Marginal Means, aka Least-Squares Means. R package version 1.10.2.090002. https://rvlenth.github.io/emmeans/.

Liberman, Mark & Ivan Sag. 1974. Prosodic form and discourse function. In *CLS 10: Papers from the Tenth Regional Meeting of the Chicago Linguistic Society*, 416–427. Chicago: Chicago Linguistic Society.

Maldonado, Mora & Jennifer Culbertson. 2023. *You say yes, I say no*: Investigating the link between meaning and form in response particles. *Glossa: a journal of general linguistics* 8(1). 1–41. DOI: 10.16995/glossa.9185.

R Core Team. 2021. R: A language and environment for statistical computing. Vienna: R Foundation for Statistical Computing. https://www.r-project.org.

Repp, Sophie. 2013. Common ground management: Modal particles, illocutionary negation and *verum*. In Daniel Gutzmann & Hans-Martin Gärtner (eds.), *Beyond expressives: Explorations in use-conditional meaning*, 231–274. Brill. DOI: 10.1163/9789004183988_008.

Roelofsen, Floris & Donka F. Farkas. 2015. Polarity particle responses as a window onto the interpretation of questions and assertions. *Language* 91(2). 359–414. https://www.jstor.org/stable/24672234.

Staňková, Anna. 2023. *The expression of speaker's bias in Czech polar questions*. Praha: Charles University. (MA thesis).

Staňková, Anna & Radek Šimík. Forthcoming. Negation in Czech polar questions. *Journal of Slavic Linguistics*.

Starschenko, Alexej & Marta Wierzba. 2023. L-Rex Linguistic rating experiments [software], version 1.0.2. GNU General Public License v3.0. https://github.com/2e2a/l-rex/.