

The expression of speaker's bias in Czech polar questions

Vyjádření předpokladů mluvčího v českých
zjišťovacích otázkách

Bc. Anna Staňková

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Vedoucí: doc. Mgr. Radek Šimík, Ph.D.



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Anna Staňková

Abstract

This MA thesis focuses on Czech polar questions, especially on the description of their syntactic-semantic interface. Besides that, I discuss an additional layer of pragmatic meaning (i.e., BIAS), which expresses the speaker's expectations about the possible answers based on their beliefs or on their immediate context. The question's bias is signaled by a number of formal means: word order (interrogative vs. declarative), polarity (positive vs. negative question) and particles (e.g. *copak*). The interpretation of negation in polar questions is by no means trivial, as it gives rise to two types of reading: inner and outer. I propose explicit syntactic and semantic analyses of negative polar questions in Czech using the generative and formal semantic approach. To capture the difference between inner and outer negation, I use Repp's (2013) theory and the VERUM/FALSUM operators. I also propose a syntactic analysis of verbal movement to the initial position in Czech interrogative sentences. The thesis, therefore, aims to characterize how the formal means interact with the question's meaning (including bias). I ran a naturalness judgment task to empirically test the hypotheses based on previous accounts of polar questions and my own analyses. The experimental set-up consisted of multiple parts investigating negative polar questions as well as the behavior of certain particles (*copak*, *náhodou*, *snad*, *přece*). The results showed that the immediate context interacts with the question's interpretation as well as its word order. To some extent, it also determined the usage of some of the particles.

Keywords: questions, polar questions, semantics, syntax, pragmatics, bias, negation, particles

Abstrakt

Tato diplomová práce se zabývá zjišťovacími otázkami v češtině, zejména jejich popisem po syntaktické a sémantické stránce. Kromě toho se věnuje dodatečným významům na pragmatické rovině, tj. předpokladům mluvčího o tom, jakou dostane odpověď. Předpoklady, které lze v angličtině zahrnout pod termín BIAS, pramení z předchozích zkušeností mluvčího anebo z jeho aktuálního kontextu. Mohou být vyjádřeny pomocí několika formálních prostředků: slovosledu (interrogativní vs. deklarativní), polarity (kladná vs. otázka s negací) a částic (např. *copak*). Negace ve zjišťovacích otázkách je dvou typů: sémantická a pleonastická. Ve své práci navrhuji syntaktickou a sémantickou analýzu českých zjišťovacích otázek s negací za použití generativního a formálně-sémantického přístupu. Analýzy sémantické a pleonastické negace se opírají o teorii Repp(ové) (2013) a dvojici operátorů VERUM/FALSUM. Vedle toho navrhuji analýzu pohybu slovesa do iniciální pozice v interogativním slovním pořádku. Cílem práce je charakterizovat vztah formálních prostředků a významových odstínů zjišťovacích otázek. Hypotézy pocházející z literatury či mých vlastních analýz jsem testovala pomocí hodnocení přirozenosti. Experiment sestával z několika částí zaměřených na otázky s negací, ale i na otázky s vybranými částicemi (*copak*, *náhodou*, *snad*, *přece*). Z výsledků vyplynulo, že kontext interaguje s interpretací otázky i jejím slovosledem. Do značné míry určuje i užívání některých částic.

Klíčová slova: otázky, zjišťovací otázky, sémantika, syntax, pragmatika, pragmatické předpoklady, negace, částice

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List of abbreviations

PQ	polar question
V1	initial verb
NON-V1	non-initial verb
PPI	positive polarity item
NCI	negative concord item
NPI	negative polarity item
LHM	Long-Head Movement
HMC	Head Movement Constraint

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1 Introduction

Recently, the topic of polar questions has been studied experimentally (Park & Dubinsky 2019; Tian et al. 2021; ao.) as well as theoretically (Krifka 2017; Goodhue 2022; Larrivéé & Mari 2022; ao.) across languages. From a formal point of view, the three questions in (1) differ only minimally, but each of them gives rise to a different combination of semantic and pragmatic meanings.

- (1) a. Is Jane coming?
b. Isn't Jane coming?
c. Is Jane not coming?

Such complexities have received a substantial amount of attention. This paper attempts to enter these discussions and suggest theoretical implications based on empirical data from Czech polar questions.

I aim at the strategies by which the speaker of the question expresses their expectations about the answer, i.e., their bias. In general, I investigate the relation between the formal and semantic/pragmatic aspects of polar questions: I focus on the interplay of word order, negation and immediate context, and their interaction with the interpretation of a question. In particular, I examine the word order patterns in polar questions and how they interact with negation and its reading. I look more closely at the role of a question's immediate context and its relation to the word order and negation reading.

First, in section 2, I provide some theoretical background for the topic of polar questions. I describe their formal features, namely word order and polarity, as well as semantic features. Since polar questions can carry biases, I also focus on their pragmatic meaning. I discuss four Czech question particles (*copak*, *náhodou*, *snad* and *přece*) and the meanings they can indicate. I propose my own syntactic and semantic analysis of Czech negated polar questions, which I test empirically by the means of a naturalness judgment task. The experimental set-up and its results with discussion are presented in section 3. I conclude the thesis in section 4.

2 Polar questions

The main focus is on polar questions (henceforth PQs) which are to be distinguished from *wh*-questions and alternative questions.¹ *Wh*-questions ask about a particular entity or circumstance which constitutes a gap in the speaker's knowledge, and which is expressed by a *wh*-word in the question. Alternative questions ask which of the presented alternatives holds. Unlike these, by using a PQ the speaker is trying to find out which polarity of the current proposition holds. Apart from that, they are also able to convey more meaning layers (biases), which lie at the center of this paper.

The rest of this chapter is organized as follows: in section 2.1, I describe the formal features of PQs – their prosody and word order. I comment on the movement of the verb to the initial position and propose a syntactic analysis of it. Declarative PQs are also mentioned. Section 2.2 is dedicated to the formal semantic account of PQs, especially the partition theory. In 2.3, I introduce the topic of biased PQs and distinguish between two types of bias: epistemic and evidential. They are part of a PQ's bias profile. The polarity of PQs is discussed in 2.4. First, I compare positive and negative PQs. Then I comment on the two types of negation – inner and outer – and the way of capturing them by the operators *VERUM* and *FALSUM*. In 2.5, four different particles are presented: *co(ž)pak*, *náhodou*, *snad* and *přece*. Section 2.6 contains my syntactic and semantic analysis of Czech PQs with negation.

2.1 Form

In general, PQs can be constructed by a set of formal means, which differ across languages, as some means are more frequent than others. According to Dryer (2013), the most frequent strategy is inserting a question particle (e.g., in Russian or French), followed by interrogative intonation (e.g., in Catalan and Italian) and interrogative verb morphology (e.g., in Korean).² For many European languages, including Czech, it is common to construct a PQ by using interrogative word order. But, as Czech researchers point out, prosody is also important in constructing a PQ (Grepel 1965; Palková 1994). Another related phenomenon is the so-called question tag. Although question tags are probably able to indicate a bias on the side of the speaker, they are out of the scope of this paper, and I will not discuss them any further.

In the following, I focus primarily on PQs that are formed as root clauses. PQs, however, can also occur as embedded clauses. In those cases, they are marked by specific connecting devices, such as *jestli*, *zda*, and their variants *jestlipak* and *zdalipak*. First, I review what has been said about PQs' prosody, and after that I pay closer attention to word order, especially how the Czech verb moves to the initial position in a clause. I propose an account of how the verb moves. Aside from that, I comment on declarative PQs and their characteristics.

2.1.1 Prosody

PQs in English (as well as in Czech) can be distinguished from statements based on their phonological composition (Quirk 1985, p. 807). In particular, it is the rise or fall-rise intonation pattern which is characteristic of Czech PQs.³ These two variants are said to be functionally

¹Some authors use the term “*yes/no* questions” which refers to the possible answer words. In Czech, they are usually called “*zjišťovací otázky*” (Grepel 1965).

²For Russian cf. Onoeva & Staňková's (to appear) corpus results, where particles were rather infrequent overall.

³Some Czech linguists use the term “*kadence*” (= “*cadence*”) for “*intonation pattern*” (Daneš 1957; Palková 1994).

equivalent, because there is little difference in their usage (e.g., they are not exclusive to some dialect) (Daneš et al. 1987, p. 323). For both of these patterns, it is typical that in Czech PQs there occurs one sudden rise in intonation, as opposed to other languages, where the rise is rather gradual. In the rise pattern, it is the last syllable that is intensified. In the fall-rise pattern, it is, on the other hand, the first syllable after the stressed syllable (Palková 1994). Daneš (1957) claims that the fall-rise pattern occurs only in at least three-syllables long units. Besides these two, Palková (1994) mentions a third, non-standard type, which is a rise-fall pattern. It is typical for the capital (Prague) and its surroundings.

Palková (1994) works with an additional phonological characteristic of Czech PQs which she calls the “concluding rising melodeme” (my translation).⁴ The term “melodeme” (akin to “phoneme” or “morpheme”) refers to a functional unit – it is an abstract melody schema which has been stabilized over some time and is connected to a specific sentence type. The “concluding rising melodeme” is the basic form of PQs.⁵ At the same time, it is sometimes the only means by which we differentiate between an assertion (*Přijedou.* = ‘They’ll come.’) from a question (*Přijedou?* = ‘Will they come?’), which is why it is phonological.

Czech root PQs with the particles *jestli*, *jestlipak* and *zdalipak* in the initial position are typically pronounced with a fall intonation pattern, which is characteristic for assertions (Grepl 1965). In these cases, the particle itself is enough to indicate the question-hood of the sentence, and the rise or fall-rise intonation is unnecessary.

Regardless of what the utterance consists of from the lexical and syntactic point of view, the specific intonation pattern suggests that a sentence is a PQ. Daneš (1957, p. 110) gives this example: a *wh*-question *Kdo to řekl?* (= ‘Who said it?’) pronounced with a rise intonation has to be interpreted as a PQ with the meaning ‘You are asking me who said it?’ (my translation).⁶ The intonation pattern guarantees that the addressee will understand the utterance as a PQ and that the speaker is asking about the whole proposition (whether it holds).

Even though prosody is an important part of PQs, I leave it aside for the rest of the paper, as it was not tested in the experiment. Instead, word order and its alternations are discussed in more detail.

2.1.2 Word order

In English, the primary and unmarked way of forming a PQ is by preposing the finite verb (auxiliary) to the first position in the sentence (= V1). The subject-auxiliary inversion in English is shown in example (2) on an S-Aux (“declarative”) and a Aux-S (“interrogative”) sentence. Note that “declarative” and “interrogative” are terms used to describe form (not meaning).

- (2) a. Peter has bought a car. declarative
 SBJ AUX V DET OBJ
 b. **Has** Peter bought a car? interrogative
 AUX SBJ V DET OBJ

In Czech, V1 questions are also considered as neutral and unmarked in (pragmatic) meaning (Křížková 1968; Štícha 1995a), and, according to Dryer (2013), word order is the main formal means to signal a PQ in Czech. Some authors suggest that word order is not a constitutive formal means of Czech PQs, at least not as indicative as intonation (Daneš et al. 1987; Grepl

⁴“melodém ukončující stoupavý”

⁵Daneš (1957, p. 48) uses his own term “antikadence” (= “anti-cadence”) synonymously to “concluding rising melodeme”.

⁶“Ty mně kladeš otázku, kdo to řekl?”

& Karlík 1998; Malá 2008; Dušková 2012). This is because in Czech, pronominal subjects are in most instances covert, and therefore questions and assertions can be formed by the same (declarative) word order. Just like in English, there are PQs with a declarative form in Czech (declarative PQs, for short). When the subject is overt and preceded by a finite verb, the sentence has to be interpreted as a question (Štícha 1995a).

In the next sections, I look closely at the V1 situation in Czech PQs and describe the syntactic processes behind it. I also address declarative PQs in more detail.

2.1.3 Verb movement

In Czech PQs, the finite verb is in the indicative or conditional mood, and since Czech has a relatively free word order, it can be spelled-out in different positions (Veselovská 1995; Grepl & Karlík 1998). What is characteristic of PQs with an overt non-pronominal subject is that the finite verb moves in front of it to the initial position (= V1). This is exemplified in (3-a) and (3-b), where the verb moves past the subject *Standa* and the clitic *si*.⁷

- (3) a. Přečetl si Standa ten dopis?
 read.PTCP REFL Standa DET letter
 ‘Has Standa read the letter?’
- b. Nepřečetl si Standa ten dopis?
 NEG.read.PTCP REFL Standa DET letter
 ‘Hasn’t Standa read the letter?’

In literature, there has been a debate about the exact nature of this type of verb movement. There are three main approaches with respect to which element in the structure is moving. The first one proposes that it is the verbal head which moves to another head position (“long head movement”; Rivero 1991). The second one claims that the verbal head moves to a specifier position (“Head-to-Spec”; Harizanov 2019). The third approach suggests that the whole verbal phrase, although incomplete, undergoes the movement (“remnant movement”; Migdalski 2006). I will describe and evaluate each of them trying to apply them on Czech material, and then provide my own analysis.

Long head movement According to Rivero (1991), V1 sentences are the result of long head movement (= LHM, for short). This mechanism involves the verbal head V which moves to the head position of C across an intervening auxiliary head Aux, as schematized in (4). Since Rivero talks about participle fronting, there is a Part head in the schema. The movement is represented by the trace t_i which is co-indexed with the participle.

- (4) [CP [C Part_i] [IP Aux [VP [V t_i] DP]]]

Rivero illustrates this on Bulgarian, in (5). In this Slavic language, it is possible for the verbal head *pročel* to move from its base position, shown in (5-a), to the C head position, shown in (5-b). Rivero argues that it is not a case of phrasal movement based on the ungrammaticality of (5-c), where the whole VP *pročel knigata* moves. Thus, only the participle *pročel* can be fronted.

⁷In the English translations, which are part of the examples, I use the syntactic form which was proposed for the respective bias profiles by (Büring & Gunlogson 2000; Sudo 2013; ao.).

- (5) a. Petur e **pročel** knigata.
Peter has read book-the
'Peter has read the book'
- b. **Pročel** e knigata Petur./**Pročel** e Petur knigata.
- c. *[**Pročel knigata**] Petur e. (Rivero 1991)

The same observations apply to Czech. In (6-b), the verb has moved from its base position to the initial one, and since the subject is non-pronominal, non-focused, and non-clause-final, the sentence should be interpreted as a PQ, solely based on its syntactic nature (i.e., not on the intonation pattern). Fronting of the whole VP, as in (6-c), is illicit.

- (6) a. Petr si **přečetl** knihu.
Peter REFL read.PTCP book
'Peter has read a book'
- b. **Přečetl** si Petr knihu?
- c. *[**Přečetl knihu**] si Petr.

The participle head *pročel* in (5-b) moves across the Aux head *e*, which goes against the theoretical presumption of Head Movement Constraint (= HMC). HMC states that a moving head X cannot skip a governing head position (Travis 1984). Rivero (1991, p. 326) claims that HMC is “descriptively inadequate” for LHM and that HMC should be abandoned.

Remnant movement Migdalski (2006) points out that there are multiple problems with the LHM theory. Firstly, LHM has been proposed only for main clauses, but according to others, this restriction does not hold (see the examples in Migdalski 2006, p. 64). Moreover, if it were the case that V moves to C, it should be possible to insert a subject to the specifier of I, although this leads to ungrammaticality, see (7).

- (7) *[_{CP} Pročel [_{IP} Petur [_{I'} e [... knigata]]]] (Migdalski 2006)

Therefore, Migdalski proposes to treat participle movement on a par with locative inversion (Hoekstra & Mulder 1990). It is based on the agreement of ϕ features (i.e., nominal features, in particular person, number, and possibly gender) on the subject and the participle. One of these elements raises to SpecTP, where it checks the ϕ features. The subject and the participle are in complementary distribution, because they compete for the same position in the structure where only one of them can raise. In (8), I show the movement schematically (taken from Migdalski 2006).

- (8) a. [_{TP} ... T_[+\phi] ... [_{Aux} BE [_{vP} subject_[+\phi] v [_{PartP} Part_[+\phi] object]]]]
- b. [_{TP} [_{PartP} Part t_k] [_T Aux_j [_{Aux} t_j [_{Agro} object_k [_{vP} subject_[+\phi] v [t_{PartP}]]]]]]]]

The base-generated stage is in (8-a). The subject and the participle are specified for ϕ features (indicated by $[\phi]$). The structure after the movement is in (8-b). The auxiliary moves to T in order to check Tense. The direct object must leave PartP and moves to SpecAgro. Once PartP contains only Part (and the object trace), it can raise to SpecTP across the other elements. Since the destination of the movement is a specifier position, it is an instance of phrasal movement. This way, the HMC is not violated. Since the Part head is the only “remnant” in PartP (after the object has moved out), the kind of movement entertained by Migdalski is the so-called “remnant movement” (Müller 1996).

Head-to-Spec An alternative point of view is presented by Harizanov (2019), who says that syntactic head movement is formally indistinguishable from phrasal movement, and that syntactic head movement can target specifier positions in the tree. The first claim builds on the idea that these two movements are both instances of feature valuation and that they differ in the features triggering the movement: for head movement the trigger is c-selection, while for phrasal movement it is Agree (see also Matushansky 2006).

The second claim is explained on Bulgarian participle fronting, where the participle precedes an auxiliary. Harizanov rejects that the verb moves only because of prosodic reasons to become a phonological support to the clitic, because some Bulgarian clitics can appear in sentence-initial positions. In Czech, clitics can also sometimes stand in the initial position, although this is limited to spoken language.

It is said that for the remnant movement it would have to be ensured that the VP/PartP-internal material, except for the verbal head, obligatorily moves out of it. This, however, does not happen in all cases, as is shown on the Bulgarian secondary predicate *pijana*, exemplified here in (9).

- (9) a. Bjaha **videli** Marija pijana.
 be.3P.PST seen Maria drunk
 ‘They had seen Maria drunk.’
 b. *Bjaha pijana **videli** Marija.
 c. **Videli** bjaha Marija pijana.
 d. *[**Videli**] Marija pijana bjaha.
 e. *[**Videli**] pijana bjaha Marija. (Harizanov 2019)

In (9-b) we can see that the secondary predicate cannot move to a VP/PartP-external position. The three variants in (9-c), (9-d) and (9-e) show that *pijana* stays in the final position, even though the participle *videli* is fronted and cannot move anywhere else. These are the main arguments for rejecting Migdalski (2006)’s theory.

In Bulgarian, the participle is able to skip not only one, but multiple auxiliaries, for which the HMC cannot hold. Since Harizanov understands participle movement as an instance of Internal Merge, and not as head movement per se, HMC does not apply to it. Finally, it is claimed that the Bulgarian participle-auxiliary sequence is not discourse neutral and that it indicates discourse effects. This does not apply to Czech, where this word order is perceived as unmarked.

My proposal For Czech, it has been proposed that the second position in a sentence is occupied by a clitic or a clitic cluster (Wackernagel 1892, 2020). I place these in the head C (see also Lenertová 2004). I further assume that in Czech PQs with an overt subject, only the verbal/participle head moves, not the whole (remnant) phrase, and that it moves from head to head position. Eventually, this means that the verb ends up in a head position, not specifier, above CP – for this purpose, I work with PolP.

When the subject is pronominal, it is often covert, which leads to V1 word order being frequent even in declaratives. In such cases, the sentence also contains an auxiliary, as exemplified in (10).

- (10) a. Koupila jsem si auto.
 buy.PTCP AUX REFL car
 ‘I bought a car’

- b. [CP [C Koupila_i jsem_j si] [AuxP [Aux t_j] [vP *pro* [v' t_i [VP t_i auto]]]]]

In (10-b), the covert pronominal subject is represented by *pro* and, just like the direct object *auto*, remains in situ. What moves is the auxiliary *jsem*, which adjoins to C, creating a clitic cluster.⁸ The verbal head *koupila* raises as a head across all the other elements and adjoins to C. Since it moves as a head, I assume that it cannot raise to SpecCP.

Verbal movement across an overt (non-focused/non-clause-final) non-pronominal subject gives rise to a question reading. In that case, there is no auxiliary in the structure, as in (11). I leave the analysis of the question semantics for later, now I focus only on the syntactic processes.

- (11) a. Koupil si Petr auto?
buy.PTCP REFL Petr car
'Did Petr buy a car?'
b. [PolP [Pol Koupil_i] [CP [C si] [TP Petr_k [T' t_i [AspP t_i [vP t_k [v' t_i [VP t_i auto]]]]]]]]]

In (11), the direct object *auto* again remains in situ. The subject raises to SpecTP and the verbal head to Pol. This analysis, similarly to the one of Rivero or Harizanov, violates the HMC. I suggest that this violation is only apparent. The clitics in C have already reached their final (aka "criterial") position and are therefore not candidates for moving further. The verb is then the closest head available for moving to Pol. PolP is employed especially because it is able to carry the negative feature which can, in turn, scope over the tensed predicate (De Clercq 2020). I make use of this in negative sentences like the one in (12), which is enriched by NegP lower in the structure. I discuss the syntax and semantics of negation in the following sections.

- (12) a. Nekoupil si Petr auto?
NEG.buy.PTCP REFL Petr car
'Didn't Petr buy a car?'
b. [PolP [Pol Nekoupil_i] [CP [C si] [TP Petr_k [T' t_i [AspP t_i [NegP t_i [vP t_k [v' t_i [VP t_i auto]]]]]]]]]

In all the three cases, (10), (11) and (12), the verb moves as a head only, and its final position is Pol inside PolP. SpecCP is left empty, as it cannot host a head. I use the just-explained mechanism in my analysis of negative PQs in Czech later in section 2.6. Now I turn to declarative PQs.

2.1.4 Declarative polar questions

Besides the V1 word order, Czech PQs can be realized as declarative sentences. They are distinguished from assertions by their rising intonation pattern (or a question mark in written text) (Grepl 1965). Two examples of declarative PQs are provided in (13), a positive and a negative declarative PQ.

- (13) a. Standa si přečetl ten dopis?
Standa REFL read.PTCP DET letter
'Standa has read the letter?'
b. Standa si nepřečetl ten dopis?
Standa REFL NEG.read.PTCP DET letter
'Standa hasn't read the letter?'

⁸I leave aside the issue of how the reflexive *si* has reached the C position.

Some authors do not comment on the difference between V1 and declarative PQs at all (e.g., Dušková 2012), but others claim that the declarative word order is associated with additional inferences called biases (Štícha 1995a). According to Gunlogson (2002), rising declaratives (i.e., declarative sentences with the rise intonation pattern) are subject to certain contextual restrictions, e.g., they cannot be used out of the blue (i.e., without preceding context). More specifically, these PQs give rise to the so-called evidential bias – the implication that there is contextual evidence that the prejacent is true (see section 2.3.2 for a more detailed discussion of evidential bias). The prejacent for (13-a) is ‘Standa has read the letter’ ($= p$), whereas for (13-b) it is ‘Standa has not read the letter’ ($= \neg p$).

The intonation of rising declaratives has been discussed and assigned specific meanings (e.g., Jeong 2018; Rudin 2022). After empirically testing them, Jeong distinguishes two types of rising declaratives: assertive and inquisitive rising declaratives. They differ in their intonational contours as well as in their discourse effects. Rudin associates the specific meaning of the intonation of inquisitive rising declaratives with the meaning of discourse particles in other languages than English. In the remainder of this paper, whenever I mention “declarative PQs”, I have inquisitive rising declaratives in mind.

In the following section, I describe how the meaning of PQs can be captured using formal semantic tools.

2.2 Semantics of PQs

The semantics of PQs has received considerable scholarly attention. In the following, I present some of the possible approaches to the meaning of questions, and PQs in particular. The propositional approach is highlighted and discussed in more detail because it is the one I work with in the upcoming chapters and in my proposal.

On the semantic level, the meaning of a question can be defined in terms of its possible answers (Hamblin 1973). On the pragmatic level, its meaning is that of an inquiry, since by asking a genuine question, the speaker is expressing their ignorance about some fact. Thus, a question works as a request for the addressee to give an answer. When a question is not genuine (i.e., it is biased), the speaker is not completely ignorant about what they are asking about. In this case, the speaker probably has some previous knowledge or has just learned about the topic during the conversation, so they are expressing surprise at the current revelation. Biased PQs are characterized in detail in section 2.3.

As opposed to assertions, questions are informationally incomplete. Moreover, it is impossible to determine the conditions under which a question is true (its truth-conditions), since questions cannot be judged true or false. This has caused trouble to the truth-conditional semantics approaches to language meaning. One way of analyzing question semantics is called the propositional approach.⁹

Research under the propositional view shares one general idea which is that a question denotes a set of answers. More precisely, the set consists of propositions which correspond to the answers (Hamblin 1973; Karttunen 1977; Groenendijk & Stokhof 1984a). For a PQ, the two answers are ‘yes’ and ‘no’, which correspond to the propositions p and $\neg p$, respectively. However, we can easily imagine a PQ answered by a different lexical material, as in B’s answer in (14), which entails ‘yes’. Speaker A is asking for a lighter (he probably wants to light up a cigarette) and addressee B offers him a candle. She does not answer with ‘yes’, but with a

⁹Other theories could be subsumed under the labels “embedding approaches” (Lewis 1970; Boër 1978) and “categorical approaches” (Von Stechow & Ede Zimmermann 1984). This classification is taken from Groenendijk & Stokhof (1984b).

proposition that entails ‘yes’.¹⁰

(14) A: máš voheň?
 have.PRS fire
 ‘Do you have a lighter?’

B: tady máš svíčku
 here have.PRS candle
 ‘Here’s a candle.’

(Kopřivová et al. 2020; henceforth *ORTOFON v2*)

According to Hamblin (1973), the set of answers to a PQ contains all possible answers, regardless of their being true or false. A different view was presented by Karttunen (1977), who claimed that the set contains all true answers, which are only weakly exhaustive. He investigated mainly PQs in the form of embedded interrogatives, not root PQs.

For Groenendijk & Stokhof (1984a), the set contains all exhaustive answers. They work with the concept partition, saying that a question denotes a partition of the set of possible worlds, which corresponds to the set of possible complete answers. It holds that a partition π of a set P consists of non-empty subsets of P . The union of those subsets equals P and the intersection of any two (non-equivalent) subsets is empty. In (15), I give a formal definition of a partition presented by Groenendijk & Stokhof (1984b, p. 214).¹¹

(15) π is a partition of P iff

$$\begin{aligned} \forall x \in \pi : x \neq \emptyset \\ \cup(x \in \pi) = P \\ \forall x, y [y \in \pi : x \cap y = \emptyset \vee x = y] \end{aligned}$$

The fact that a PQ denotes a set of answers can be formally captured by the so-called Q -morpheme, which is an element that occurs at the top of a question’s semantic structure. I adopt its denotation from Romero & Han (2004) (who in turn follow Groenendijk & Stokhof 1984b) and exemplify it in (16). The Q -morpheme takes a proposition as its argument and returns a partition of the set of worlds (relative to the evaluation world w) such that the worlds are either compatible with p or with $\neg p$.

(16) $\llbracket Q \rrbracket = \lambda p_{\langle s,t \rangle} \lambda w_s \lambda q_{\langle s,t \rangle} [q = p \vee q = \neg p]$

A member of a partition is called a cell. For PQs, the partition consists of two cells: one of them is p (or entails p) and the other is $\neg p$ (or entails $\neg p$), as illustrated in (17-c) and (17-d) for a positive PQ. It should be noticed that, opposed to Karttunen (1977), exhaustive answers are included in the partition. Even though one of the propositions in π is false, it is still a member of the set of possible answers.

(17) a. Does John smoke? positive PQ
 b. $\llbracket \text{John smokes} \rrbracket = \lambda w. \text{smokes}(j, w)$
 c. $\llbracket Q \text{ John smokes} \rrbracket(w_0)$
 $= \lambda q [q = \lambda w. \text{smokes}(j, w) \vee q = \lambda w. \neg \text{smokes}(j, w)]$
 $= \{\text{smokes}(\text{John}), \neg \text{smoke}(\text{John})\} = \pi$
 d. $\pi = \{\llbracket \text{John smokes} \rrbracket, \llbracket \text{John doesn't smoke} \rrbracket\}$

According to these theories, the same partition is applied to positive and negative PQs, at

¹⁰Due to limited space, I do not discuss the topic of answers to PQs in much detail.

¹¹In their paper, they use A instead of my π , and A instead of my P . I modified the definition for it to be legible.

least in English. The partition π in (18-d), as a result of the computations under (18-c), is the same as in (17-d).¹²

- (18) a. Does John not smoke? negative PQ
 b. $\llbracket \text{not } [\text{John smokes}] \rrbracket = \lambda w. \neg \text{smokes}(j, w)$
 c. $\llbracket Q \text{ John does not smoke} \rrbracket(w_0)$
 $= \lambda q [q = \lambda w. \neg \text{smokes}(j, w) \vee q = \lambda w. \neg \neg \text{smokes}(j, w)]$
 $= \{ \neg \text{smokes}(\text{John}), \text{smokes}(\text{John}) \} = \pi$
 d. $\pi = \{ \llbracket \text{John doesn't smoke} \rrbracket, \llbracket \text{John smokes} \rrbracket \}$

There have been abundant comments on the semantic nature of PQs as well as on their pragmatic meaning. For example, Rooy & Safarova (2003) agree with the above-mentioned semantic analysis using partitions, but they argue that there is a difference between positive and negative PQs, namely on the level of pragmatics. They claim that positive PQ bias the addressee for positive answers, and, conversely, negative PQs bias negative answers.

A slightly different approach is represented by Roelofsen & Farkas (2015). They look at the dynamic potential of PQs and how their meaning influences context. The denoted set of propositions stays the same, but the PQs highlight different propositions. A positive PQ highlights p and a negative PQ highlights $\neg p$. Those propositions which are highlighted are easier to access for anaphoric reference in the upcoming discourse. It seems clear that positive and negative PQs are not felt to be equal in meaning, especially in their pragmatic meaning. This leads us to the topic of biased PQs, which are addressed in more detail in the next section.

2.3 Bias

As was stated above, a genuine question seeks some kind of information. The communicative goal of the speaker is to get the missing piece of information from an addressee. By asking a PQ, the speaker expresses their uncertainty about the truth of p or $\neg p$. If a PQ is biased, then the speaker is not only asking about the propositional content, but conveys additional pragmatic meanings.

Bias could be defined as a “non-truth-conditional aspect of question meaning” (Sudo 2013). This means that PQs convey more than only the $\{p, \neg p\}$ partition. The extra meanings have been extensively studied, theoretically as well as experimentally, (see e.g., Buring & Gunlogson 2000; Rooy & Safarova 2003; Roelofsen & Farkas 2015; Tian et al. 2021). There exists more than one classification of biases, and researchers then refer to one of them or they do not explicitly work with classes of bias. For example, Malá (2008) discusses her data in relation to the classification by Huddleston & Pullum (2002), who in turn distinguish between deontic and epistemic bias. In my study, I build on previous work by Buring & Gunlogson (2000), followed by Sudo (2013), who identifies two main types of bias: epistemic and evidential. These are based on their source, i.e., for what reasons the PQ is biased. The source for the former is the speaker themselves, particularly their inner assumptions, desires and hopes (epistemic). The source for the latter is contextual evidence which is mutually available to all discourse participants (evidential).

Depending on what bias a PQ carries, we can compose its bias profile (Gärtner & Gyuris 2017). Based on this assumption, some authors, for instance, Repp & Geist (to appear), claim that every PQ is biased in one way or another, and that genuine, unbiased PQs do not exist. We should also keep in mind that bias profiles of PQs differ cross-linguistically, as shown by

¹²For negation I assume this semantics: $\llbracket \text{not} \rrbracket = \lambda p. \lambda w. \neg p(w)$.

e.g., Sudo (2013). This opinion is also supported by my experimental investigation. In the following, I look at each of the biases closely and exemplify them. Finally, the idea of bias profiles is described in more detail.

2.3.1 Epistemic bias

A PQ carries epistemic bias if its speaker implies that they have some beliefs about what the answer will be. If the speaker believes in the positive answer, we say that the PQ carries positive epistemic bias. If the speaker believes in the negative answer, we say that the PQ carries negative epistemic bias (Sudo 2013).

This type of bias subsumes not only the speaker's beliefs or previous knowledge about p or $\neg p$, but also their deontic expectations about the answer, which are based on some norms or rules, and bouletic expectations, which derive from what the speaker desires or hopes. All of these beliefs/expectations are private and speaker-internal, so the other participants of the discourse do not know about them, unless they are hinted at formally or are recoverable from the context. Whenever a speaker conveys some of these meanings by asking a PQ, we say that the PQ carries an epistemic bias. I exemplify positive epistemic bias based on speaker's prior belief in (19), negative epistemic bias based on speaker's knowledge in (20), and positive epistemic bias based on speaker's hope/desire in (21).

(19) scenario: *John and Mary are colleagues from work, and they talk about their mutual friend Alice getting engaged. John believes (but is not 100% sure) **that Alice got engaged on Saturday** (= p).*

Mary: Have you heard about Alice?

John: Oh, did she get engaged on Saturday? positive epistemic bias

(20) scenario: *Alice is a high school geography teacher. She knows **that Slovakia is not a kingdom** (= $\neg p$). John is her student.*

John: I've heard about the coronation in Slovakia.

Alice: Well, is Slovakia a kingdom? negative epistemic bias

(21) scenario: *Mary needs to sign a contract, but she does not have a pen on her at the moment. She hopes **that John has a pen** (= p).*

Mary: John, you have a pen, right? positive epistemic bias

If the speaker has no previous assumptions about the answer and they remain agnostic about it, we say that the PQ does not carry epistemic bias (cf. Gärtner & Gyuris 2017, who say that in such cases, the epistemic bias is neutral, which leads to the assumption that every PQ is biased).

2.3.2 Evidential bias

The other type of bias is called evidential because it stems from the evidence in the current conversational situation which makes the speaker expect a certain answer (Sudo 2013). The evidence is mutually available to both the speaker and the addressee(s), so it is not private, but shared among them. Moreover, it should be relatively new and not part of the previously established common ground. (Büring & Gunlogson 2000, p. 7) stress that the contextual evidence has to be compelling, which means that, if "considered in isolation, it would allow

the participants to assume p (i.e., the evidence could reasonably be considered to justify the inference *that p*)”.¹³ They give the following example (22):

- (22) 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.*

S: Is Carl left-handed?

(Büring & Gunlogson 2000)

The compelling evidence in this context is that Carl is cutting with his left hand, i.e., he is left-handed, but A and S have expected the opposite, which gives S space to express doubts about the evidence. The PQ in (22) carries positive evidential bias, since there is contextual evidence for the positive answer ‘yes’ (= that Carl is left-handed). A PQ with negative evidential bias is shown in (23).

- (23) scenario: *John always carries a pen in his backpack.*

John: Could you lend me a pen, Mary?

Mary: You don’t have a pen?

negative evidential bias

The contextual evidence in (22) comes from what the participants perceive in their surroundings, but it can also appear in the form of an utterance, as in (23). The speaker then reacts by posing a question, probably because they believed otherwise. In (23), Mary infers from John’s request that he does not have a pen at the moment (= $\neg p$), which clashes with her previous beliefs. In my experiment, I manipulated evidential bias in the form of an utterance by the addressee.

Finally, it should be mentioned that PQs can appear in contexts with neutral contextual evidence (i.e., contexts which do not imply p nor $\neg p$). This specifically applies to positive and outer negation PQs, which I describe in section 2.4.

2.3.3 Bias profile

Based on the combinations of biases that PQs are able to carry, we can construct the so-called bias profiles. Gärtner & Gyuris (2017) investigate the possible combinations and stress that these vary depending on the language. For instance, bias profiles have been proposed for English and Japanese (Sudo 2013), while my study focuses on Czech. In (24), I repeat the bias profile for English positive PQs (= “PPQ”), inner negation PQs (= “IN-NPQ”) and outer negation PQs (= “ON-NPQ”). These two types of negation are discussed in more detail in section 2.4. The kind of bias is written in superscript (“^{ev}” for evidential bias and “^{ep}” for epistemic bias). Whether it is positive, negative, or neutral is symbolized by “+”, “-” or “%”, respectively.

- (24) English PQs

a. PPQ: $\langle \{+^{\text{ev}}, \%^{\text{ev}}\}, \{+^{\text{ep}}, -^{\text{ep}}, \%^{\text{ep}}\} \rangle$

b. IN-NPQ: $\langle \{-^{\text{ev}}\}, \{+^{\text{ep}}\} \rangle$

c. ON-NPQ: $\langle \{-^{\text{ev}}, \%^{\text{ev}}\}, \{+^{\text{ep}}\} \rangle$

(Gärtner & Gyuris 2017)

The bias profile tells us under what conditions the particular type of PQ is licensed. This is why the information stated in the profile can be treated as restrictions on the usage of PQs. For instance, we have already seen above that English positive PQs can carry all variants of

¹³Or, in the case of negative evidence, the inference would be *that $\neg p$* .

the epistemic bias – positive in (19), negative in (20), and neutral. But, according to the profile, their evidential bias needs to be either positive, or neutral (i.e., it cannot be negative). As for the negative PQs, I discuss them more in the next section.

There are reasons to assume that for Czech the bias profiles would look a little different, especially because of different syntactic rules governing word order and negation in PQs. Also, as it is a Slavic language, it is expected to behave differently from English or Japanese. Based on the results from my experiments, I make claims about the bias profiles of Czech PQs, particularly about their evidential bias. The next section discusses polarity of PQs, primarily its semantic/pragmatic implications.

2.4 Polarity

Polarity of PQs has been the center of scientific attention because using a positive vs. negative PQ leads to interesting semantic/pragmatic effects (see e.g., Ladd 1981; Büring & Gunlogson 2000; Romero & Han 2004; ao.). Importantly, it is not only the difference between positive and negative PQs, that has been discussed by researchers, but also the differences among negative PQs themselves.

In English PQs, the syntactic position of negation can be either low (following the subject), as in (25-a), or high (preceding the subject), as in (25-b). The English negative marker is a head on its own (and moves on its own), unlike in Czech, where it is fixed on a verb in the form of the prefix *ne*.

- | | | |
|------|--|---------------|
| (25) | a. Is John not cooking a Mexican dish? | low negation |
| | b. Isn't John cooking a Mexican dish? | high negation |

It has been noticed that the syntactic position of negation in PQs is associated with a certain interpretation (AnderBois 2019; Goodhue 2022). Low negation correlates with inner (= semantic) negation, whereas high negation correlates with outer (= pleonastic) negation. Thus, the terms low and high are related to syntax, but inner and outer are terms describing meaning. Since my main experiment focuses on the behavior of negative PQs, I first compare positive and negative PQs. Then I explain the difference between inner and outer negation in more detail. I also comment on the VERUM/FALSUM theory by Romero & Han (2004) and Repp (2013), which is a way of coping with negative PQs formally.

2.4.1 Positive vs. negative

In English, positive PQs can be unbiased and simply express the desire of the speaker to fill the information gap in their epistemic state. This is evident from their bias profile in (24), where they are assigned a “%” (= “neutral”) for evidential as well as for epistemic bias.

The same applies to Czech, where positive PQs are considered to be the unmarked variant of posing a PQ, especially in combination with the interrogative word order (V1) (Štícha 1984; Běličová 1989).¹⁴ Such PQs are perfectly fine to be uttered in situations where the speaker has no prior beliefs (or knowledge, desire etc.) and there is no compelling evidence for or against one of the possible answers in the current conversation.

However, when comparing positive and negative PQs, some authors claim that in Czech there is no difference between these two variants (Grepl 1965; Šmilauer 1969; Daneš et al. 1987; Dušková 2012). They say that the two options are mutually interchangeable, since their

¹⁴Here, I use “unmarked” with respect to expressing bias.

meaning can be captured by their possible answers – and those are ‘yes’ and ‘no’ in both cases (see section 2.2, examples (17) and (18) in particular).

The opposite approach is represented by the work of Štícha (1984, 1995a,b); Běličová (1989); Malá (2008); Kopecký (2010); ao. These accounts state that positive and negative PQs are not equal and provide various classifications of PQs based on their usage conditions and biases. For example, Běličová (1989) says that positive PQs are semantically simple, whereas negative PQs can carry additional implications. In (26-a), the speaker expresses something along the lines of “(you) understand that I expect not $\neg p$ ” (my translation).¹⁵ In other words, the PQ carries a positive epistemic bias. It could be substituted by a positive PQ, such as in (26-b), but the additional meanings would disappear.

- (26) a. Nedíval ses včera na televizi?
 NEG.watch.PTCP AUX yesterday on television
 ‘Didn’t you watch TV yesterday?’
 b. Díval ses včera na televizi?
 watch.PTCP AUX yesterday on television
 ‘Did you watch TV yesterday?’

Another secondary meaning, that can be conveyed by Czech negative PQs, is characterized by Běličová (1989) as “(you) understand that I hope that $\neg p$ ” (my translation).¹⁶ This is exemplified in (27), which carries negative epistemic bias, since the speaker hopes that the addressee is not hungry. Again, its positive counterpart would lack this implication.

- (27) Nemáš hlad?
 NEG.have.PRS hunger
 ‘Are you hungry?’

In literature, it is stressed that what determines the polarity of a Czech PQ is largely its context (Štícha 1984; Běličová 1989; Kopecký 2010). When the speaker uses a negative PQ, they might convey evidential bias. Whether this bias is positive or negative (or there is none/it is neutral) depends on the type of negation (inner vs. outer) in the PQ. I discuss inner negation first.

2.4.2 Inner negation

This type of negation is also sometimes called “semantic” or “propositional”. This is because it triggers the semantic operator \neg , which enables the computation of negation on the semantic level. Importantly, when this type of negation occurs in assertions, it operates on the proposition itself. I provide a formal denotation of inner negation in an assertion in (28).

- (28) $\llbracket \text{John didn't come} \rrbracket = \llbracket \text{not}[\text{John came}] \rrbracket = \lambda w. \neg \text{came}(\text{John}, w)$

In PQs, inner negation retains its semantics and is interpreted, which is apparent from the partition of an inner negation PQ in (18), repeated here as (29).

- (29) a. Does John not smoke? negative PQ
 b. $\llbracket \text{not}[\text{John smokes}] \rrbracket = \lambda w. \neg \text{smokes}(j, w)$
 c. $\llbracket Q \text{ John does not smoke} \rrbracket(w_0)$
 $= \lambda q[q = \lambda w. \neg \text{smokes}(j, w) \vee q = \lambda w. \neg \neg \text{smokes}(j, w)]$
 $= \{ \neg \text{smokes}(\text{John}), \text{smokes}(\text{John}) \} = \pi$

¹⁵“chápeš, že (spíše) předpokládám nikoli ne”

¹⁶“chápeš, že doufám, že ne”

- d. $\pi = \{\llbracket \text{John smokes} \rrbracket, \llbracket \text{John doesn't smoke} \rrbracket\}$

Let us now turn the attention to how negation works in Czech. According to Zeijlstra (2004), Czech is a negative concord language. He defines negative concord as “two or more negative elements yielding one semantic negation” (p. 61). More specifically, Czech is claimed to be a strict negative concord language. This means that indefinites like *žádný* ‘no.DET.NCI’, *nikdo* ‘nobody.NCI’, *nic* ‘nothing.NCI’ etc. have to be accompanied by a negative marker – the *ne* prefix on the verb. Similarly to other Slavic languages, the Czech prefix *ne* is only a weak negative marker, which needs to be governed by an abstract negative operator higher in the clause. The abstract operator carries the [iNeg] feature (= interpretable negation), whereas the verb and indefinites like *žádný* carry the [uNeg] feature (= uninterpretable negation). The operator c-commands the elements carrying [uNeg] and scopes over the whole proposition. When it comes to feature checking, the [uNeg] features are eliminated thanks to (multiple) Agree and they do not contribute negative meaning to the LF. Multiple Agree is a relation between the negative operator \neg and all the potential elements carrying [uNeg]. Since indefinites like *žádný* participate in negative concord, they are called negative concord items (= NCIs).

It is proposed that the preverbal negative marker moves in the structure along with the verb, and [uNeg] moves with it. The negative operator \neg is placed in the specifier of Neg. For Czech, the position of NegP has been determined to be between TP and AspP (see Kosta 2001 or the discussion in Biskup 2017). The extended verbal projection is given in (30).

- (30) $[_{CP} C [_{TP} T [_{NegP} Neg [_{AspP} Asp [_{vP} v [_{VP} V]]]]]]$ (Biskup 2017)

Based on these assumptions, I take NCIs to be indicators of inner negation. This is supported by Penka (2011), who says that the function of NCIs is to mark the presence of a covert negative operator. So, whenever a Czech negative PQ contains an NCI, it is considered to carry inner negation, which has consequences for its interpretation. According to Ladd (1981), these PQs suggest that the answer is $\neg p$. Sudo (2013) claims that (English) PQs require negative evidential bias, i.e., they would be infelicitous in neutral and positively biased contexts. Moreover, they also convey positive epistemic bias – the speaker had some previous belief *that p*. It is the conflict between the positive epistemic bias and the negative evidence which prompts the speaker to ask the question.

Kopecký (2010) puts forward a hypothesis that whenever the finite negative verb of a PQ is focused (in the sense of topic-focus relation) and is placed in the intonational centre, we can assume that the negation is inner (cf. Meyer 2017 for further discussion). Some of Kopecký’s examples are provided in (31).

- (31) a. NEMLUVIL jsi o tom s Petrem?
 NEG.speak.PTCP AUX about it with Petr
 ‘Haven’t you spoken about it with Petr?’
 b. Ty jsi o tom {NEMLUVIL} s Petrem {NEMLUVIL}?
 you AUX about it NEG.speak.PTCP with Petr NEG.speak.PTCP
 ‘You haven’t spoken about it with Petr?’

Apart from inner negation, PQs can also contain outer negation, which I describe next.

2.4.3 Outer negation

This type of negation is sometimes also called “pleonastic” or “expletive”. These terms make it clear that its interpretation is different from inner negation. The most general definition of it would be: “a negative item which lexically contributes to negation does not modify the truth value of the proposition in which it occurs” (Espinal 2000). Researchers say that this phenomenon appears not only in PQs, but also in *wh*-exclamatives, *before*-clauses, in clauses depending on negatively connotated predicates (*doubt*), and predicates that express emotive attitudes (e.g., *fear* or *hope*).

Espinal (2000) focuses on outer (in her work dubbed “expletive”) negation and negative concord and analyzes them in a similar fashion. For both of them she proposes a feature-checking mechanism – the negative feature F_{neg} resides in the head of NegP and for expletive negation it is licensed by a higher non-veridical operator.¹⁷

A different approach is presented by Greco (2019), who distinguishes between weak and strong expletive negation environments based on their ability to license weak or strong negative polarity items (= NPIs). Greco’s ideas are further developed by Delfitto et al. (2019). These authors claim that expletive negation is irrelevant for the truth-conditional meaning, but keeps its logical mechanism of value reversal, which is applied on the level of implicatures. If a speaker utters *p* which implies *q*, then expletive negation reverses the value of *q* to $\neg q$.

Another attempt to capture expletive negation and its various syntactic positions is by Halm & Huszár (2021). They analyze Hungarian exclamatives and propose that expletive negation occurs in a structurally different position to inner (= semantic) negation, and that expletive negation itself can occur in different positions depending on the type of the sentence.

Outer negation in PQs also received considerable attention (Ladd 1981; Romero & Han 2004; Repp 2013; Sudo 2013; etc.). It has been noticed that, unlike inner negation, it licenses positive polarity items (= PPIs). For Czech, those would be, for example, indefinites like *nějaký* ‘some.DET.PPI’ or *něco* ‘something.PPI’. English outer negation PQs are said to carry positive epistemic bias (Sudo 2013), so by uttering them the speaker is suggesting a strong inclination towards the positive answer. This is also possible in Czech, see example (26-a). As for evidential bias, English outer negation PQs require either negatively biased context or a neutral one (Sudo 2013). I attempt to explore evidential bias of Czech outer negation PQs in the present paper (main experiment and filler experiment 1).

Kopecký (2010) claims that when some other sentence element than the finite verb is focused, then the negative PQ can contain a PPI. He calls PQs like the one in (32) “fear questions” (my translation).¹⁸ The speaker of such a PQ expresses that they fear *p* and that they would prefer $\neg p$ as an answer.

- (32) Neujede nám v Brně PŘÍPOJ?
NEG.go.PRS we in Brno connection
‘Aren’t we going to miss our connection in Brno?’

In the next subsection, the VERUM/FALSUM theory is presented. It is one of the key parts of my syntactic and semantic proposals about negated PQs.

¹⁷See Dočekal (2017) on the topic of veridicality.

¹⁸“obavové otázky”

2.4.4 VERUM/FALSUM

Another approach of analyzing negation in PQs, which I have not discussed yet, is the VERUM/FALSUM one (Romero & Han 2004; Repp 2013). It is a way of analyzing and theoretically grasping the difference between inner and outer negation in PQs.

VERUM (Romero & Han 2004) The theory originates from the idea of Verum Focus (Höhle 1992). In here, the VERUM operator (although undefined) occurs in declarative sentences when there is focal phonological stress on polarity elements. It is used to emphasize the truth or falsity of a given proposition which is formally captured in (33).

(33) $[[\text{VERUM}(p)]] = \text{'It is true that } p\text{'}$

Romero & Han (2004) adopt the operator in their attempt to analyze negative PQs and call it “epistemic”, since in PQs, VERUM triggers the existence of an epistemic implicature. They say that the operator arises in PQs because of the English word *really*, polarity focus (in the sense of Höhle 1992), or preposed negation (i.e., negative interrogatives). The authors notice that English PQs like the one in (34-a) are ambiguous when uttered this way.¹⁹

- (34) a. Isn't Jane coming?
 b. scenario: *Pat and Jane are two phonologists who are supposed to be speaking in our workshop on optimality and acquisition.*
 c. A: Ok, now that Stephan has come, we are all here. Let's go!
 S: Isn't Jane coming too?
 d. A: Pat is not coming. So we don't have any phonologists in the program.
 S: Isn't Jane coming either?

When we add the context from (34-b), and, crucially, a PPI *too* (34-c) or an NPI *either* (34-d), we can distinguish between the outer and inner negation readings, respectively. In order to analyze the meaning of these PQs, the authors use the VERUM operator in combination with the negative operator. Their formal definition of VERUM is given in (35).

(35) $\lambda p \lambda w \forall w' \in \text{Epi}_x(w) [\forall w'' \in \text{Conv}_x(w') [p \in \text{CG}_{w''}]]$

VERUM asserts that “the speaker is *certain* that *p should be added to the Common Ground (CG)*” (italics original). The authors clarify the formula this way: “ $\text{Epi}_x(w)$ is the set of worlds that conform to x 's knowledge in w , $\text{Conv}_x(w')$ is the set of worlds where all the conversational goals of x in w' are fulfilled (e.g., attain maximal information while preserving truth) and where $\text{CG}_{w''}$ is the Common Ground or set of propositions that the speakers assume in w'' to be true” (Romero & Han 2004, p. 627).

For the variant in (34-c) they claim that outer negation scopes over VERUM. In (36), there is its formal structure and the resulting partition π . Outer negation PQs double-check the positive proposition p .

- (36) a. $[\text{CP } Q \text{ not } [\text{VERUM } [\text{IP } \text{Jane is coming too}]]]$
 b. $\pi = \{\text{"it is not for sure that we should add to CG that Jane is coming"}, \text{"it is for sure that we should add to CG that Jane is coming"}\}$

¹⁹I intentionally leave out the possibility to utter *Is Jane not coming?*, which in English signals inner negation. In Czech, there is no counterpart to this, as the negative marker is a prefix on the verb which cannot move on its own in the structure (unlike the English *not*).

The inner negation PQ from (34-d) is formally rewritten in (37-a). Here, *VERUM* scopes over negation. The corresponding partition is in (37-b). Notice the difference in the positions of negation from the outer negation case. Inner negation PQs are said to double-check $\neg p$.

- (37) a. $[_{CP} Q \text{ VERUM } [_{\text{not}} [_{IP} \text{Jane is coming}] \text{ either}]]]$
 b. $\pi = \{\text{“it is for sure that we should add to CG that Jane is not coming”}, \text{“it is not for sure that we should add to CG that Jane is not coming”}\}$

FALSUM (Repp 2006 et seq.) In a series of articles, Repp has proposed another operator called *FALSUM* (Repp 2006, 2009, 2013). It is claimed to be a “common-ground managing operator”, which means that it indicates the status of a proposition relative to CG. It informs about the proposition’s newness, about the interlocutors’ current stances towards the proposition (e.g., their surprise) and about how the CG should develop in the future (should the proposition be added to CG or rather removed?) (Repp 2013). When there is no CG-managing operator, the default is assigned, i.e., the proposition is new for the interlocutors, it is suggested to be added to CG and the speaker takes it to be true. The structural position of such an operator is given in (38). For PQs, the illocutionary operator would be the *Q*-morpheme.

- (38) $[_{\text{ForceP}} \text{illocutionary operator } [_{\text{StrengthP}} \text{CG-managing operator } [_{\text{proposition } p}]]]]$

Repp says that there are (at least) three realizations of a CG-managing operator: (i) modal particles, (ii) conversational epistemic operators like *VERUM*, (iii) illocutionary negation (*FALSUM*). Unlike Romero & Han (2004), Repp suggests that outer negation is an operator itself, located in StrengthP right under ForceP. By placing it syntactically higher in the tree, it is implied that outer negation is distinct from inner negation. Its definition is in (39).

- (39) $\lambda p \lambda w \forall w' \in \text{Epi}_x(w) [\forall w'' \in \text{Conv}_x(w') [p \notin \text{CG}_{w''}]]]$

The meaning of *FALSUM* is then linked to the Speech Act theory by saying that “*FALSUM* expresses that there are zero degrees of strength for sincerely adding a proposition to the CG” (Repp 2013, p. 9).²⁰ This means that the degree of strength for adding the proposition to CG is so low that it should not be added at all, which could be roughly translated as “don’t add *p* to CG/remove *p* from CG”. When used in PQs, the speaker expects the addressee to determine whether or not there are zero degrees of strength for adding *p* to CG (because outer negation PQs primarily double-check *p*). From this point of view, *VERUM* can be understood as a counterpart to *FALSUM* by expressing high degree of strength – see the informal definitions in (40), which are taken from Repp (2006).

- (40) a. $[[\text{VERUM } p]] = \text{high degree of strength for adding } p \text{ to the common ground}$
 b. $[[\text{FALSUM } p]] = \text{zero degrees of strength for adding } p \text{ to the common ground}$

Apart from the definition in (39), *FALSUM* is associated with certain discourse conditions. These include: (i) speaker expresses prior positive epistemic bias, (ii) the immediately preceding context does not entail *p* (Repp 2013). We have already encountered both of them when discussing English outer negation PQs and their biases (Büring & Gunlogson 2000; Sudo 2013).

We have seen that the polarity of a PQ plays an important role when looking at its semantic and pragmatic meaning. Not only are there differences between positive and negative PQs,

²⁰Degrees of strength were first suggested by Vanderveken (1990), where *zero degrees of strength* is taken to be the neutral point on a scale. In Repp’s work, *zero degrees of strength* refers to the lower boundary of degrees of strength.

but there are also differences between the two types of negation: inner and outer. They are said to carry different combinations of epistemic and evidential bias, and they differ in their ability to license NCIs (or NPis) and PPIs. There has been a variety of accounts that tried to capture these, out of which I described the VERUM/FALSUM approach in more detail, as I use these operators in my proposal in section 2.6. Besides negation, another indicator of bias in Czech PQs are question particles. I focus on them in the upcoming section.

2.5 Particles

Even though particles are not the main formal strategy of constructing Czech PQs, there exist a few of them that are closely tied with questions and their semantics. According to Daneš et al. (1987, p. 324), particles in PQs signal a “vague tone of expectation” on the part of the speaker, usually conveying fear or hope. They mention *snad*, *náhodou* and *třeba*. In my study, I observe the behavior of the first two and add *co(ž)pak* and *přece*. Sudo (2013, p. 15) says that “a question particle is void of truth-conditional import, but operates on a non-truth-conditional dimension of the meaning”. I expect that the individual particles are associated with certain types of biases, which the speaker of the PQ wants to communicate to the addressee. In the next sections, I describe each of the chosen particles in detail.

2.5.1 *Co(ž)pak*

Copak is a particle strongly connected to the PQ environment. Its variant *cožpak* is equal to it in function, but it is felt to be archaic (see entry *copak II* in ASSČ 2017–2013).²¹ This claim agrees with frequency data from the SyD application of the Czech National Corpus (Cvrček & Vondříčka 2011), which combines data from written (SYN2010) as well as spoken corpora (Oral2006, Oral2008, Oral2013). From the total number of occurrences of these two variants, *copak* is used in 90% of the cases. Based on these results I have decided to focus only on *copak* in the experiments because I assume that native speakers will perceive it as more natural.

Syntactically, the position of *copak* in a sentence is always initial (though cf. Nekula’s 1996 examples on p. 60). This blocks the finite verb’s movement to the pre-clitic position, so *copak* PQs are always non-V1. I exemplify this constraint in (41).

- (41) a. **Copak** Petr hraje na kytaru?
 COPAK Petr play.PRS on guitar
 ‘Petr plays the guitar?’
 b. Hraje **{copak}** Petr **{copak}** na kytaru **{copak}**?

Previous research noticed that *copak* PQs are consistently used in situations where the speaker has a previous belief/knowledge about the truth of *p* while being presented with a contrasting piece of information at the present moment (Štícha 1995b; Nekula 1996; Malá 2008; Šebestová & Malá 2016). Through these PQs, the speaker expresses their reproach, surprise or objection which they feel with regard to the present evidence. Grepl & Karlík (1998, p. 462) call these “false polar questions” (my translation), because they might be interrogative in form, but their function is not that of a question.²² The fact that *copak* is used to express emotions and the speaker’s evaluation was claimed also by others (Trávníček 1951; Komárek et al. 1986).

²¹*Copak* can be segmented into *co-pak* and it translates as ‘what-then’. The meaning is not compositional, however. The morpheme *ž* has no consistent function, but appears, for instance, in *což* ‘what/which’ used as a relative pronoun in particular types of relative clauses.

²²“nepravé zjišťovací otázky”

It is interesting to see how *copak* interacts with polarity. When a *copak* PQ expresses an objection, speaker's previous belief/knowledge about *p* is of the opposite polarity than that of the PQ. In (42), the polarity of the PQ is negative, but the speaker believes/knows that *p* (which is of positive polarity). We can say that the PQ conveys positive epistemic bias (see section 2.3.1 for a definition).

- (42) **Copak** jsem to neřikal? objection
 COPAK AUX it NEG.say.PTCP
 'Haven't I said it?' (Grepl & Karlík 1998)

In *copak* PQs expressing surprise, the bias profile is more diverse. When the PQ is positive, like in (43), the speaker was convinced that $\neg p$ holds, but now they are faced with evidence that suggests that *p* holds. In this case, the polarity of the PQ corresponds with the polarity of the evidential bias (positive), while epistemic bias is negative.

- (43) **Copak** Petr promoval? surprise
 COPAK Petr graduate.PTCP
 'Petr has graduated?' (Grepl & Karlík 1998)

In (44), we can see a negative *copak* PQ. Again, it communicates surprise, but this time the speaker believes/knows that *p* holds (positive epistemic bias), while being confronted with negative evidence (negative evidential bias). Just like in the previous example, the polarity of the PQ is the same as that of the evidential bias.

- (44) **Copak** ty to nevíš? surprise
 COPAK you it NEG.know.PRS
 'You don't know it?' (Grepl & Karlík 1998)

Despite their capacity to express speaker's objection or surprise (and despite them being referred to as "false"), it is important to note that *copak* PQs can be used as genuine PQs in the sense that the speaker expects the addressee to provide an answer. In the approach taken in the present thesis, it is natural to integrate both the core PQ meaning (expression of polar alternatives) and additional meanings (referred to as biases).

2.5.2 *Náhodou*

Náhodou is mostly (or even exclusively) used in negative PQs, in which it indicates hope or fear on the side of the speaker (Štícha 1984; Daneš et al. 1987; Grepl & Karlík 1998), or simply that the speaker expects a positive answer (Běličová 1989).²³ This is illustrated in (45), where the context could be that the speaker hopes (but is not sure) that Karel is going to Brno. This means that the PQ carries positive epistemic bias.

- (45) Karle, nepojedeš **náhodou** do Brna?
 Karel NEG.go.PRS NÁHODOU to Brno
 'Karel, are you going to Brno?' (Štícha 1984)

As for evidential bias, it seems that *náhodou* PQs do not have to convey any. In (46), the two speakers are discussing some past event and the speaker of the *náhodou* PQ is not being confronted with some new evidence, which would bias the question.²⁴

²³*Náhodou* literally translates as 'by chance' and can be used as an adverbial.

²⁴In examples from spoken corpora, I preserve the original transcription style from the source.

- (46) A: pak mu nějak otáčel hlavou že téměř mu zlomil vaz ..
 then him somehow turn.PTCP head that almost him break.PTCP neck
 ‘then he was turning his head so that he almost broke his neck’
- B: tou hlavou . jo
 DET head yes
 ‘his head yeah’
- A: a ne* .. nemaloval mu **náhodou** na tu pleš . ty oči ?
 and no NEG.paint.PTCP him NÁHODOU on DET bald-head DET eyes
 ‘and didn’t he paint the eyes on his bald head?’ (ORTOFON v2)

In (47), there is a *náhodou* PQ with negative evidential bias. Speaker A suggests that the object is green ($\neg p$), which prompts speaker B to ask a PQ about whether it is blue (p).

- (47) A: a shodnete se na barvě je zelený opravdu ?
 and agree.PRS REFL on color be.PRS green really
 ‘and do you agree about the color, is it green?’
- B: a je zelený ? .. není modrý **náhodou** ?
 and be.PRS green NEG.be.PRS blue NÁHODOU (Kopřivová et al. 2017;
 ‘is it green? isn’t it blue?’ henceforth ORAL v1)

Apart from these, *náhodou* PQs can be employed as polite requests. The speaker in (48) is asking for Ibalgin (a painkiller) and hopes that the addressee has one. Notice that there is the PPI *nějakej* in the scope of the negative verb. Based on the observation that negative *náhodou* PQs license PPIs (and not NCIIs), I assume that they are outer negation PQs.

- (48) nemáš **náhodou** Ibalgin ? nebo nějakej takovejhle růžovej ?
 NEG.have.PRS NÁHODOU Ibalgin or some DET pink
 ‘do you have Ibalgin? or something like that?’ (ORAL v1)

2.5.3 *Snad*

Snad can appear in positive as well as negative PQs, illustrated by (49), and in interrogative as well as declarative word order, in (49) and (50), respectively. As for the type of negation, outer negation is possible as well as inner.

- (49) {Máte / Nemáte} **snad** na někoho nějaké podezření?
 have / NEG.have SNAD on someone some suspicion?
 ‘Are you suspicious of someone?’ (Daneš et al. 1987)

These PQs convey speaker’s hope, fear or previous belief/knowledge, so they carry epistemic bias. Nekula (1996, p. 52) claims that by using *snad*, the speaker indicates that their bias is strong, stronger than when using *copak* instead. PQs like the one in (50) can sound like confrontation. The speaker is appalled by the immediate context and objects to it (Štícha 1995b).

- (50) Ty **snad** neumíš číst?
 you SNAD NEG.can.PRS read.INF
 ‘Can’t you read?(!)’ (Nekula 1996)

Similarly to *copak*, the polarity of *snad* PQs is the same as the polarity of their evidential bias. At the same time, it is the opposite from their epistemic bias. The PQ in (50) is negative, so it

is expected that it has negative evidential bias (the addressee probably has troubles reading) and positive epistemic bias (the speaker expects the addressee to know how to read, maybe because it is a common skill in their context). A positive *snad* PQ, e.g., *Ty snad umíš číst?* (= ‘You can read?’), carries positive evidential bias and negative epistemic bias. This would fit in a situation where the addressee is able to read fluently, and the speaker is surprised by this fact, because they expected the addressee to be illiterate.

2.5.4 *Přece*

The particle *přece* is typical for statements and, therefore, is incompatible with the *Q* morpheme (Meyer 2017). Nekula (1996) claims that the function of *přece* PQs is to make an objection, as in (51). *Přece* can appear in a question only with the rise or fall-rise intonation pattern (or with a question mark for written text). Nevertheless, their occurrence is very sparse.

- (51) On je **přece** zkušený chirurg!?
 he be.PRS PŘECE experienced surgeon
 ‘He is an experienced surgeon!’ (Nekula 1996)

By adding *přece* into an outer negation PQ, we change the type of negation to inner. Meyer (2017) gives an example of two negated PQs, I repeat it here in (52): one of them has outer negation (52-a), the other one inner negation caused by the addition of *přece* (52-b).

- (52) a. Nemáte naspěch?
 NEG.have.PRS rush
 ‘Are you in a rush?’
 b. Nemáte **přece** naspěch?
 NEG.have.PRS PŘECE rush
 ‘You aren’t in a rush, (right?)’ (Meyer 2017)

With *přece* I conclude the overview of the particles under investigation. In the next section, I propose syntactic and also semantic analysis for PQs with negation with respect to their context. Based on these, I test the naturalness of PQs as a result of the combination of the above-mentioned factors (word order, polarity, context). Additional experiments focused on the behavior of particles are commented upon.

2.6 Proposal

Based on previous accounts of PQs and of negation, I propose what syntactic and semantic composition Czech negative PQs have. First, I provide an explanation of what happens in the syntax of interrogative vs. declarative PQs, and how negation and speech act operators are involved in the structure. Next, outer and inner negation are compositionally analyzed from the formal semantic/pragmatic view.

2.6.1 Syntactic analysis

My syntactic analysis of negation in PQs builds on Zeijlstra (2004) and Penka (2011). Since Czech is a strict negative concord language, Czech sentences may contain multiple negative elements (e.g., negative prefix on the verb, negative indefinites etc.), each of them carrying the uninterpretable [uNeg] feature (Zeijlstra 2004). Negation is interpreted thanks to the c-commanding negative operator carrying [iNeg]. Depending on the type of negation (outer =

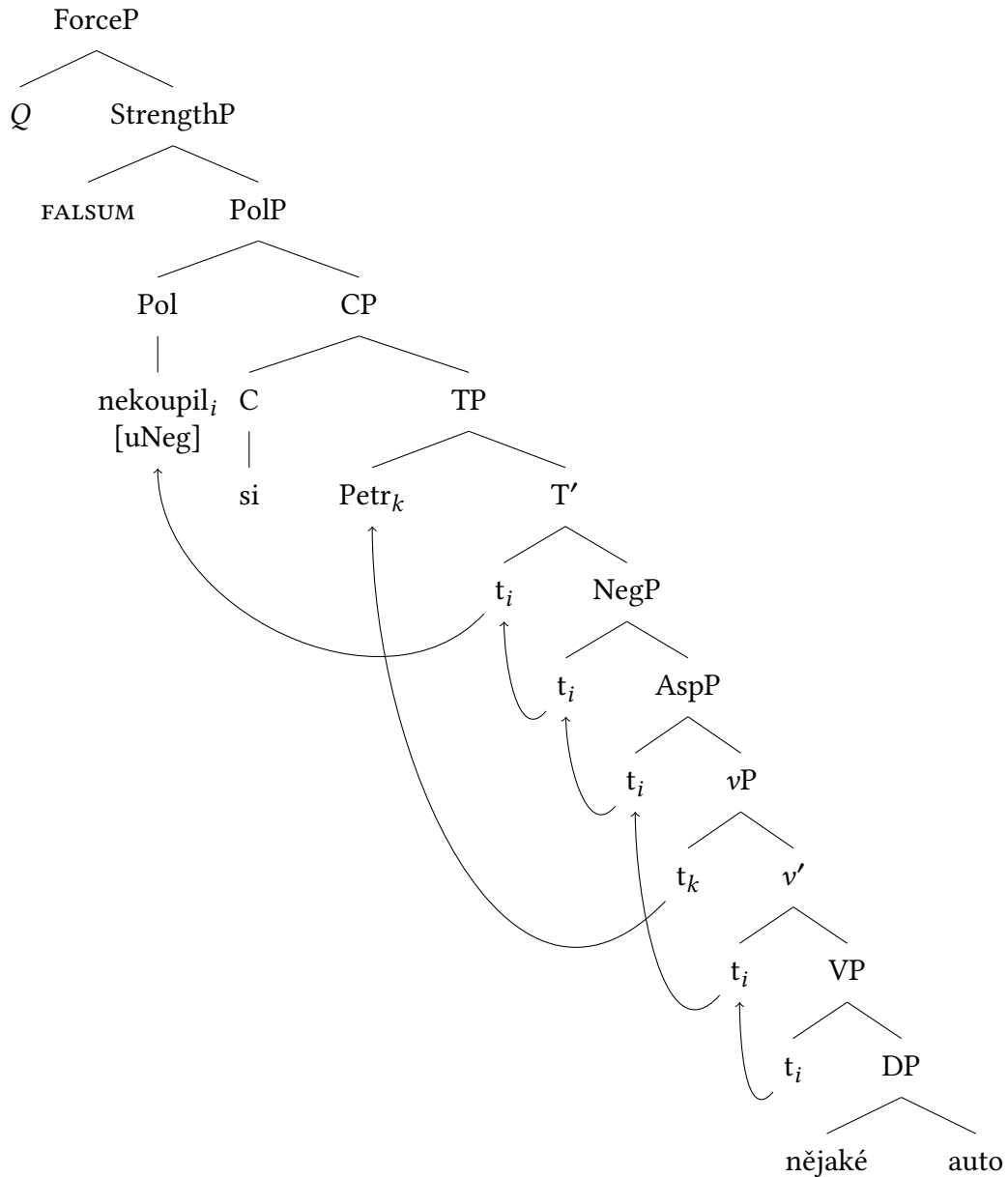


Figure 1: Proposed syntactic analysis of outer negation (interrogative question)

FALSUM, or inner), PPIs or NCIs are licensed. I assume that the verb in Czech moves as a head (see section 2.1.3 for more details).

For illustration, I work with these example PQs:

- (53) a. Nekoupil si Petr nějaké auto? outer negation
 NEG.buy.PTCP REFL Petr *nějaké*.DET.PPI car
 ‘Hasn’t Petr bought a car?’
- b. Petr si nekoupil žádné auto? inner negation
 Petr REFL NEG.buy.PTCP *žádné*.DET.NCI car
 ‘Petr hasn’t bought any car?’

Figure 1 shows the syntactic analysis of outer negation in an interrogative question, particularly for the PQ in (53-a). In interrogative questions, the finite verb precedes an overt subject. I assume that the verb undergoes head movement from its base position in the head of

VP. It moves to Pol (head of PolP), right above the clitic position (head C). The verb carries the uninterpretable feature [uNeg], which means that the negative morpheme is not interpreted directly, but merely indicates that there is a suitable interpretable operator in the structure (either semantic negation or FALSUM). Apart from the verb, it is also the subject that moves from its base position to SpecTP, where it checks its grammatical categories. The verb triggers the insertion of the FALSUM operator to StrengthP (Repp 2006). This operator stands for outer negation and operates on the level of speech acts (see more in section 2.4.4). Since there is no interpretable negative operator \neg in the tree (i.e., an operator carrying the [iNeg] feature), a PPI (*ně*-indefinite) can appear in the sentence. It stays in situ in the object DP. The topmost phrase is ForceP in whose head there is the *Q*-morpheme which supplies the sentence with the interrogative force.

Figure 2 shows the syntactic analysis of inner negation in a declarative question, particularly for the PQ in (53-b). In a declarative question, the finite verb does not move to the initial position, but rather stays in T and is thus preceded by at least one other constituent (here: the subject), which serves as a syntactic support for clitics by moving to SpecCP. The verb and the NCI (*žád*-indefinite) both carry the uninterpretable feature [uNeg]. The interpretable negation [iNeg] is triggered and is generated in SpecNegP. The NCI is licensed precisely because of the presence of [iNeg]. Since the verb can trigger either FALSUM, or [iNeg], but not both at the same time, a different speech act operator is used, namely VERUM, located in StrengthP. Above it, there is the *Q*-morpheme.

2.6.2 Semantic analysis

My semantic analysis of PQs relies on the partition theory of Groenendijk & Stokhof (1984b), where the semantic meaning of a PQ is expressed by a partition of the set of possible worlds into two propositions: p and $\neg p$. As for the semantics of negation in PQs, I follow (Romero & Han 2004; Repp 2006, 2009, 2013) and their VERUM/FALSUM dichotomy. These operators describe the degree of strength for adding propositions to the common ground. I use these in combination with the presence of the negative operator to capture the difference between inner and outer negation.

An outer negation PQ like (53-a) denotes a partition consisting of two elements: {“there are low degrees of strength for adding p to CG”; “there are not low degrees of strength for adding p to CG”}. Figure 3 shows the compositional analysis of the semantic meaning of (53-a). First, the affirmative proposition in PolP combines with FALSUM. The contents of StrengthP then undergo lambda abstraction over x , which results in binding the x variable. The question operator *Q* is enriched with the H_u variable of type e , which stands for the hearer of the utterance. ForceP contains the final partition.

The partition of an inner negation PQ can be captured like this: {“there is high degree of strength for adding $\neg p$ to CG”; “there is not high degree of strength for adding $\neg p$ to CG”}. Its compositional analysis is in Figure 4. The proposition in PolP carries interpretable negation and it combines with the VERUM operator. The rest of the computation is in essence the same as it is for outer negation PQs, it is just the final partition in ForceP that is different.

Apart from theoretical contributions, in this study there were multiple experiments aimed at the various forms and meanings Czech PQs can have. In the following sections, I report on these and comment on the tendencies based on empirical data.

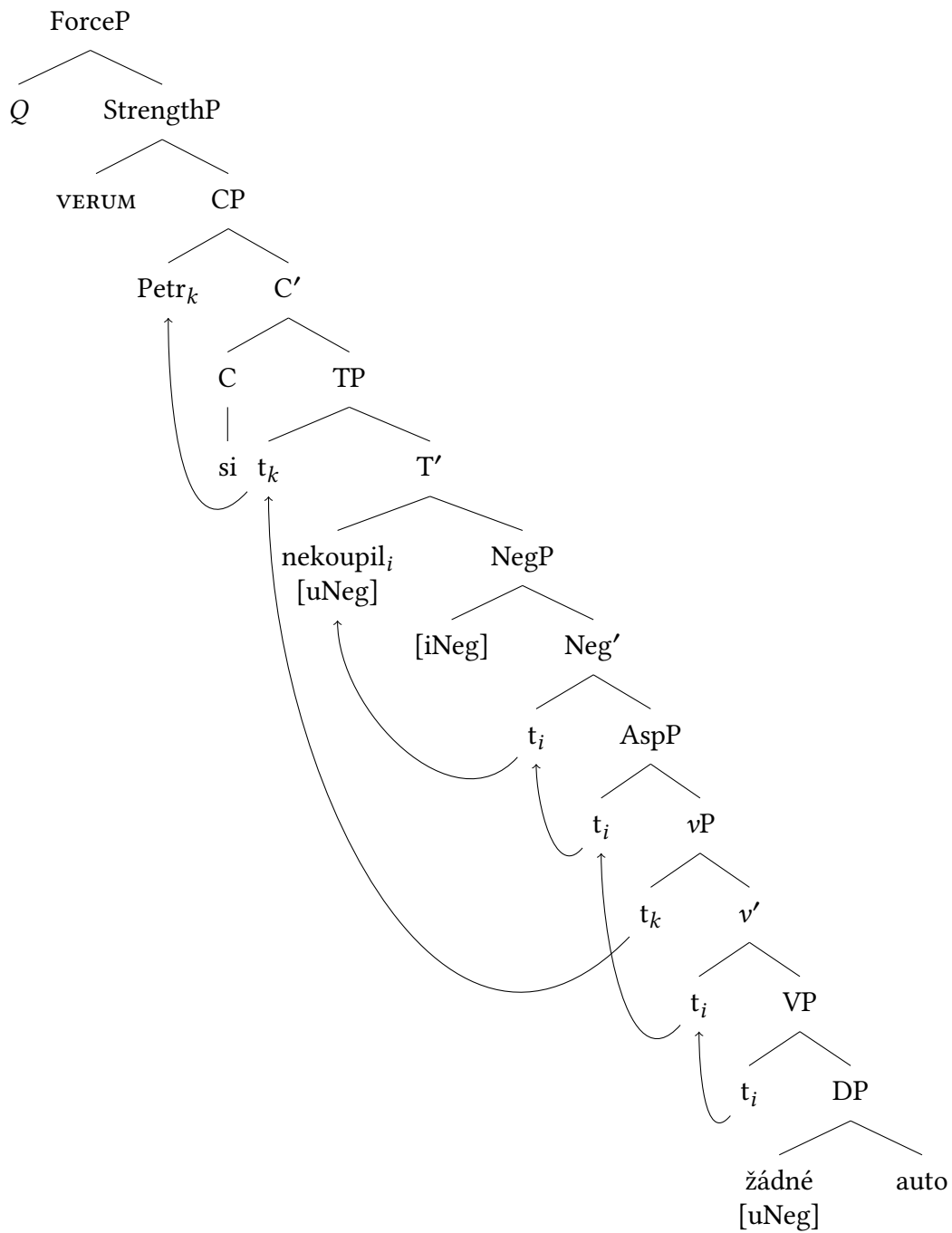


Figure 2: Proposed syntactic analysis of inner negation (declarative question)

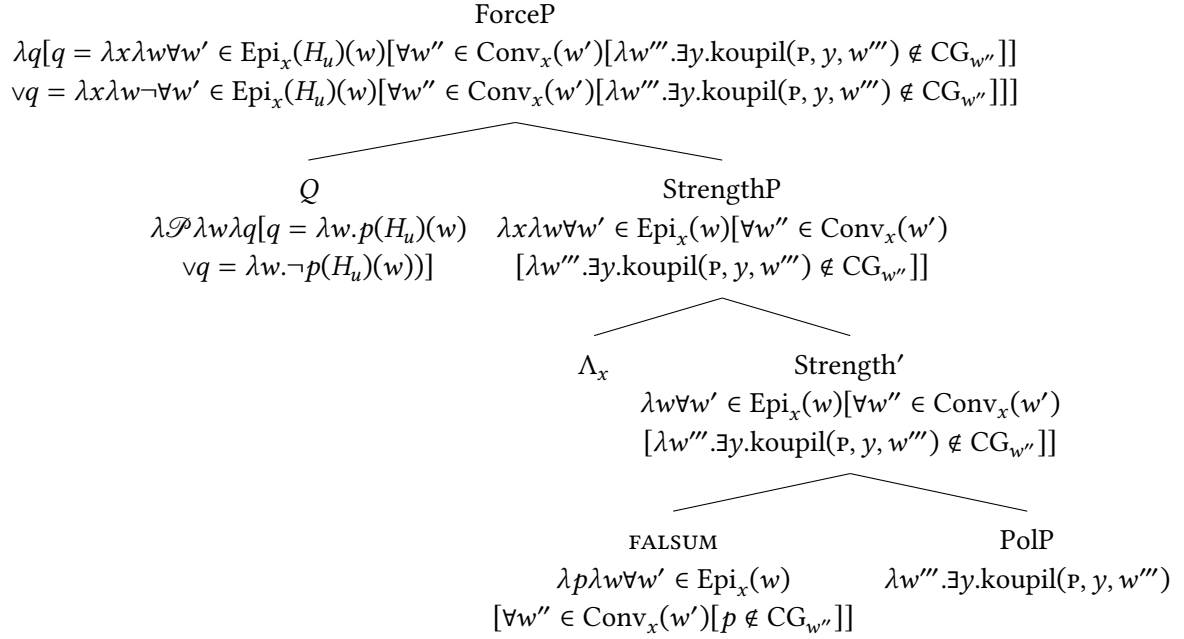


Figure 3: Proposed semantic analysis of outer negation in Czech PQs

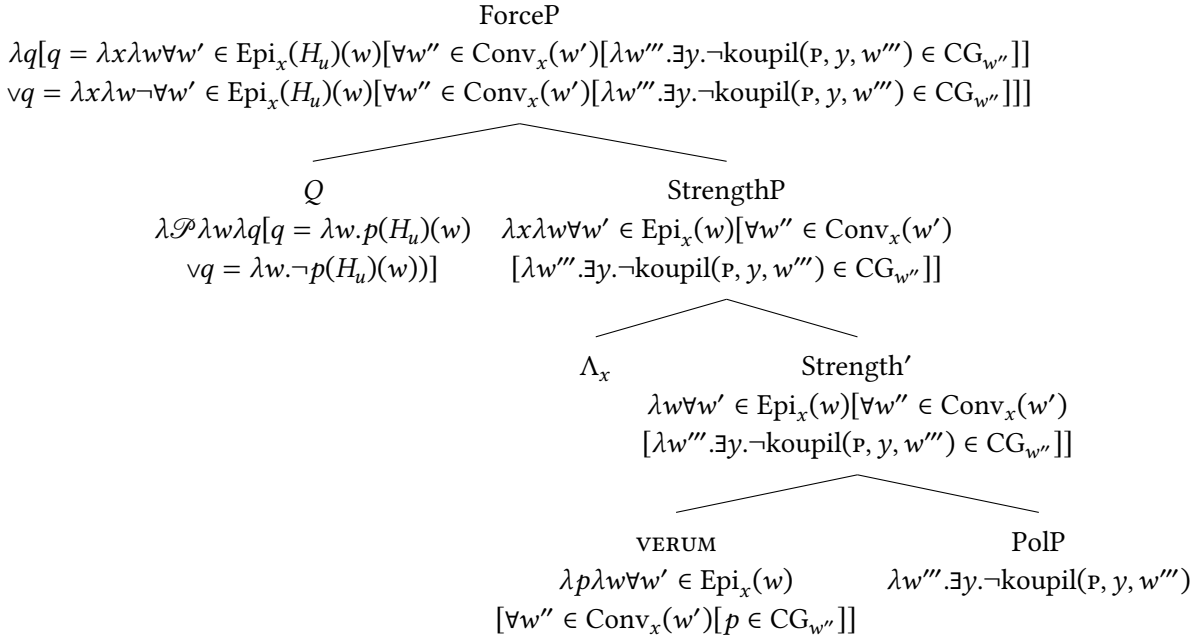


Figure 4: Proposed semantic analysis of inner negation in Czech PQs

3 Experiments

I designed a naturalness judgment task to investigate Czech PQs and their properties. This methodology allowed me to focus closely on the phenomena under scrutiny and to familiarize myself with the judgments of native speakers.

In total, there were 10 experiments: 1 main, 7 filler, and 2 control experiments. The main experiment consisted only of negative PQs; other experiments included also positive PQs and PQs with particles. All of them were combined into one experimental set-up, so that I could compare the results of the same participant group.²⁵ In the next section, I describe the participants and method which were the same for all the parts. Then I present and discuss the design, materials, predictions and results for each experiment separately.

3.1 Participants and method

In total, 139 participants took part in the experiment. 10 of them were excluded from the data set because they did not pass the criteria set for reliable participants (see section 3.8 for more detail). In the descriptive and inferential statistical analyses I work with data from 75 participants for them to give accurate results. All the participants were native speakers of Czech, mostly students from the Charles University. They were compensated with university credits. Before the actual task, the participants were informed that their responses would be anonymized and used only for academic purposes.²⁶ They read instructions how to rate the naturalness of PQs in their immediate context and the naturalness of their form. They saw 2 example stimuli with the preferred way of rating. Shortened version of the instruction was available even during the task.

The participants were presented with written mini conversations between two people labeled A and B. They consisted of two utterances: the first one was contextual information and the other was a PQ. Audio was not available, so the participants had to imagine the rise or fall-rise intonation pattern of a PQ on their own. The task was to rate how natural the PQ is in the immediate context.

Each participant rated 82 experimental items (32 items from the main experiment and 50 items from the filler/control experiments) in a pseudo-randomized order. An overview of the experiments with numbers of items for each is given in Table 1. The items were distributed over lists by Latin Square. The participants chose a value on a Likert scale, ranging from 1 (= least natural) to 7 (= most natural). On average, the task took 27 minutes. The experiment was run online on L-Rex (Starschenko & Wierzba 2022).

experiment	no. of items
E1	32
F1	8
F2	8
F3	4
F4	8
F5	2
F6	4
F7	4
Repetitiveness	2
Reliability	10

Table 1: Summary of materials

²⁵The main experiment was preregistered, see OSF. On OSF, there are also all the experimental items and results.

²⁶I only collected the participants' email addresses for the purposes of assigning them the university credits.

Results are shown in plots made in RStudio by using packages `ggplot2`, `tidyr` and `dplyr` (Wickham 2016; Wickham et al. 2023a,b). Statistical tests were also run in RStudio. I used the Cumulative Link Mixed Models and the package `ordinal` (Christensen 2022). For the main experiment, I fitted a random slopes model, whereas for the filler experiments, I fitted random intercepts models.

3.2 Main experiment

3.2.1 Design and materials

The design of the main experiment (= E1) was a within-item and within-participant $2 \times 2 \times 2$, as I manipulated 3 variables, each with 2 possible values. In this experiment, all PQs were negative. Table 2 schematically summarizes all the 8 conditions.

condition	CONTEXT	VERB POSITION	INDEFINITE
a	neg-biased	V1	NCI
b	neutral	V1	NCI
c	neg-biased	V1	PPI
d	neutral	V1	PPI
e	neg-biased	non-V1	NCI
f	neutral	non-V1	NCI
g	neg-biased	non-V1	PPI
h	neutral	non-V1	PPI

Table 2: Variable manipulations in individual conditions (E1)

The CONTEXT was either neutral, or neg-biased. It was presented in the form of A’s utterance about a concrete protagonist, for example, Jana in (54). The main clause gives a basic fact about Jana, the following relative clause provides a piece of new information for the hearer B. If the CONTEXT was neutral (uttered by A), the relative clause implied neither p , nor $\neg p$, i.e., none of the possible meanings of the following PQ. If the CONTEXT was neg-biased (uttered by A’), it implied $\neg p$. It was important that the new information in the relative clause did not entail p nor $\neg p$, so that it still allowed for the question to be asked. The gender of protagonists in the items was balanced, so there were female as well as male ones.

The VERB POSITION was either initial (V1), or not (non-V1). When it was initial (V1), the negative verb preceded an overt subject and clitics – in B’s utterance in (54) it precedes *Jana* and *tam*. When it was not initial (non-V1), it followed an overt subject and clitics (uttered by B’). I used the VERB POSITION as a proxy for declarative (non-V1) vs. interrogative (V1) word order in PQs.

The INDEFINITE was either an NCI (*žádný*), or a PPI (*nějaký*). The indefinite was part of an object DP, serving as a determiner. I used it as a proxy for the type of negation: *žádný* for inner, *nějaký* for outer.

- (54) A: Jana má na zahradě záhon, **který vybudovala před rokem.** neutral
 Jana has in garden garden.bed, which built before year
 ‘Jana has a garden bed, which she built a year ago.’
- A’: Jana má na zahradě záhon, **kam zasadila zeleninu.** neg-biased
 Jana has in garden garden.bed, where planted vegetables
 ‘Jana has a garden bed, where she planted vegetables.’
- B: **Nezasadila** tam Jana {**žádné / nějaké**} květiny? V1
 NEG.planted there Jana DET.NCI DET.PPI flowers
- B’: Jana tam **nezasadila** {**žádné / nějaké**} květiny? non-V1
 Jana there NEG.planted DET.NCI DET.PPI flowers
 ‘Didn’t Jana / Did not Jana / Jana didn’t plant there any / some flowers?’

3.2.2 Predictions

There were multiple predictions about the variables and their values in E1. All of them were based on previous literature or on my proposed analysis. I first comment on them in general, then I discuss the individual conditions and how the variables were expected to interact in them.

From the syntactic point of view, negative PQs with an interrogative word order (V1) were expected to trigger *FALSUM* and, therefore, outer negation reading signaled by a PPI. NCIs should be unnatural in these PQs. In negative PQs with a declarative word order (non-V1) the negative verb stays lower in the structure and is thus able to be licensed either by *FALSUM*, or by inner negation (negative operator with [iNeg]). The inner negation reading is the most canonical for the non-V1 word order, so NCIs were expected to be preferable to PPIs.

More predictions stem from the questions’ contexts. It was predicted that V1 negative PQs do not require evidential bias (in the preceding context there does not have to be contextual evidence for them to be perceived as natural), because they exhibit the neutral interrogative word order, which carries no bias. They can, however, likewise appear in negatively biased contexts implying $\neg p$. Negative non-V1 PQs, on the other hand, were expected to require negative evidential bias – there should be negative contextual evidence preceding the question. In neutral contexts, they would be unnatural. Context and type of negation were expected to interact according to the proposed bias profiles of the PQs, see section 2.3.3.

The predicted interaction between the individual variables could be summarized as follows:

- VERB POSITION – INDEFINITE
- CONTEXT – VERB POSITION
- CONTEXT – INDEFINITE

As for the interactions of the syntactic and semantic/pragmatic properties of negative PQs, I present them in Table 3. It shows the predictions for the individual conditions according to three types of clashes. Either there is a clash in the inner syntactic make-up, meaning that VERB POSITION and INDEFINITE are incompatible; or there is a clash between CONTEXT and INDEFINITE, or CONTEXT and VERB POSITION. A “+” means there is a clash, a “–” means there is not any. Based on these evaluations, I computed the overall expected ratings of the individual conditions.

According to the analysis showed earlier and bias profiles in section 2.3.3, I expected that conditions (c), (d) and (e) would be rated as very natural. Their inner syntactic structure does

cond.	V POS – INDEF	CTXT – INDEF	CTXT – V POS	expected rating
a	+	–	–	medial
b	+	+	–	low
c	–	–	–	high
d	–	–	–	high
e	–	–	–	high
f	–	+	+	low
g	+	–	–	medial
h	+	–	+	low

Table 3: Predictions for individual conditions (E1)

not lead to any clash, and so does not their relation to the preceding context, as the outer negation reading is acceptable in neg-biased and neutral contexts, and the inner negation reading only in neg-biased context. Also, a declarative PQ like (e) is supposed to require a biased context, while for (c) and (d) this does not make any difference.

Conditions (a) and (g) were expected to be judged less natural because of clashes in their inner syntactic make-up. In (a), it is the verb in the initial position in combination with an NCI lower in the tree. In (g), it is the verb in a non-initial position in combination with a PPI (possible, but an NCI would be preferable).

Conditions (b), (f) and (h) were expected to be the least natural, although for different reasons. Condition (b) exhibits a clash in its syntactic make-up as well as contextual inappropriateness. The initial verb clashes with the NCI, and inner negation clashes with the neutral context. The rating of (f) was also expected to be low, but this time because of the clash between the inner negation (triggered by the NCI) and the neutral context. In addition, the neutral context poses a problem for the naturalness of a non-V1 PQ. In (h), the NCI is less preferable with the non-V1 word order, and, again, the neutral context is problematic when followed by a non-V1 PQ.

3.2.3 Results & discussion

As mentioned above, I present the results of the total of 75 participants. Ratings are demonstrated in the form of stacked bar plots as well as descriptive measures (such as medians).

Figure 5 shows the raw results of the main experiment. On the y-axis, there is the proportion of ratings, which is represented by the shades in the stacked bar plot. On the x-axis, there are the two CONTEXTS: negative (neg-biased) and neutral. The horizontal line cuts through the median rating in each cell (this applies to this and all the following stacked bar plots in this thesis). Values of descriptive statistical measures are summarized in Table 4 for the respective conditions.

The results of the main experiment exhibited some strong tendencies which Czech negative PQs follow. I used the `ordinal` package in R to fit two Cumulative Link Mixed Model (Christensen 2022), one for each value of VERB POSITION, using CONTEXT, INDEFINITE (both sum-coded), and their interaction as fixed effects and random intercepts for items and participants as random effects.

Figure 6 plots the median values again in order to make the effects/interactions of the variables more visible. I comment on these in more detail below.

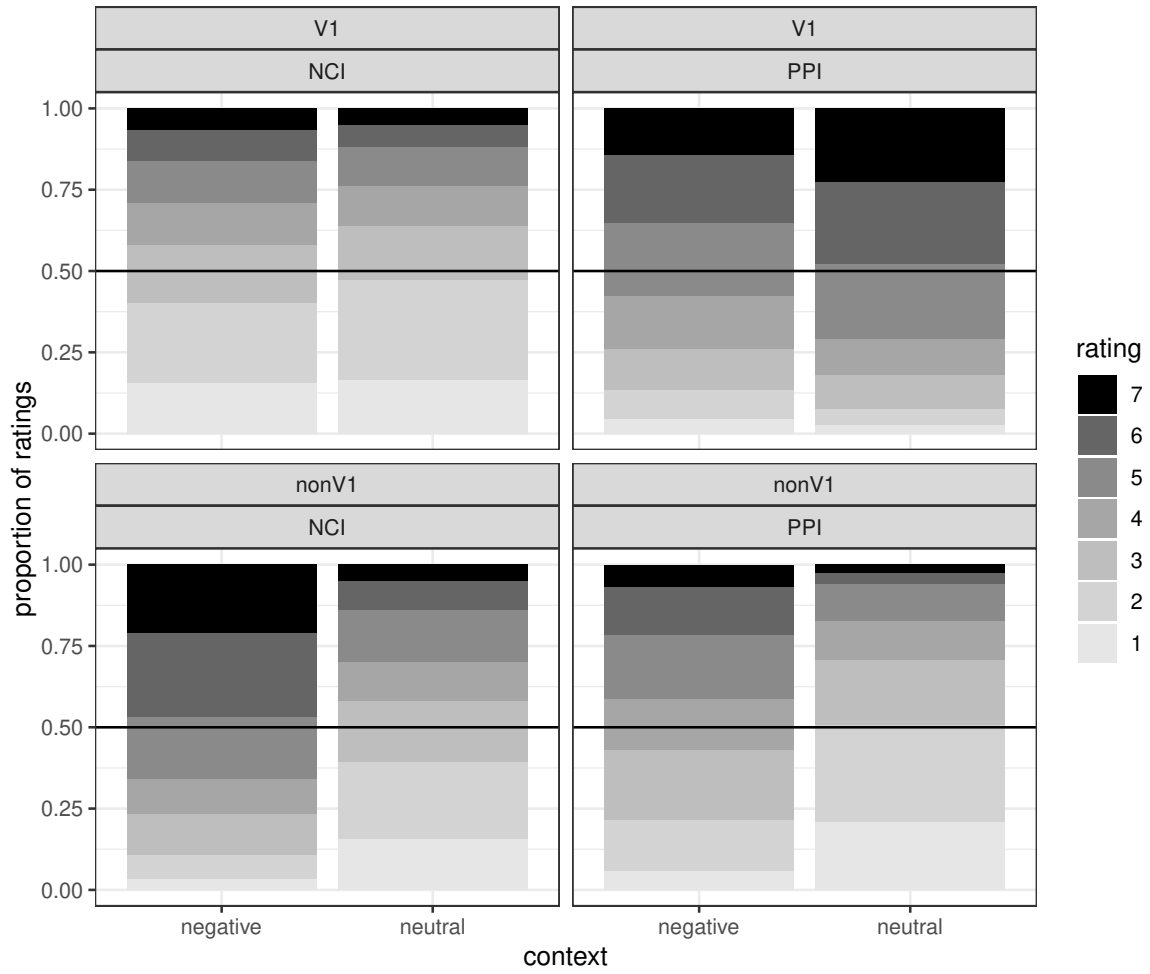


Figure 5: Raw results: ratings of naturalness depending on VERB POSITION, INDEFINITE and CONTEXT (E1). Black line cuts through median rating.

condition	CONTEXT	V1	INDEF	median	mean
a	neg-biased	+	NCI	3.0	3.4
b	neutral	+	NCI	3.0	3.2
c	neg-biased	+	PPI	5.0	4.7
d	neutral	+	PPI	5.0	5.2
e	neg-biased	-	NCI	5.0	5.0
f	neutral	-	NCI	3.0	3.3
g	neg-biased	-	PPI	4.0	4.0
h	neutral	-	PPI	2.0	2.8

Table 4: Medians and means of ratings for individual conditions (E1)

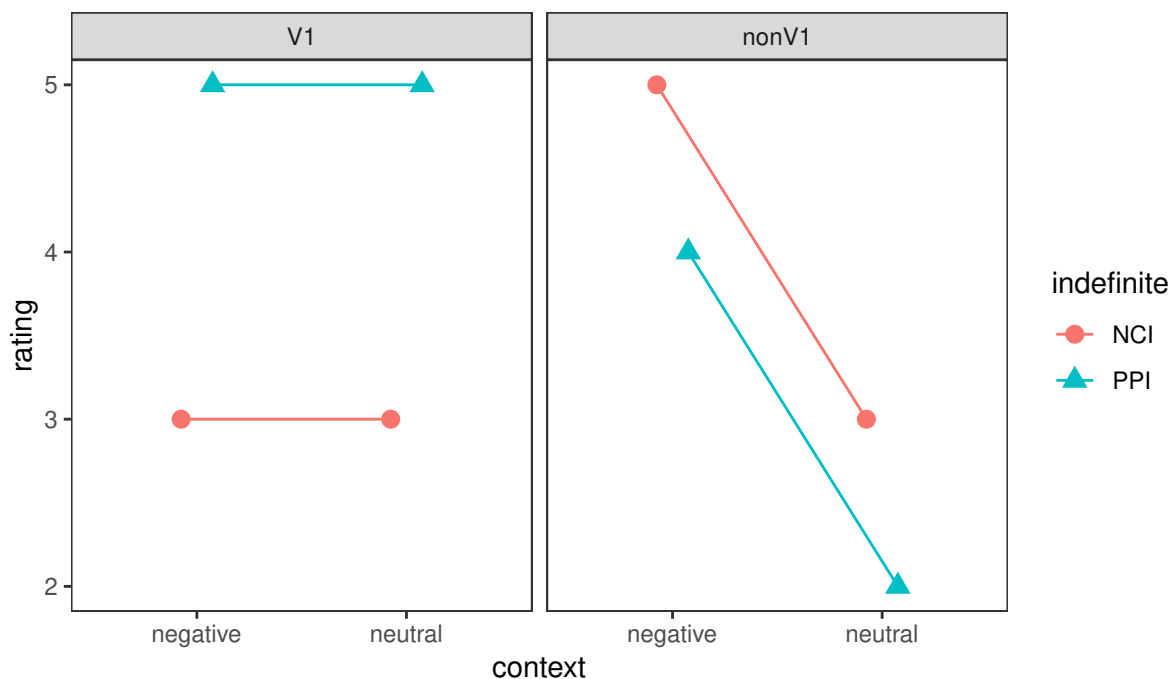


Figure 6: Median results (E1)

For further discussion, I divide the results based on the word order of the PQs – I start with the V1 and then I talk about the non-V1 PQs. I compare the results with the predictions and explain any differences. Also, based on the results, I make additional adjustments to the bias profile of Czech negative PQs.

V1 results & discussion In V1 PQs, there was a significant main effect of INDEFINITE: PPIs were more natural than NCIs ($z = -10.483$, $p < 0.001$) – conditions (c) and (d) received one of the highest ratings.²⁷ In the left cell of Figure 6, the blue triangles, representing PPIs, are higher than NCIs. This result tells us that negative V1 PQs are mostly interpreted as outer negation, which agrees with the expectations – the expected ratings of conditions (c) and (d) (V1 + PPI) in Table 3 were high, also because of no clash in their structural make-up. In my syntactic analysis, I claimed that the verbal head raises to PolP and that *FALSUM* is triggered. Since there is no interpretable negation in the structure, the question carries the outer negation reading.

CONTEXT did not show any statistically significant effect in V1 PQs ($z = -1.374$, $p = 0.169$). These PQs do not have any requirements with respect to their context. This agrees with previous claims about V1 PQs being a neutral means of asking for information (carrying neutral evidential bias), but also with the idea that they can express negative evidential bias.

Condition (b) was expected to be rated lower than condition (a), which means that an NCI in V1 PQs would be less natural in neutral context than in a negatively biased one. According to the median values, these two conditions both received the rating of 3, but if we examine the proportions of ratings in Figure 5, it is apparent that my expectations were – at least numerically – in line with the results. The horizontal line, which cuts through medians, is on the borderline between 3 and 2, showing a slight dispreference of NCIs in neutral context.

There was an interaction between INDEFINITE and CONTEXT: negatively biased context was

²⁷I round the z -score values to thousandths and p values in an ad hoc manner.

of evidential bias into its final version.

3.3 Filler experiment 1

3.3.1 Design and materials

The first filler experiment contained positive and outer negation PQs. Its design was 2×2 , and it consisted of 8 items. Table 5 summarizes the design, and an example item is provided in (57). I manipulated CONTEXT: either it was pos-biased (implying *p*), or neutral; and POLARITY: the PQ was either negative (outer negation), or positive. Because of this, the indefinite used was *nějaký* and the verb stood at the initial position in all the conditions.

condition	CONTEXT	POLARITY
a	pos-biased	outer negation
b	neutral	outer negation
c	pos-biased	positive
d	neutral	positive

Table 5: Variable manipulations in individual conditions (F1)

- (57) A: Viktor se pohádal s manželkou, **které byl nevěrný.** pos-biased
 Viktor REFL argued with wife, on.whom was unfaithful.
 ‘Viktor argued with his wife, on whom he cheated.’
- A’: Viktor se pohádal s manželkou, **se kterou má tři děti.** neutral
 Viktor REFL argued with wife, with whom has three children.
 ‘Viktor argued with his wife, with whom he has three children.’
- B: {**Nenašel / Našel**} si Viktor nějakou milenku? polarity
 NEG.found found REFL Viktor DET.PPI lover?
 ‘Did / Didn’t Viktor find himself a lover?’

3.3.2 Predictions

Positive PQs with an initial verb were expected to be natural after neutral context. In this case, the speaker of the PQ is asking about the protagonist mentioned in the context, and the main function of the PQ is to simply fill their information gap, not to ascertain previous beliefs or expectations, nor doubt what the addressee is saying. Positive PQs were expected to be less natural after the positively biased context. Even though the context is biased, the form of the PQ is not marked: it has positive polarity and a preposed verb. Its form does not signal any bias, which could lower its naturalness in a biased context.

PQs with outer negation were expected to be natural after neutral context (just like in E1), but unnatural after the positively biased one. According to, for example, Büring & Gunlogson (2000) or Sudo (2013), outer negation PQs are incompatible with evidence for *p* in the preceding context.

3.3.3 Results & discussion

The results of F1 are shown in Figure 7. Unlike in E1, the values of CONTEXT on the x-axis are neutral and positive (pos-biased). ‘Negative question’ refers to an outer negation PQ. Descrip-

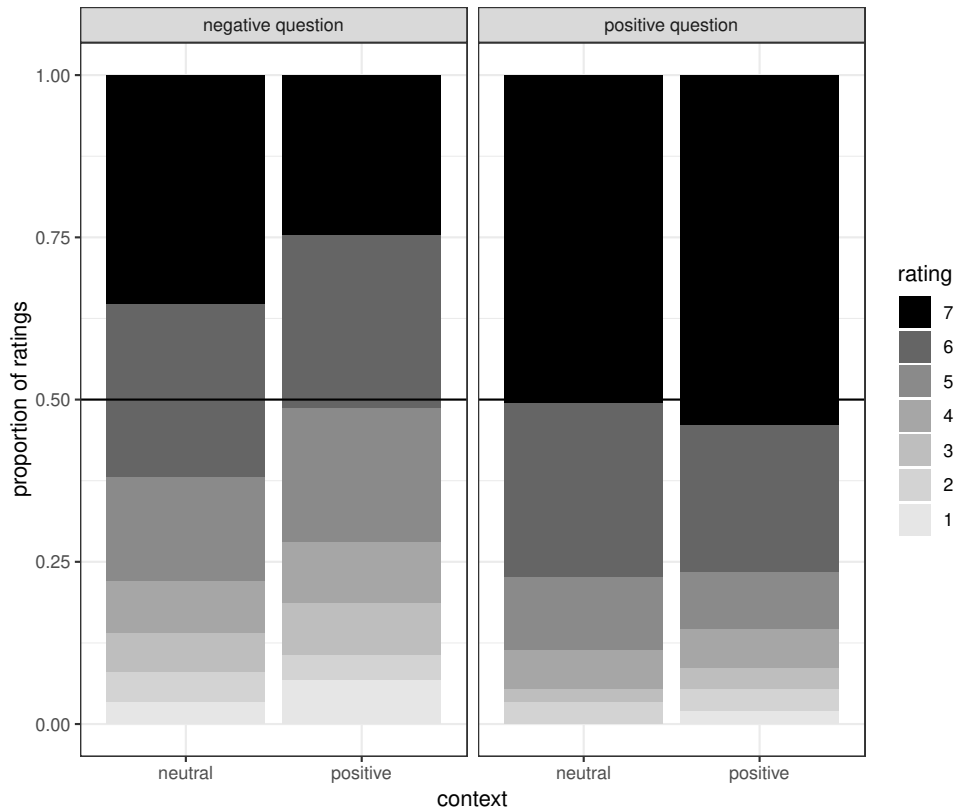


Figure 7: Raw results: ratings of naturalness depending on POLARITY and CONTEXT (F1).

condition	CONTEXT	POLARITY	median	mean
a	pos-biased	outer negation	6.0	5.1
b	neutral	outer negation	6.0	5.5
c	pos-biased	positive	7.0	6.0
d	neutral	positive	7.0	6.1

Table 6: Descriptive statistics for individual conditions (F1)

tive measures are presented in Table 6.

These results showed that positive PQs were, in general, considered more natural than outer negation ones ($z = -7.400$, $p < 0.001$). Positive PQs are claimed to be a neutral way of asking a question and they are overall more frequent, as was found in a corpus study by Onoeva & Staňková (to appear). These frequency effects probably led to the statistically significant difference between positive and outer negation PQs.

Interestingly, there was no statistically significant CONTEXT effect ($z = 1.212$, $p = 0.225$). This could be interpreted as a similarity of outer negation and positive PQs with respect to their context conditions, although we see that they are not completely interchangeable. This was evident already from the main experiment, where outer negation PQs appeared in negatively biased context, which is impossible for positive PQs.

Positive PQs were expected to be less natural in biased context, since they were V1, which is claimed to be the form which does not signal any bias. The experiment did not prove this, as positive PQs in both contexts received medians of 7 or 6.5.

Outer negation PQs were expected to be natural in neutral contexts (just like in E1), which proved correct, but they were rated similarly natural in positively biased context. In Figure 7, a drop in rating is evident, but it was not statistically significant, so I assume that the evidential bias profile of Czech negative PQs should be adjusted this way:

(58) *Evidential bias profile for Czech negative PQs (final)*

- a. non-V1 inner negation PQs: $\{-^{ev}\}$
- b. non-V1 outer negation PQs: $\{-^{ev}\}$
- c. V1 outer negation PQs: $\{+^{ev}, -^{ev}, \%^{ev}\}$

In the following sections, I present the filler experiments aimed at Czech question particles.

3.4 Filler experiments 2 & 3

3.4.1 Design and materials

Filler experiments 2 (F2) and 3 (F3) focused on the *copak* particle in PQs. In F2, I manipulated CONTEXT: biased, or neutral; and POLARITY: inner negation, or positive (see Table 7). All 8 items contained *copak* in the initial position. Positive PQs contained the PPI *nějaký*, while negative PQs contained the NCI *žádný* to signal inner negation. Whenever the CONTEXT was biased, as in conditions (b) and (c), I opted for the generally more acceptable type of context.²⁸ For a positive PQ the biased CONTEXT was pos-biased, and for a negative PQ it was neg-biased.

condition	CONTEXT	POLARITY
a	neutral	positive
b	biased	positive
c	biased	inner negation
d	neutral	inner negation

Table 7: Variable manipulations in individual conditions (F2)

All the 4 items in F3 contained neg-biased context, *copak* and a negative verb. The within-item manipulated variable was INDEFINITE aka type of negation, with the two values: *nějaký* and *žádný*.

I opted for *copak*, and not *cožpak*, as the first variant is more frequent in spoken register. Since the experimental items were designed as conversations, the more informal alternative seemed to be more fitting.

3.4.2 Predictions

PQs with *copak* were expected to need a biased context. In neutral context they would sound unnatural, no matter if the polarity of the PQ was positive or negative.

A positive *copak* PQ was expected to be natural in the positive context, while a negative one was expected to be natural in the negative one. The polarity of the PQ would correspond with the bias of the context.

²⁸These assumptions were mainly based on previous research, see section 2.5.1 for more details.

Moreover, negative *copak* PQs were expected to prefer the inner negation reading with an NCI rather than outer negation with a PPI, because they were non-V1, which is strongly tied to inner negation.

3.4.3 Results & discussion

Results of F2 are presented in Figure 8. Values of CONTEXT are either biased or neutral. The left cell represents inner negation PQs, whereas the right cell represents positive PQs.

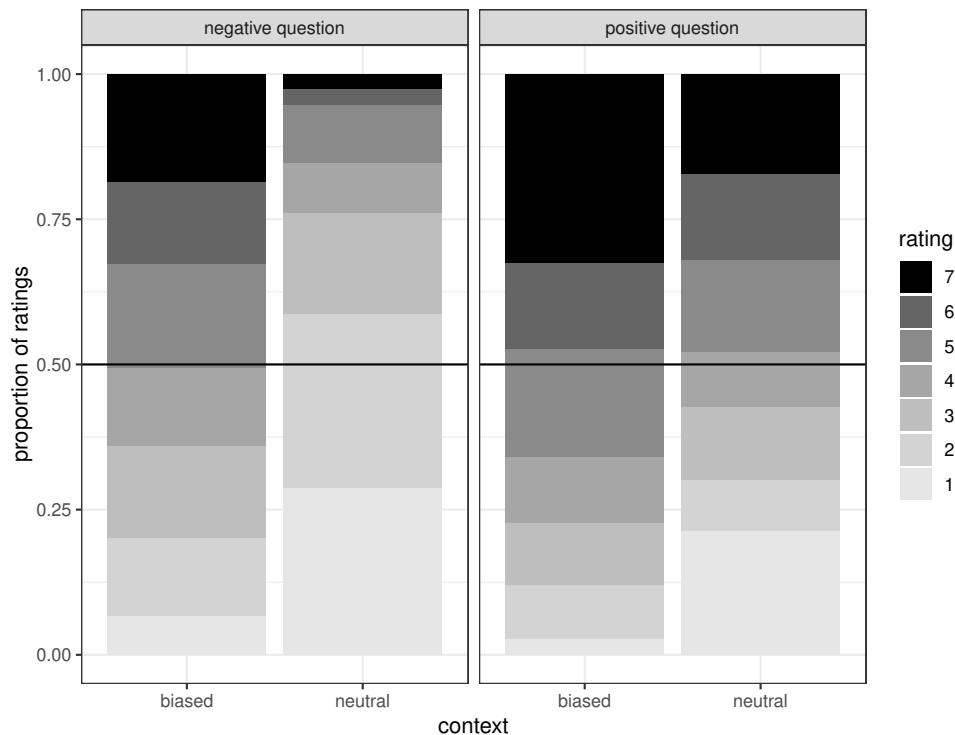


Figure 8: Raw results: ratings of naturalness depending on POLARITY and CONTEXT (F2).

As expected, *copak* PQs were more natural in biased contexts than in neutral ones, which applied to both positive as well as negative PQs. It is surprising that positive *copak* PQs were quite natural in neutral context (median rating of 4), since I would expect *copak* PQs to be biased. Their relative naturalness could appear due to the fact that positive PQs and neutral context match in general (as was confirmed in F1).

I observed main effect of POLARITY, so positive *copak* PQs were rated higher than negative ($z = -6.941, p < .001$), although this is probably skewed by the negative PQs in neutral context, which were very low in rating. Next, I observed main effect of CONTEXT ($z = 9.372, p < .001$).

Results of F3 are in Figure 9. It plots the difference between *copak* PQs with NCIs and PPIs, so the difference between inner and outer negation *copak* PQs, respectively.

Filler experiment 3 showed that both NCIs and PPIs are almost equally natural in negative *copak* PQs ($z = -0.463, p = 0.643$). This means that they do not prefer a certain type of negation. It further supports the assumptions about the syntax/semantics interface of negative PQs, where I claimed that even in non-V1 word order it is possible to trigger *FALSUM*, so that PPIs are licensed. Moreover, these findings are in accordance with those from E1, see the ratings of conditions (e) and (g). The polarity of the PQ corresponded with the context (neg-biased), irrespective of the type of negation.

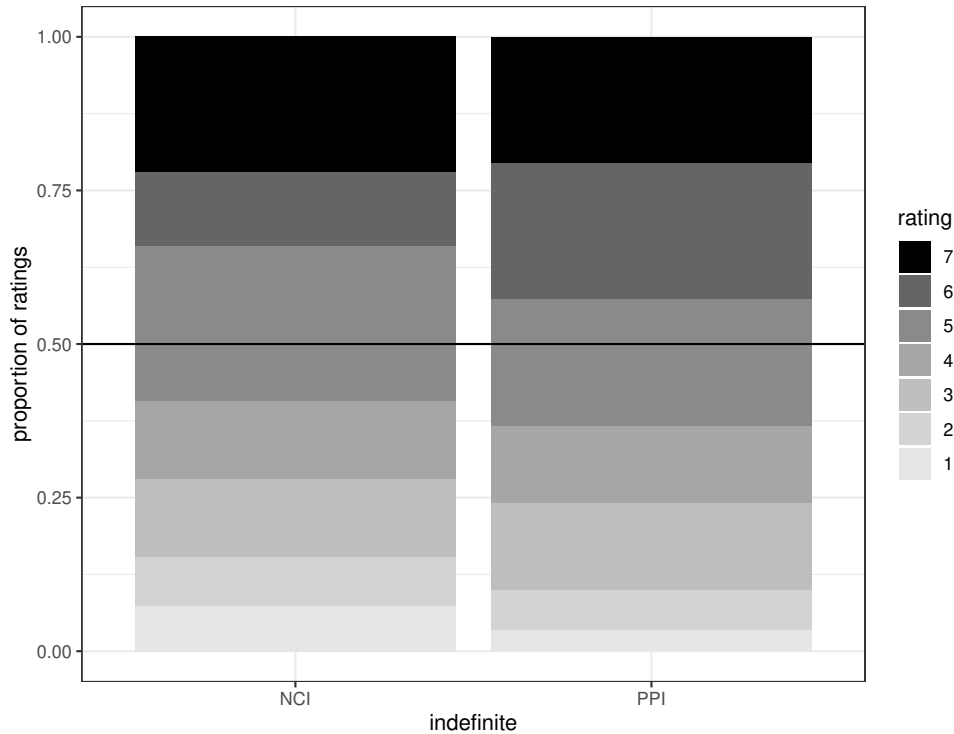


Figure 9: Raw results: ratings of naturalness depending on INDEFINITE (F3).

condition	CONTEXT	INDEFINITE
a	neg-biased	NCI
b	neutral	NCI
c	neg-biased	PPI
d	neutral	PPI

Table 8: Variable manipulations in individual conditions (F4)

3.5 Filler experiments 4 & 5

3.5.1 Design and materials

The next two filler experiments were aimed at *náhodou*. Filler experiment 4 (F4) consisted of 8 items and the manipulated variables were CONTEXT (neg-biased, or neutral) and INDEFINITE (NCI, or PPI). Table 8 shows the 2×2 design. All the conditions were V1 PQs.

Filler experiment 5 (F5) consisted of 2 items where context was neutral, and the PQ was positive with an initial verb. It was within-participant manipulation.

All the *náhodou* items were constructed carefully, so that the word *náhodou* in them would be perceived as a particle, not as an adverb with the meaning ‘accidentally’. This was mainly achieved by the content of the utterances: e.g., in a PQ like *Drží Tonda náhodou nějakou dietu?* (= ‘Is Tonda *náhodou* on a diet?’), it would be strange to interpret *náhodou* as an adverb, as being on a diet is not something people do by accident.

3.5.2 Predictions

For negative *náhodou* PQs, it was expected that outer negation would be more natural than inner. This is because *náhodou* PQs express speaker’s previous positive epistemic bias (speaker believes/hopes/etc. that p) and non-positive evidential bias (speaker hears something different than p from the addressee). For this reason, both values of CONTEXT (neutral and neg-biased) were expected to be natural with a negative *náhodou* PQ containing a PPI. *Náhodou* PQs with NCIs were expected to be unnatural irrespective of the context.

In addition, positive *náhodou* PQs were expected to be mostly unnatural as *náhodou* appears almost exclusively in negative PQs.

3.5.3 Results & discussion

Results for negative *náhodou* PQs are in Figure 10. The left cell shows inner negation PQs (with an NCI) and the right one shows outer negation PQs (with a PPI). CONTEXT on the x-axis was either negative (neg-biased), or neutral.

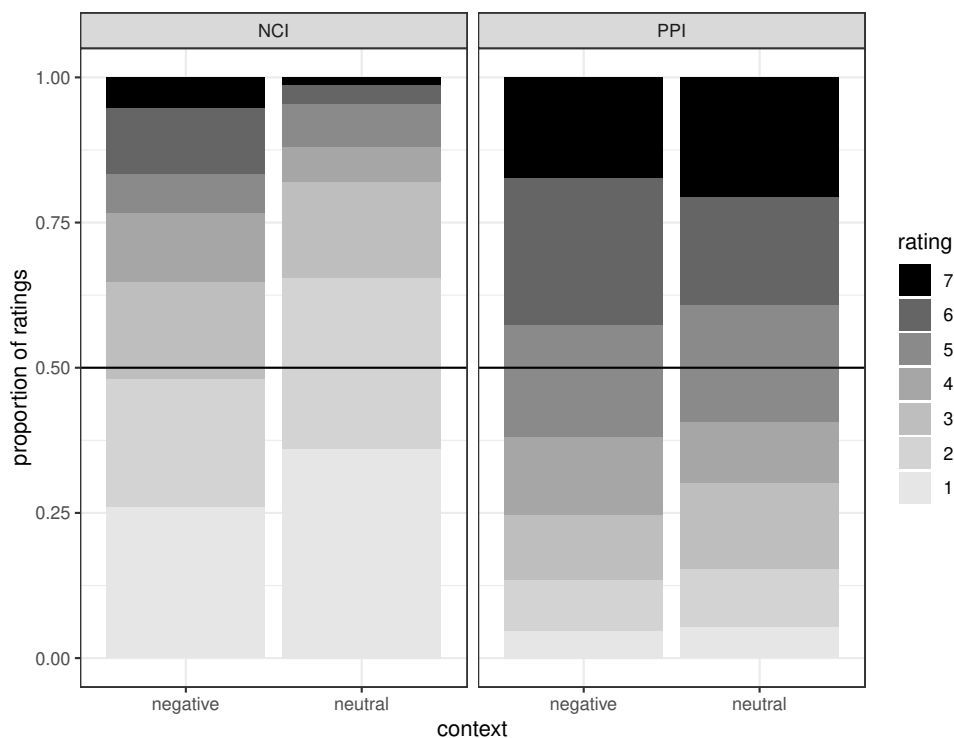


Figure 10: Raw results: ratings of naturalness depending on INDEFINITE and CONTEXT (F4).

Results for positive *náhodou* PQs are in Figure 11. The ratings of individual participants for each of the two items are in Figure 12.

The results of F4 are in line with the expectations. *Náhodou* is primarily associated with outer negation PQs and rather repulsive of inner negation. I observed main effect of INDEFINITE ($z = -12.845, p < .001$). Based on these findings, I suggest that *náhodou* could be used as a test for the type of negation in PQs. It seems to be indicative of FALSUM in the structure.

Context had an effect on the naturalness ($z = 2.634, p < .01$). However, this context effect mirrors the one from the main experiment (see section 3.2), at least for inner negation combined with neg-biased context. Both types of context were rated as natural for outer negation (PPI) *náhodou* PQs. From this it can be concluded that evidential bias is not necessary

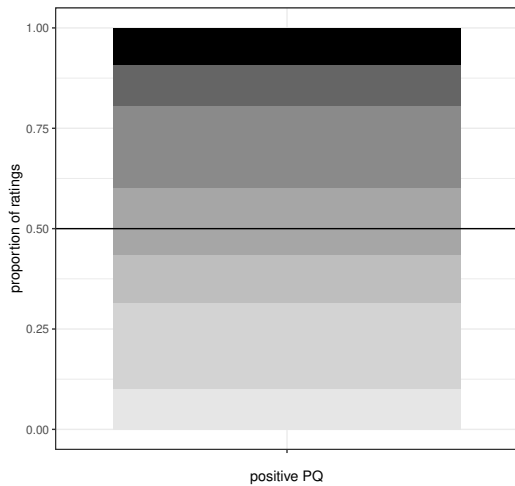


Figure 11: Raw results (F5)

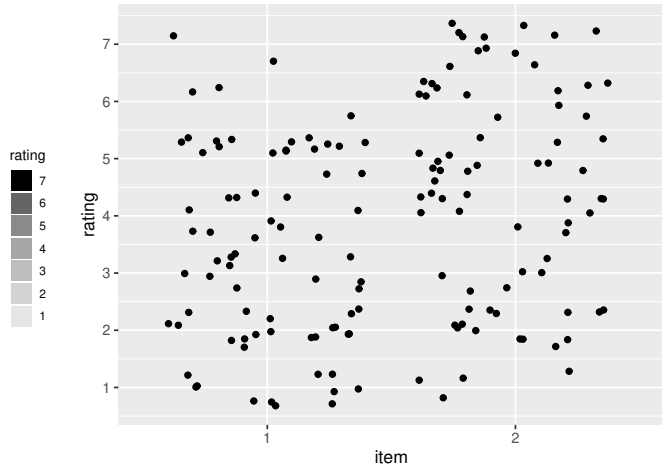


Figure 12: Naturalness ratings of individual participants (F5)

for these PQs, and that they are primarily used to check epistemic bias, i.e., what the speaker believed/knew/hoped for.

F5 showed that *náhodou* in positive PQs was rated as quite neutral (median of 4). If we look at the ratings of the two items separately, one of them got median 3 and the other median 5. As there were only two items in the design, it would be difficult to make definite conclusions based on such a small number of data. Nevertheless, this filler experiment showed that positive *náhodou* PQs are not that preferable and that they are problematic for Czech speakers to compute. This is evident from the jitter plot in Figure 12, where each dot represents the rating from one participant. As we can see, the ratings are not clustered, quite the opposite, they are spread along the whole scale. Participants were not in agreement, which suggests that these PQs are uncommon. In comparison to the ratings of positive PQs in F1 (where the median rating was 7), the variant with *náhodou* seems less favorable.

3.6 Filler experiment 6

3.6.1 Design and materials

In filler experiment 6 (F6), I focused on *snad*. It was mainly designed as an exploratory experiment to obtain some data about this particle. For this reason, I put *snad* PQs into three types of CONTEXT (neutral, neg-biased, pos-biased). I further manipulated VERB POSITION (V1, or non-V1), POLARITY (positive, or negative PQs), INDEFINITE (NCI, or PPI). I constructed 4 items, each with 18 conditions. In order to keep the naturalness of the experimental set-up balanced, I excluded several of the conditions, such as those that had a positive PQ combined with an NCI. These could skew the results towards lower rating independently of the presence of the particle.

3.6.2 Predictions

I had few predictions about the *snad* particle and its usage in PQs based on previous accounts. All the values of VERB POSITION, POLARITY and INDEFINITE were believed to be relatively natural, depending mostly on their mutual compatibility, e.g., V1 PQs would prefer PPIs rather than NCIs, which is something we have already seen in E1.

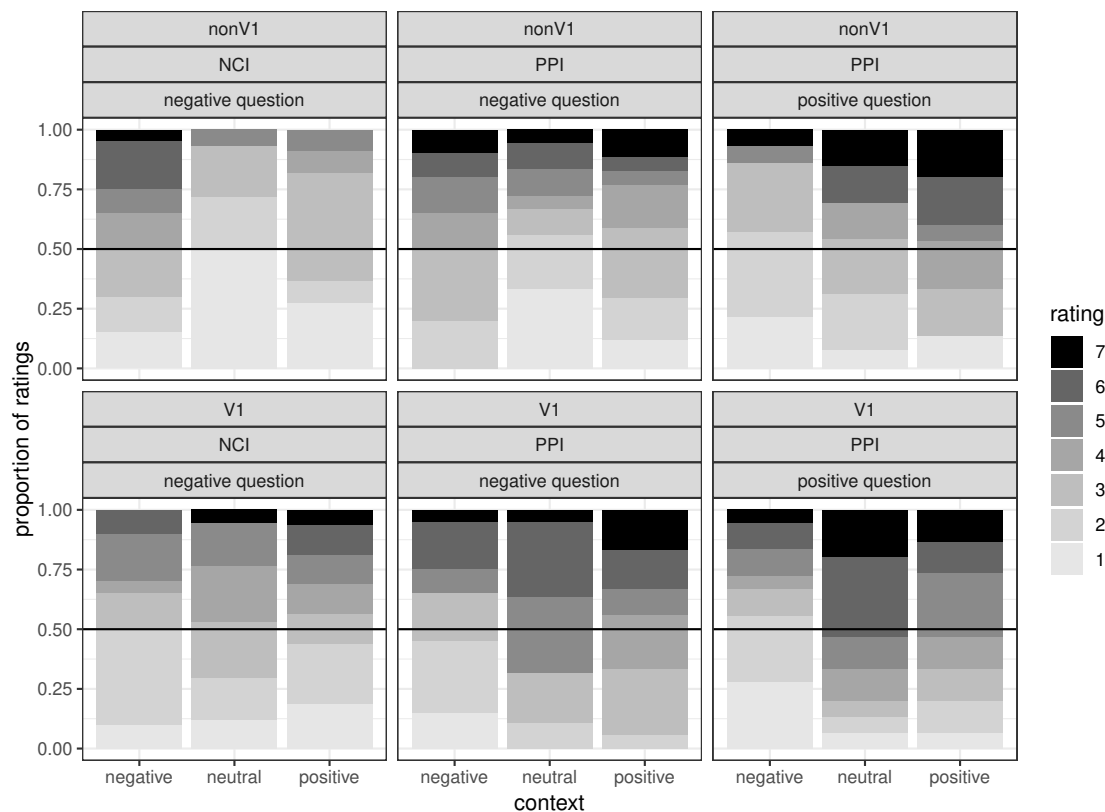


Figure 13: Raw results: ratings of naturalness depending on VERB POSITION, INDEFINITE, POLARITY and CONTEXT (F6).

Snad was claimed to be connected with bias, and therefore it was expected to be unnatural in neutral contexts. Since the polarity of a *snad* PQ should be the same as the polarity of its evidential bias, I expected POLARITY to interact with CONTEXT, whenever CONTEXT was not neutral.

3.6.3 Results & discussion

Figure 13 presents the ratings of *snad* PQs. The upper cells show nonV1 PQs and the lower cells show V1 PQs.

When examining the results in Figure 13, some combinations of factors seem to be rather unnatural, e.g., a nonV1 PQ with an NCI in a neutral context, which support the results from E1.

In post hoc statistical analysis for positive and negative PQs separately, I did not discover any effect of CONTEXT: for positive PQs in neutral and positive contexts: $z = -0.037, p > 0.9$; for negative PQs in negative and neutral contexts: $z = 1.315, p > 0.1$. This means that *snad* PQs can be natural even in neutral contexts, and therefore do not have to carry positive nor negative evidential bias. It is possible that *snad* is not connected to evidential (at least not as strongly), but epistemic bias, which I did not involve in the experiment.

After comparing the *snad* PQs in negatively and positively biased contexts, there was an effect of CONTEXT ($z = -2.145, p < .01$). I also observed an interaction between CONTEXT and POLARITY ($z = 2.124, p < .01$). Such findings are in line with the expectations about the polarity of *snad* PQs being the same as the polarity of their evidential bias.

item	CONTEXT	VERB POSITION
1	neutral	V1
2	neutral	V1
3	pos-biased	non-V1
4	pos-biased	non-V1

Table 9: Variable manipulations in individual conditions (F7)

3.7 Filler experiment 7

3.7.1 Design and materials

The last particle I tested was *přece*. My hypothesis (supported by previous accounts) was that *přece* cannot occur under the *Q*-morpheme, as it is strongly associated with assertions. I presented the participants with PQs containing *přece* to test this. The experiment consisted of 4 items. I tested CONTEXT (neutral, or pos-biased) and VERB POSITION (V1, or non-V1). Table 9 summarizes the variables and their values, which were manipulated within-participants, not within-items. Biased context was always matched with a non-V1 variant, while neutral CONTEXT was matched with a V1. All the PQs were positive.

3.7.2 Predictions

I expected that the items from filler experiment 7 (F7) would receive very low ratings as they contained the particle *přece*, which is rather unnatural in questions (see section 2.5.4). It is predominantly used in assertions, which are mainly associated with declarative word order, so a slight preference of the non-V1 items was expected.

3.7.3 Results & discussion

I present the results for *přece* in two separate plots. In Figure 14, there are the results for V1 PQs, and in Figure 15 there are results for non-V1 PQs. The jitter plot in Figure 16 shows ratings of individual participants for the four items.

The results of this filler experiment were in agreement with the predictions. *Přece* is unusual in PQs, even in positive PQs in neutral context which are said to be unbiased. There was no difference in the combinations of CONTEXT and WORD ORDER – both variants were rated as unnatural. If we look at the jitter plot in Figure 16, similarly to the case in section 3.5 with positive *náhodou* PQs, the ratings of items 1, 3 and 4 were not in agreement (the dots are dispersed). The participants probably had difficulties when rating these types of sentences. At the same time, there could have been an item effect.

In this filler experiment, the rating relied very much on what intonation the participants assigned to the PQs. If they imagined a *přece* PQ pronounced with a rise or fall-rise intonation pattern, they might have judged the question as unnatural, since the interrogative type of intonation pattern would be in disagreement with assertion-related *přece*. If the participants imagined a falling boundary tone, then they probably interpreted the PQ as an assertion and rated it as natural.

The next section describes two control experiments. They were mainly used to check the reliability of the items as well as participants.

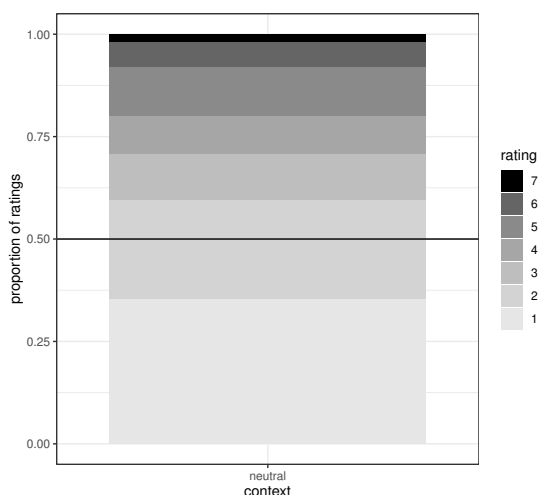


Figure 14: Raw results (F7 V1)

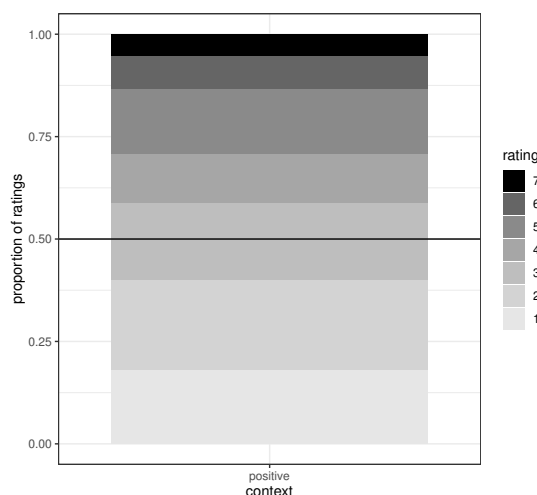


Figure 15: Raw results (F7 non-V1)

3.8 Repetitiveness & reliability filler experiments

3.8.1 Design and materials

The repetitiveness filler experiment (2 items) was included to control for the effect of the same verb appearing in the context as well as in the PQ. The reliability filler (10 items) was used as a participant filter. There were 3 items which were supposed to be rated as very unnatural (positive PQs with an NCI) and 7 items which were expected to be natural. The participants had to rate these items with at least 80% accuracy. If they did not, they were excluded from the experiment results.

3.8.2 Results & discussion

When comparing the results from the repetitiveness filler experiment, I found no statistically significant effect of the verb repeating itself. From this I conclude that when the context as well as the PQ featured the same verb, it did not affect the rating of the participants. However, what might have affected the overall ratings was the name of the protagonist, which repeated itself in the context and the PQ, e.g., *Jana* or *Viktor* in (54) and (57), or the fact that the mode of presentation was written, not spoken (as written language is more difficult to process than spoken). Such questions remain open and would have to be tested in a follow-up experiment.

As for the reliability of participants, I excluded 10 participants from the data set, because they did not pass the required accuracy of ratings. The data from these participants would have skewed the results, which I have prevented this way.

With this, I end the section about the experiments. In the next one, I conclude the thesis. I recapitulate the main points, observations, proposals and contributions, which I have made. Moreover, I pose further research questions that I could not address here.

4 Conclusion

In the present thesis, I focused on the topic of Czech polar questions from the formal perspective. I investigated the effects of formal features, such as word order or negation, on their

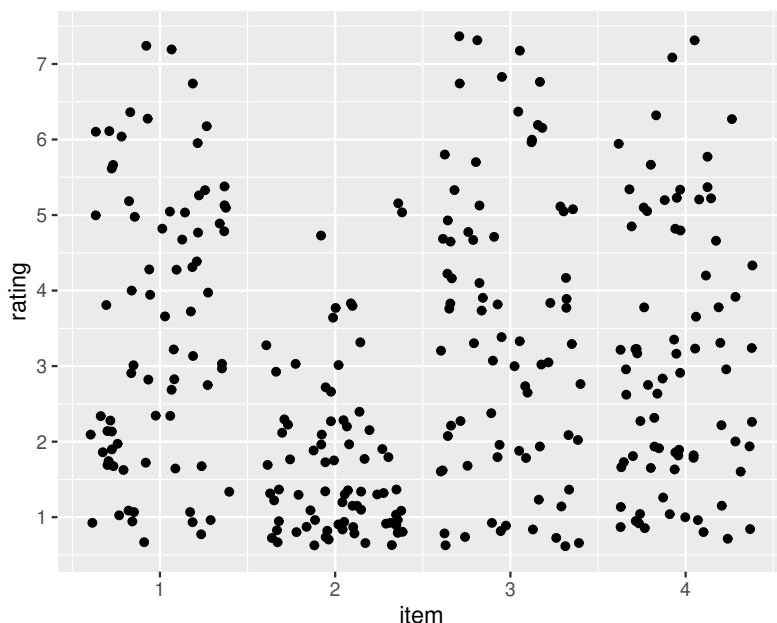


Figure 16: Naturalness ratings of individual participants (F7)

semantic and pragmatic interpretation, esp. their bias. Moreover, multiple question particles were put under scrutiny.

The experiments which I ran offered an empirical point of view of the topic of PQs. They provided data which helped me to map the usage of PQs in Czech. In contrast to corpus data, it allowed me to manipulate certain variables, such as the PQ's word order (V1 vs. non-V1), type of negation (inner vs. outer) or context (biased vs. neutral), which enabled me to study these in more detail.

As for the theoretical contributions, I proposed a syntactic analysis of verb movement as a head, which raises to PolP in V1 PQs. The verb position in combination with the semantic operators VERUM and FALSUM signal different types of negation, inner and outer, respectively. I suggested that the evidential bias profile of Czech negative PQs should be broader than that of English PQs. Since Czech is a Slavic language, it seems natural to expect that it behaves differently from other families of languages. This assumption proved to be right because Czech outer negation PQs are licensed even in a positively biased context. I also stressed that when constructing a bias profile, word order needs to be considered, at least for Czech. I confirmed what was claimed before about the interaction between a PQ's word order and type of negation: V1 tends to the outer negation interpretation, whereas non-V1 tends to the inner negation interpretation. However, negative contextual evidence enables outer negation even in non-V1 PQs. This result suggests a strong connection of context and word order in PQs: a (negatively) biased context triggers the non-V1 word order. This correlation (if not causality) follows from the fact that negative V1 PQs are underspecified with respect to evidential bias: if there is a need to convey negative evidential bias, a non-V1 PQ is the only reliable way of doing that.

As for the particles, *copak* and *snad* were confirmed to be strongly tied to biased contexts. *Náhodou* can be used as an indicator of outer negation, if not being FALSUM itself. *Přece* tends to be associated with the assertion environment rather than being used in questions.

My thesis leaves several issues unresolved. For example, in my experiments, I worked only with evidential bias, but epistemic bias was left aside. It would be interesting to fill in this gap

by attempting to test epistemic bias of positive as well as negative PQs. Related to this are outer negation PQs which signal the speaker's hope or have a specific illocutionary force, such as an offer (e.g., *Nechceš něco k pití?* = 'Would you like something to drink?') or a suggestion (e.g., *Nepůjdeme si někam zaplavat?* = 'Why don't we go swim somewhere?'). These were excluded from the experiments, but they deserve more theoretical and empirical attention. I did not have the space to address prosody of Czech PQs and its effect on their interpretation. Further research could test whether prosody can distinguish between outer and inner negation (as suggested by Kopecký 2010) or if it is able to signal different constellation of the sentence elements and the VERUM/FALSUM operators. Last but not least, an interesting follow-up would be to investigate the relation between PQs' features and information structure.

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