Questions in context: the case of French wh-in-situ

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4 A role for context: prosody[25]

1 Introduction

As I discussed in Chapter 2, one of the areas in which the data regarding French *wh*-in-situ questions are not yet clear is their prosody. I target this issue in the current chapter. In Chapter 3, I discussed two factors that may affect the prosody of these questions, both of which are connected to context. They are the information structure of the sentence and the distinction between echo and information seeking questions. In this chapter, I investigate whether these two factors affect the prosody of French *wh*-in-situ questions, and if so, how.

In the first place, the context in which a sentence is uttered affects its information structure, which may in turn affect its prosody. Even though there are languages that mark the *wh*-phrase as the focus of a *wh*-question, I laid out in Chapter 3 that this is not the case for all languages. Based on the behaviour of *wh*-fronting questions, French falls in this latter category of language (Beyssade 2006; Beyssade et al. 2007).

In the second place, French *wh*-in situ questions may be string-identical to echo questions. As was shown in Chapter 3, an echo question 'echoes' the preceding utterance and can therefore only be uttered in a particular context. Although echo and information seeking questions can be string-identical, they display different prosodic properties in several languages for which this has been investigated. It is as yet unclear whether they also differ prosodically in French.

In this chapter, I report on a production experiment that investigated the influence of these two factors relating to context on the prosody of

[25] This chapter corresponds roughly to a paper that has been published as:
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French *wh*-in-situ questions. The research question, which is subdivided into three sub-questions, is the following (1).

(1) *Research question*
Does the context in which a French *wh*-in-situ question is uttered influence its prosody, and if so, how?

A. Is information structure reflected in the prosody?
B. Is the distinction between echo and information seeking questions reflected in the prosody?
C. What prosodic properties are unaffected by the contextual factors in A. and B.?

As I mentioned in Chapter 3, two main types of echo questions are commonly distinguished: those expressing auditory failure and those expressing surprise. I also mentioned that the emotion of surprise itself may affect the prosody of speech utterances. To avoid this confound, the experiment reported in this chapter focuses on echo questions expressing auditory failure. The term 'echo question' refers in the chapter to this particular type, unless specified otherwise.

The chapter offers prosodic descriptions of French *wh*-in-situ questions and demonstrates that the context in which such questions are uttered affects their prosody. Both differences in information structure and the distinction between echo and information seeking questions are reflected. The chapter also adds to and confirms claims regarding focus marking in French. Furthermore, it shows that the focus in *wh*-interrogatives may differ depending on the context. The chapter also describes the prosodic properties of French echo questions and shows that these differ from those of information seeking questions, even if the information structure of the questions is the same.

The structure is as follows. In Section 2, I provide the necessary background information. Section 3 presents the experimental design of the production experiment, for which I developed the elicitation paradigm 'Scripted Simulated Dialogue'. Using this paradigm, the context preceding a French *wh*-in-situ question was manipulated in order to elicit a particular type of question (echo or information seeking) and a

particular information structure in information seeking questions. Section 4 presents the results of the experiment. Section 5 provides discussion of the findings and Section 6 concludes the chapter.

2 Background

Chapter 3 discussed the notions of focus and givenness I employ in the dissertation and provided background information on echo questions. As further background to the production experiment, I discuss here the prosodic correlates of information structure in French (Section 2.1) and the prosodic properties of French echo as compared to information seeking questions (Section 2.2).

2.1 Prosodic correlates of information structure in French

In languages like English, focus is marked by the presence of the nuclear pitch accent (see also Chapter 3) (Pierrehumbert 1980; Pierrehumbert & Hirschberg 1990; Selkirk 1984a); for French, this is less clear. As French has no lexically stressed syllables to which a pitch accent may be assigned, the notion of a pitch accent is a complicated one. In French, the right edge of a focus is preferably aligned with (i.e. situated at) the right edge of a prosodic constituent and is marked by a tone (2) (Beyssade et al. 2004a; 2004b; Clech-Darbon et al. 1999; Delais-Roussarie et al. 2015; Féry 2001; 2013; Hamlaoui 2008) .

(2) [[... focus]$_{\text{TONE}}$ ...]

I will assume that this is the boundary tone associated with the right edge of the Intonation Phrase, the prosodic constituent with which the focus is aligned (Beyssade et al. 2004b; Féry 2001; 2013).[26]

The tone at the right edge of a focus tends to be low (L) in declaratives and high (H) in interrogatives, reflecting the illocutionary force of the

[26] Alternatively, one could assume that the prosodic boundary determines the position of the nuclear pitch accent which in turn is responsible for focus marking.

utterance (Beyssade et al. 2004b; Clech-Darbon et al. 1999; Delais-Roussarie et al. 2004; Delais-Roussarie et al. 2015; Doetjes et al. 2004; Martin 1981). In broad focus utterances and sentences in which a narrow focus occurs sentence-finally, the tone is located at the end of the utterance (3).

(3) *Broad focus or focus at end of utterance*

a. Declarative

[… focus]$_{L\%}$

b. Interrogative

[… focus]$_{H\%}$

In other narrow focus utterances, the tone usually occurs twice, both at the end of the focus and at the end of the utterance. This phenomenon, which is visualised in (4), is referred to as 'tone copying' (Martin 1981).

(4) *Tone copying*

a. Declarative

[[… focus]$_{L\%}$ …]$_{L\%}$

└ COPYING ┘

b. Interrogative

[[… focus]$_{H\%}$ …]$_{H\%}$

└ COPYING ┘

Specifically, Martin claims that the F0 minimum (in declaratives) or maximum (in interrogatives) of the final syllable of the focus is copied to the final syllable of the utterance. This leads to two syllables that are very similar in pitch.

When a given constituent follows the focus (5), it may be compressed (Dohen & Lœvenbruck 2004; Féry 2001; Jun & Fougeron 2000).

(5) [[… focus]$_{H\%}$ [given post-focus]]$_{H\%}$ (interrogative)

The prosodic correlates of this are a lower F0 and a shorter duration (Destruel & Féry 2015). However, unlike in the Germanic languages where post-focal material is standardly deaccented, such material is not always compressed in French. In contrast, post-focal givenness compression seems to occur mainly in material that forms its own (maximal) phonological phrase (Destruel & Féry 2015; Féry 2014; Hamlaoui et al. 2012). In addition, there may be some genuine optionality as to its occurrence, i.e. more so than in the Germanic languages (Féry 2014; see also Beyssade et al. 2004b).

Regarding the area preceding the focus, it is not yet clear whether French marks given material there as such (6).

(6) [[[given pre-focus] focus]$_{H\%}$ …]$_{H\%}$ (interrogative)

Some authors have observed a compression of the pitch in this area (Dohen & Lœvenbruck 2004; Jun & Fougeron 2000; Touati 1987) and a reduced amplitude (Jun & Fougeron 2000). In contrast, Beyssade et al. (2004b) state that there is no pitch compression in the pre-focus domain.

Only a few previous authors discussed focus marking in French *wh*-in-situ questions. First, Mathieu (2016) relates known prosodic correlates of focus marking to the prosody associated with an in-situ *wh*-phrase. As I explained in Chapter 3, it is a common assumption that in *wh*-questions, the *wh*-phrase is the focus; this is also Mathieu's assumption. He notes that there is a prosodic boundary between an in-situ *wh*-phrase and any subsequent material (see also Chapter 2). Under the assumption that the *wh*-phrase is the focus, he interprets this as a correlate of focus marking, cf. (2) above. Second, Hamlaoui (2011) claims that the focus structure of a *wh*-question is related to the difference between *wh*-in-situ and *wh*-fronting in French (cf. Mathieu 2002: 124-133). According to her, *wh*-fronted questions have broad focus, while *wh*-in-situ questions standardly display a narrow focus on the *wh*-phrase. Like Mathieu's (2016) proposal, this predicts that there is only one focus structure possible for *wh*-in situ questions, which should lead to uniform prosody of information seeking *wh*-in situ questions. Finally, Di Cristo (2016) does allow for the possibility of different focus structures in French *wh*-in-situ questions. His approach

to focus in *wh*-questions is similar to my own. However, he states that the right edge of an in-situ *wh*-phrase is marked by an accent in all cases. Hence, he seems to suggest that the difference between broad and narrow focus is not prosodically marked. Note however that in the examples he discusses, the *wh*-phrase is situated at the end of the sentence. This means that the right edge of the focus co-occurs with the right edge of the sentence and tone copying cannot apply.

2.2 French echo versus information seeking questions

Regarding the distinction between echo and *wh*-in-situ information seeking questions, it is as yet unclear whether these two question types are prosodically distinct in French, and if so, how.

Most of the debate surrounding the prosody of *wh*-in-situ information seeking questions has centred on the question whether they obligatorily end in a large rise (i.e. a rise with a large pitch excursion). This debate was described in Chapter 2. A second controversial issue is whether they exhibit an accent on the *wh*-word. Gryllia et al. (2016) systematically found an emphatic accent in questions uttered without context (cf. Engdahl 2006; Hamlaoui 2011; Mathieu 2002; Wunderli 1983; Zubizarreta 1998). Yet according to Baunaz and Patin (2011), the *wh*-phrase does not bear any accent when the question is uttered in an out of the blue context (cf. Baunaz 2016; Wunderli 1982; Wunderli & Braselmann 1980).

The prosody of French echo questions has not yet been investigated in much detail. Most descriptions in the literature are very brief. Some of them describe echo questions as displaying an overall higher pitch than information seeking questions (Boeckx 1999; Di Cristo 1998). Most suggest that they display a large sentence-final rise (Adli 2006; Boeckx 1999; Déprez et al. 2013; Di Cristo 1998; Di Cristo 2016; Engdahl 2006; Mathieu 2002; Mathieu 2016). Some mention a prominent accent on the *wh*-word (Chang 1997: 17; Engdahl 2006; Mathieu 2002). According to Engdahl (2006), the *wh*-word may also be lengthened.

Déprez et al. (2013) investigated the prosody of echo questions as compared to (*wh*-in-situ) information seeking questions experimentally, but focused exclusively on the final part of the utterance. Their study

offers some first evidence to suggest that the final rise in echo questions may be present more consistently and may display a somewhat larger pitch excursion. However, the methodology of the study does not allow for a statistical comparison of the question types, nor for a mapping of the F0 (i.e. pitch) movements to individual syllables.

In short, while the prosodic properties of both question types are not yet clear, a large sentence-final rise and an accent on the *wh*-word have been claimed for both. Mathieu (2002: 58), who claims that there is no large sentence-final rise in information seeking questions, even states that if such a rise were present, it would be very hard to distinguish information seeking questions from echo questions. Hence, in order to clarify the prosodic properties of information seeking questions, it is essential to distinguish explicitly between the two question types and to find out whether they differ. This also provides the first in-depth description of the prosody of French echo questions.

3 Experimental design

I now turn to the experimental design. To answer the research question in (1) above, I set up three conditions (7).

(7) *Conditions*
   A. Echo question (expressing auditory failure)
   B. Information seeking question with broad focus
   C. Information seeking question with narrow focus

As I explained in Chapter 3, echo questions (Condition A) always have a narrow focus on the *wh*-word, as the non-*wh*-portion of the question is 'echoed' from the previous utterance. The focus structure in broad focus questions (Condition B) is therefore maximally different from the focus structure in echo questions. As a third condition, I included information seeking questions with an information structure as in echo questions, i.e. a narrow focus on the *wh*-word (Condition C). Consequently, if information structure is marked prosodically in French *wh*-in-situ questions (RQ A. in (1)), information seeking questions with broad focus

(Condition B) should differ from both echo questions (Condition A) and information seeking questions with a narrow focus on the wh-word (Condition C) as in echo questions. In addition, if the distinction between French *wh*-in-situ echo and information seeking questions is reflected in the prosody (RQ B. in (1)), echo questions (Condition A) should differ from both types of information seeking questions (Conditions B and C). An advantage of this experimental set-up is that it is possible to separate the prosody associated with the discourse-semantic function of echo questions from the prosody associated with their specific information structure.

I elaborate on the properties of these three conditions in Section 3.2. The conditions were created by manipulating the context preceding the target sentences. I start by laying out the elicitation paradigm designed to accomplish this context manipulation (Section 3.1). Subsequently, the constructed materials are discussed, which include both items and contexts (Section 3.2). I then lay out the recording procedure (Section 3.3), the participants (Section 3.4) and the acoustic (Section 3.5) and statistical analyses (Section 3.6).

3.1 Elicitation paradigm: Scripted Simulated Dialogue

To elicit the three conditions, I designed a paradigm that I will refer to as Scripted Simulated Dialogue. This elicitation paradigm simulates a series of short dialogues, in which the participant's interlocutor is a recorded voice. The participant's speech turns are scripted: s/he reads them from a computer screen. Every dialogue has one target sentence or filler embedded in it, always at the same position in the dialogue. As this position is almost at the end of the dialogue, the preceding discourse can be used to manipulate a particular reading of the sentence. The participant does not know that the dialogues contain a particular target sentence.

Every dialogue is preceded by a description of the conversational setting, which contains information about who the interlocutors are and where the conversation takes place. The context manipulation thus has two elements: the description of the conversational setting and the

preceding speech turns. An example of a dialogue is presented in Figure 1. Speaker A represents the participant and Speaker B the 'interlocutor'. The target sentence is underlined (it was not in the actual experiment).

[Conversational setting] Tu discutes avec Ernestine, ta femme. Elle part quelques jours en voyage d'affaires et rentrera mercredi, juste à temps pour ton anniversaire. Tu lui dis :

A *Bon voyage ma chérie. Tu as bien ton passeport ?*
B *Oui merci. Ah voilà mon taxi.*
A *Tu m'envoies un texto quand tu es arrivée à Londres ?*
B *Oui, oui bien sûr. A mercredi ; pour ta dernière soirée de trentenaire !*
A *Moque-toi ; dans six mois c'est ton tour. D'ailleurs tu ne m'as pas dit.*
Tu as réservé quel resto pour jeudi soir ?
B *Surprise…*

[Conversational setting] You're talking to Ernestine, your wife. She's going on a business trip for a few days and will be back on Wednesday, just in time for your birthday. You say:

A *Have a good trip love. Have you got your passport?*
B *Yes thanks. Oh that's my taxi.*
A *Will you send me a text when you've arrived in London?*
B *Yes, sure, I will. On Wednesday; on your last evening in your thirties!*
A *Careful with the teasing; in six months it's your turn.*
By the way, you didn't tell me.
Which restaurant did you book for Thursday evening?
B *Surprise…*

Figure 1. Example of a Scripted Simulated Dialogue (used in Condition B) with translation underneath

Following each dialogue, the participant receives a question about the information supplied by the recorded 'interlocutor', as in (8).

(8) Ernestine rentre de voyage…
1. mercredi
2. samedi
3. vendredi

Ernestine is coming back from her trip on…
1. Wednesday
2. Saturday
3. Friday

The purpose of this is to direct the participants' attention to the content of the dialogue, rather than the form of the utterances. The elicitation paradigm is discussed further in Section 4.2 of Chapter 7.

3.2 Materials

Twelve target stimuli were created. Each of these was presented in three conditions, yielding a total of thirty-six target utterances. The stimuli had twelve syllables. An example is shown in (9), along with its translation as an echo and an information seeking question.

(9) Tu as réservé quel resto pour jeudi soir ?
You have booked which restaurant for Thursday evening?
'You booked which restaurant for Thursday evening?' [Echo]
'Which restaurant did you book for Thursday evening?' [Inform. s.]

All stimuli contained the pronoun *tu* 'you (informal)' as a subject (to avoid differences in the information status of the subject), followed by a verb composed of the auxiliary *as* 'has' and a three-syllable past participle. Next came the *wh*-phrase, which was the direct object of the utterance. It contained the *wh*-word *quel* 'which' and a disyllabic noun. I chose to use complex *wh*-phrases (rather than, for instance, *quoi* 'what') to keep the prosody associated with the *wh*-word distinct from the prosodic correlates of a possible phrase boundary at the end of the *wh*-phrase. A PP, composed of a one-syllable preposition and a three-syllable DP, followed the *wh*-phrase. Its purpose was to separate the prosody associated with

the *wh*-phrase from the prosody associated with the end of the utterance. Sonorants were used as much as possible to facilitate F0 measurements.

The target sentences were intermingled with thirty-six fillers. Twelve of these were declaratives that resembled the discourse-pragmatic function of echo questions, such as *Désolé, je n'ai pas bien entendu* 'Sorry, I didn't hear what you said'. The remaining twenty-four fillers were sentences that fitted naturally in the context and that were not *wh*-in-situ questions.

Each stimulus or filler was embedded in a dialogue as in Figure 1 above. The dialogues always had six speech turns, three for the participant and three for the recorded 'interlocutor'. The stimulus or filler was part of the participant's last speech turn, with the 'interlocutor's' last speech turn following it. The dialogues, which were written and checked by three native speakers of French, were constructed to be natural and informal.[27] The voice that represented the 'interlocutor' was a female native speaker of French, while the description of the conversational setting that preceded a dialogue was read by a male speaker (to make the distinction clear). Both were recorded in the Leiden University phonetics lab.

Except for the dialogues containing fillers, each dialogue had certain properties that were intended to trigger either an echo question expressing auditory failure (Condition A), an information seeking question with broad focus (Condition B) or an information seeking question with an information structure as in echo questions, i.e. a narrow focus on the *wh*-word (Condition C). I discuss each of these in turn.

Figure 2 presents an example of a dialogue used in Condition A (echo question). In this example, pink noise (a deep, even noise) covers the word *Monette* (represented as strikethrough text). This causes a need to ask for repetition. (Recall also that after every dialogue, a participant is asked a question about the content of the dialogue.) An episode of pink noise was also present in all other contexts (pertaining to the other

[27] I would like to thank Yannick Gloanec, Marion Bracq and in particular Sylvie Cuchet.

conditions and the fillers), but in a position where it would not hinder the conversation, for instance on the final syllable of a long word.

[Conversational setting] Tu es directeur d'une petite école primaire. La semaine prochaine, c'est la rentrée des élèves. Mais, demain, mercredi, c'est la pré-rentrée pour les maîtres et maîtresses. Tu es à l'école avec Axelle, ta secrétaire, pour organiser les dernières petites choses. Tu dis :

A *Et c'est reparti pour un an !*
B *Oui et avec deux classes et deux nouvelles maîtresses de plus.*
A *C'est bien qu'on ait prévu ce petit dîner*
pour faire plus ample connaissance.
B *Oui, d'ailleurs je voulais te dire, pour qu'on soit au calme pour parler,*
j'ai réservé le resto « chez ~~Monette~~ » pour jeudi soir.
A *Tu as réservé quel resto pour jeudi soir ?*
B *Chez Monette, dans la petite salle du fond, on devrait être tranquilles.*

[Conversational setting] You are the principal of a small primary school. Next week, it's the start of the new school year. But tomorrow, Wednesday, is the first day for the teachers. You are at the school together with Axelle, your secretary, to organize the last things. You say:

A *So we start again!*
B *Yes, and with two new classes and two new teachers.*
A *It was a good idea to have this small dinner party*
to get to know each other.
B *Yes, by the way, I wanted to tell you. In order to have a quiet place*
to talk, I booked the restaurant Chez ~~Monette~~ for Thursday evening.'
A *You booked which restaurant for Thursday evening?*
B *Chez Monette. They have a back room that's usually quiet.*

Figure 2. Scripted Simulated Dialogue used in Condition A (echo question) with translation underneath

Condition B, of which Figure 1 above is an example, was designed to elicit information seeking *wh*-in-situ questions with broad focus. Although the target sentence was preceded by context, it provided little information about the content of the question. Whereas the context was consistent with the existential implicature of *wh*-questions (i.e. the speaker expected there to be an answer), no part of the content of the question would be mentioned in the preceding context. Consequently, the *wh*-in-situ question formed a rather sudden departure from the topic of the preceding conversation. To keep the discourse natural, the context signaled this change in topic, for instance by a 'topic change marker' (Fraser 1996; 1999), like *d'ailleurs tu ne m'as pas dit* 'by the way, you didn't tell me' in Figure 1.

In Condition C, the context was designed to force a reading as an information seeking question with the same information structure as an echo question, i.e. a narrow focus on the *wh*-word.[28] To this end, the context would mention all elements of the content of the question except the *wh*-word, i.e. 'booking a restaurant for Thursday evening' in Figure 3 below. In order to create this type of context, while keeping the flow of the discourse natural, I used *wh*-in-situ questions with a contrastive topic, as in Engdahl (2006: 100). Subject pronouns in French are clitics and cannot be contrastively stressed (Kayne 1975). To express contrastive topichood, French uses another, 'strong' pronoun, which may be coreferential with a clitic (Lambrecht 1994: 115-116). I used *et toi* 'and you', which was taken up by the resumptive clitic *tu* 'you' in the clause proper. Consequenly, the sentence following the contrastive topic *et toi* 'and you' was string-identical to the target stimuli used in Conditions A and B.

[28] I discuss the information structure of echo questions further in Chapters 5 and 6, where I will show that in addition to their narrow focus on the *wh*-word, they are entirely 'given', which I will call 'Maximally Given'. As the context in Condition C was designed to elicit information seeking questions with the same information structure as echo questions, these questions are also Maximally Given.

[Conversational setting] Tu es violoniste dans un orchestre amateur. Tu es en séance de répétition. Pendant que les flûtistes répètent un passage délicat, tu parles avec ta voisine Eléonore. Tu lui dis :

A *Tu pars en déplacement cette semaine ?*
B *Non pour une fois, je suis là toute la semaine. Ça tombe bien, c'est la remise de diplôme de ma fille jeudi. Du coup, nous allons en famille au restaurant.*
A *C'est marrant, Fleur m'a raconté la même chose.*
B *Oui, elle m'a dit qu'elle a réservé au Pavillon pour jeudi soir.*
A *Et toi, <u>tu as réservé quel resto pour jeudi soir ?</u>*
B *Le Bord du Lac.*

[Conversational setting] You play the violin in an amateur orchestra. During a rehearsal, while the flutists are practicing a particularly difficult passage, you talk to Eléonore, who is sitting next to you. You say:

A *Are you going on a trip this week?*
B *No, just this once I'm going to be here all week. Good timing: it's my daughter's graduation ceremony on Thursday, so we're going out for a family dinner.*
A *Oh that's funny, Fleur said just the same thing.*
B *Yes, she told me she'd booked the restaurant Pavillon for Thursday evening.*
A *And you, <u>which restaurant did you book for Thursday evening?</u>*
B *Le Bord du Lac.*

Figure 3. Scripted Simulated Dialogue used in Condition C (narrow focus) with translation underneath

The complete experimental materials can be found in Appendix A.

3.3 Recording procedure

Recordings took place in a soundproof booth at Pôle Audiovisuel et Multimédia (PAM) at the University of Nantes.[29] Participants were seated in front of a computer screen at an approximate distance of 50 cm. They wore AKG K 44 perception headphones. The speech was recorded onto digital audio tape (DAT) at a sampling rate of 44.1 kHz, using a TASCAM DR-100 recorder and a TRAM TR50 clip-on microphone.

Participants were informed that they would be taking part in a series of short dialogues with a recorded 'interlocutor' that they would hear through their headphones and that their side of the dialogue would appear on the screen in front of them. They were encouraged to project themselves into the situation represented by the dialogue, speaking naturally, 'as if they were just talking to someone' and to repeat their utterance in case of a lapse. These instructions were presented visually on the computer screen and repeated orally at the beginning of the experiment. After that, the experimenter did not intervene.

Participants pressed a key once they were ready to start the experiment. This would prompt the recording of the first conversational setting to be played through the headphones (in a male voice), while the screen was blank. Every conversational setting ended with *Tu* (*lui*) *dis :* 'You say (to her/him):'. Then the participant's first speech turn would appear on the screen. The participant would utter his/her speech turn, after which s/he would press a key for the 'interlocutor's' speech turn to start playing through the headphones (in a female voice) while the screen was blank again. Then the participant's next speech turn would appear on the screen. This process would be repeated until the participant had uttered the question that formed the target sentence in his/her third speech turn (or a filler) and received an answer in the 'interlocutor's' third and last speech turn. The alternation of speaking, then pressing a key and listening to the 'interlocutor' very soon became an automatic process.

[29] I would like to thank Hamida Demirdache, Mohammad Abuoudeh and particularly Eric Quézin at the University of Nantes, and also Elizabeth Heredia Murillo for her aid in running the experiment.

After the last speech turn of every dialogue (item or filler), a multiple choice sentence completion task as in (8) above would appear on the screen, asking about information supplied by the 'interlocutor'. The participant would answer the question by pressing 1, 2 or 3. Feedback on the answer would appear on the screen: it was usually correct, since the task was designed to be easy if the participant paid attention to the interlocutor's speech turns. The participant would then press a key to move on to the next trial. The whole paradigm was programmed in E-Prime (Psychology Software Tools Inc. 2012).

The dialogues were randomized and presented to participants in three blocks, with breaks in between. Three practice trials were used for familiarisation purposes. The experiment lasted approximately an hour.

3.4 Participants

Twenty graduate and postgraduate students at the University of Nantes, monolingual native speakers of French, were reimbursed to participate in the experiment (12 female and 7 male, age range 18-29 years old). None of them reported any speech or hearing disorders.

3.5 Acoustic analysis

A total of 720 utterances were obtained. After inspection of the data for speech errors, hesitations or unnatural pausing, 98 utterances were excluded from further analysis. The remaining 622 utterances were segmented into phones, syllables and words using EasyAlign (Goldman 2011). The segmental boundaries were then checked and adjusted manually where necessary.[30]

The utterances were inspected again to uncover any patterns in the data, such as the occurrence of different prosodic tunes within the data elicited in one condition. I marked the number of occurrences of each prosodic tune.

[30] I thank Thomas Jansen for his valuable assistance.

Based on this inspection, I selected the utterances for the statistical analyses. I followed the reasoning that if a) a prosodic tune occurred in the majority of cases elicited in a particular condition and b) none of the other tunes came close to its frequency, then this prosodic tune might be considered to be the characteristic prosodic tune of utterances elicited in that condition. I included the items uttered with these characteristic prosodic tunes in the statistical analyses, with the exception of cases that exhibited the characteristic prosodic tune but with a variation (see also Section 4.1). This was done to achieve a sample that was as homogeneous as possible.

Based on the literature regarding the prosody of French *wh*-in-situ questions, I selected the following seven F0 measurement points to obtain an overview of the entire utterance. They are visualised in Figure 4 on the next page.

1. AUXILIARY LOW
   The lowest F0 point of the second person auxiliary *as* 'have'.
   (This point, rather than the first syllable *tu* 'you', was selected to capture the F0 in the beginning of the utterance, to avoid any influence from the preceding contrastive topic in Condition C.)
2. PARTICIPLE HIGH
   The highest F0 point of the final syllable of the participle.
3. WH-WORD HIGH
   The highest F0 point of the *wh*-word *quel* 'which'.
4. FINAL WH-PHRASE HIGH
   The highest F0 point of the final syllable of the *wh*-phrase.
5. ANTEPENULTIMATE LOW
   The lowest F0 point of the utterance's antepenultimate syllable.
6. PENULTIMATE LOW
   The lowest F0 point of the utterance's penultimate syllable.
7. ULTIMATE HIGH
   The highest F0 point of the final syllable of the utterance.

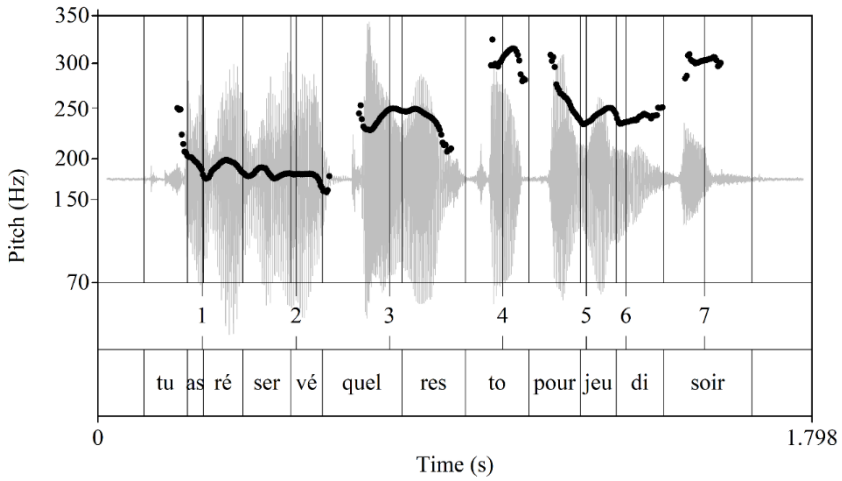

Figure 4. Waveform and Fo tune of the question *Tu as réservé quel resto pour jeudi soir ?* 'You booked which restaurant for Thursday evening?', elicited in Condition A (echo question), together with a textgrid indicating the seven measurement points

I also obtained the following Fo measurements, in order to gain insight into the pitch range of the utterances, the presence of tone copying and the presence of a sentence-final rise respectively.

A. PITCH RANGE, POINT 4 – POINT 1
The difference between the Fo maximum on the final syllable of the *wh*-phrase (a high point in the utterance) and the Fo minimum of the auxiliary (a low point in the utterance).

B. TONE COPYING, POINT 4 – POINT 7
The difference between the Fo maximum at the final syllable of the *wh*-phrase (the focus in narrow focus questions) and the Fo maximum at the final syllable of the utterance.

C. SENTENCE-FINAL PITCH MOVEMENT, POINT 7 – POINT 6
The difference between the F0 maximum at the final syllable of the utterance and the F0 minimum of the penultimate syllable.[31]

The F0 values were extracted with the help of a Praat script (Boersma & Weenink 2017), which took the values from the voiced part of the respective syllables. As rises in French have been shown to continue onto a sonorant syllable coda, and even (in rare cases) on a voiced obstruent coda (Welby & Lœvenbruck 2005), I included voiced consonants in the analysis. The F0 values in Hertz were subsequently converted into semitones (st) to reduce variation. (I used the formulas st = 12 log2 (Hz/100) for female speakers and st = 12 log2 (Hz/50) for male speakers respectively, following Li and Chen (2012).) In addition, I extracted the duration and the mean intensity in decibel (dB) of every syllable, using two more Praat scripts.

3.6 Statistical analysis

I ran a series of linear mixed-effects models using the *lmer* function of the *lme4* package (Bates et al. 2015) in R (R Core Team 2017). P-values were obtained using the package *lmerTest* (Kuznetsova et al. 2017). Specifically, I ran a model with the relevant measurement as the dependent variable, question type as a fixed factor, and intercepts of items and participants as random factors for every measurement. To obtain all relevant comparisons I ran the analyses for each reference category (Echo, Broad focus, Narrow focus). The results of the analyses can be found in Appendix B.

[31] The sentence-final pitch movement tends to start at the penultimate syllable of the utterance (Di Cristo 2016).

4 Results

I will now present the results of the experiment. First I provide descriptions of the three tunes that turned out to be characteristic of the utterances elicited in the respective conditions (Section 4.1). The remainder of the section is devoted to the comparisons between these three tunes with respect to F0 (Section 4.2) and duration and intensity (Section 4.3), after which I provide a summary of the results (Section 4.4). In short, the main results are the following. The utterances elicited in the three conditions differ from each other regarding F0 and duration, though not greatly regarding intensity. The utterances elicited in Condition B (information seeking questions with broad focus) differ from those in Condition A (echo questions) and Condition C (information seeking questions with narrow focus), indicating that information structure is reflected in the prosody (RQ A. in (1)). The utterances elicited in Condition A (echo questions) also differ from those in Conditions B and C (information seeking questions with broad and narrow focus), indicating that the distinction between echo and information seeking questions is reflected in the prosody (RQ B. in (1)). There are also some prosodic features that remain unaffected by these contextual factors (RQ C. in (1)).

4.1 Descriptions of the three characteristic prosodic tunes

Three prosodic tunes were frequently attested in the data; each of these tunes occurred in all three conditions. However, in every condition there was one tune that a) was attested much more frequently than any other tune and b) occurred only infrequently in the other conditions. I therefore regarded this tune as the 'characteristic tune' (ch.t.) of the respective condition. As mentioned, I used the utterances pronounced with the characteristic tunes of the conditions as input for the analyses. The distribution of the different prosodic tunes is illustrated in Table 1. For the sake of presentation, I will refer to the characteristic tunes of the three conditions as the 'Echo Tune', the 'Broad focus Tune' and the 'Narrow focus Tune'.

Table 1. The prosodic tunes and the frequencies with which they were attested in Conditions A, B and C. Shading marks the characteristic tune of each condition.

	CONDITION A	CONDITION B	CONDITION C
Ch.t. Condition A (echo question)	188 (87%)	6 (3%)	17 (9%)
Ch.t. Condition B (broad focus)	2 (1%)	146 (70%)	24 (12%)
Ch.t. Condition C (narrow focus)	13 (6%)	37 (18%)	137 (69%)
Other tune or unclassifiable	13 (6%)	19 (9%)	20 (10%)
Total number of cases	216 (100%)	208 (100%)	198 (100%)

I will now describe these three tunes. Figure 5 displays an example of an Echo Tune. In this tune, the F0 is quite low in the area of the utterance preceding the *wh*-phrase. There is a high point associated with the *wh*-word *quel* 'which'. The F0 rises to an even higher point associated with the final syllable of the *wh*-phrase; this peak can be high in the speaker's register. The F0 falls again on the PP, but not to the level of the beginning of the utterance: the F0 usually remains high. At the end of the utterance, the F0 rises to an extreme F0 level again, which is often similar to the F0 on the final syllable of the *wh*-phrase.

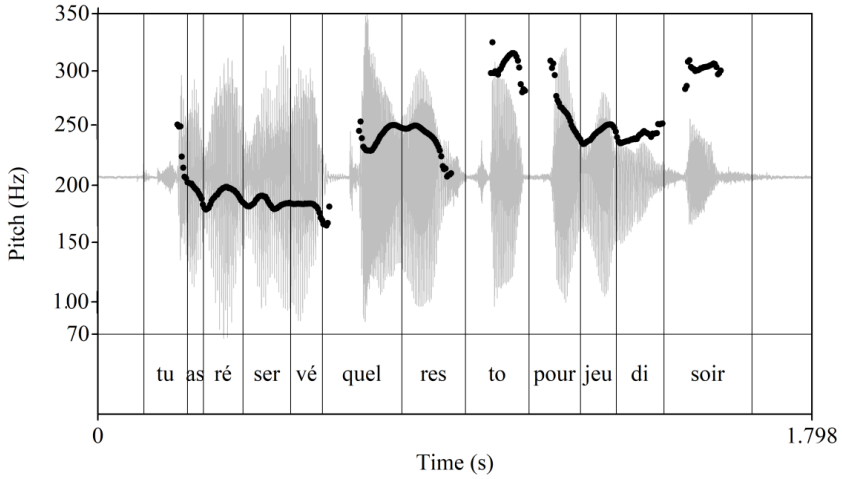

Figure 5. Waveform and F0 tune of the question *Tu as réservé quel resto pour jeudi soir ?* 'You booked which restaurant for Thursday evening?', uttered with the Echo Tune by a female speaker

Figure 6 shows an example of a Broad focus Tune.[32] There is a high point associated with the *wh*-word *quel* 'which', as in the Echo Tune. Subsequently, there is a high point associated with the end of the *wh*-phrase, which varies in height. (The peak can be late, aligned with the preposition.) There is often an F0 fall between these two high points associated with the *wh*-phrase, but the F0 can also stay level, forming a

[32] Note that this item was uttered by a male speaker, so its F0 is overall lower than that in Figures 5 and 7.

plateau over the whole *wh*-phrase. The F0 then falls on the PP, after which the sentence usually ends with a rise, which tends to be quite small. Note that the rise in the example in Figure 6 is rather large as compared to the average rise in utterances elicited in this condition.

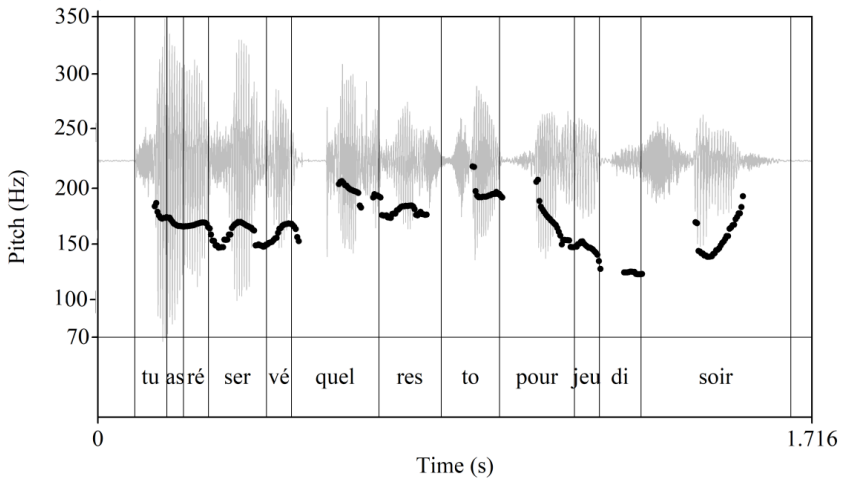

Figure 6. Waveform and F0 tune of the question *Tu as réservé quel resto pour jeudi soir ?* 'Which restaurant did you book for Thursday evening?' (lit. 'You have booked which restaurant for Thursday evening?'), uttered with the Broad focus Tune by a male speaker

Figure 7 displays an example of a Narrow focus Tune. The speaker is the same as the one that uttered the example of the Echo Tune in Figure 5. Recall that utterances elicited in Condition C (narrow focus) were preceded by the contrastive topic *et toi* 'and you' (see Section 3.2 for discussion). In the vast majority of cases, there is a high point associated with this contrastive topic (consistent with previous descriptions, Delais-Roussarie et al. 2004). Sometimes the contrastive topic is followed by a pause, with a subsequent pitch reset at the beginning of the utterance proper. When there is no pause (as in Figure 7), the F0 falls gradually from the high point of the contrastive topic. The fall then covers *tu* 'you' and often (part of) *as* 'have'. As in the Echo Tune, the rest of the area preceding the *wh*-phrase has low pitch. In contrast to both other tunes, there is either no high point associated with the *wh*-word, or a high point that is much lower. There is, however, a high point associated with the

last syllable of the *wh*-phrase. On the PP following the *wh*-phrase, the Fo falls, often to the level of the area preceding the *wh*-phrase.[33] At the end of the utterance there is an Fo rise, which often reaches a level that is similar to the high point at the end of the *wh*-phrase, like in the Echo Tune.

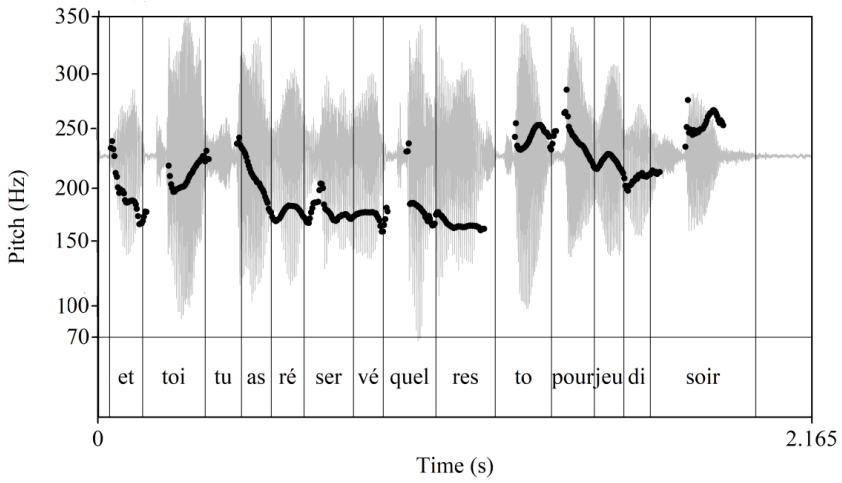

Figure 7. Waveform and Fo tune of the question *Et toi, tu as réservé quel resto pour jeudi soir ?* 'And you, which restaurant did you book for Thursday evening?' (lit. 'And you, you have booked which restaurant for Thursday evening?'), uttered with the Narrow focus Tune by a female speaker

These descriptions show that there are clear differences between the three tunes. Nevertheless, two features are present in all of them. Firstly, there is a high point associated with the end of the *wh*-phrase, followed by a fall on the PP, which I interpret as a prosodic boundary between the *wh*-phrase and the PP. Secondly, all three tunes end with at least a small

[33] It is not the case that all features of the three characteristic tunes are clearly manifested in each individual item. For instance, in the example in Figure 7, the Fo of the PP does not fall to the level of the area preceding the *wh*-phrase, but stays relatively high. My descriptions here reflect the tonal movements that I observed in most cases. They are confirmed by the average differences in semitones and statistical comparisons reported in Sections 4.2 and 4.3. The descriptions are therefore more representative of the average prosodic features than the individual examples displayed in the figures.

sentence-final rise (which seems larger in the Echo Tune and the Narrow focus Tune than in the Broad focus Tune).

Note that in all three characteristic tunes, one or both of these features were absent in some cases.[34] I excluded the utterances with a variation from the statistical analyses to achieve a sample that was as homogeneous as possible. Hence, I conducted the analyses on 164 utterances exhibiting the Echo Tune in Condition A, 130 utterances exhibiting the Broad focus Tune in Condition B and 136 utterances exhibiting the Narrow focus Tune in Condition C.

4.2 Comparisons of the three characteristic tunes: F0

I now turn to comparisons between the three tunes regarding their F0, starting with a visualisation of the seven measurement points in Figure 8 on the next page. (Note that the lines in this figure connect separate measurement points and do not represent contours.) In what follows, I discuss the different parts of the sentence in turn. All reported differences in semitones (st) are significant; details of the statistical analyses can be found in Tables 1 and 2 of Appendix B.

[34] Of the 211 occurrences of the Echo Tune in all three conditions, 180 (85%) exhibited the prototypical tune, 30 (13%) seemed to lack a fall on the PP and 1 (< 1%) lacked a sentence-final rise. The lack of a fall on the PP resulted in a high plateau over the post-focus given material, cf. Jun & Fougeron (2000).

Of the 172 occurrences of the Broad focus Tune in all three conditions, 149 (87%) exhibited the prototypical tune, 3 (2%) seemed to lack the high point at the end of the *wh*-phrase followed by a fall on the PP, 11 (6%) lacked a sentence-final rise and 9 (5%) seemed to lack both. The lack of a high point followed by a fall seemed to correlate with the absence of a prosodic boundary between the *wh*-phrase and the PP.

Of the 187 occurrences of the Narrow focus Tune in all three conditions, 179 (96%) exhibited the prototypical tune and 8 (4%) lacked a final rise (none seemed to lack a fall on the PP).

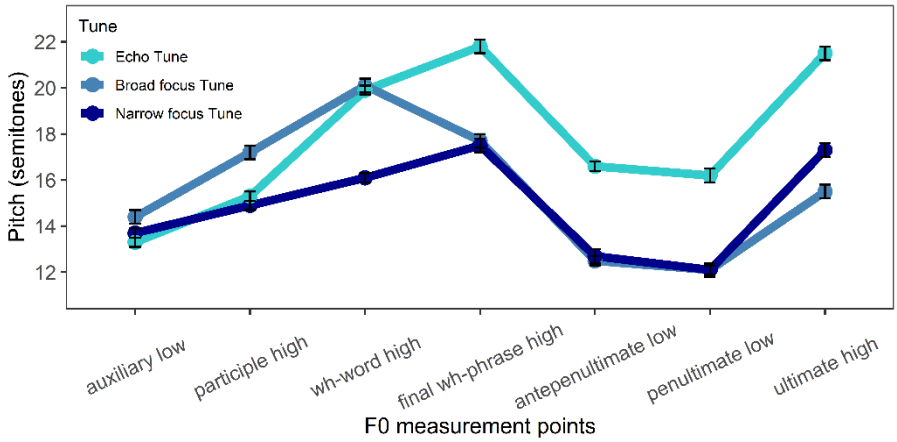

Figure 8. Average F0 at seven measurement points in the characteristic tunes of utterances elicited in Condition A (echo question), Condition B (broad focus) and Condition C (narrow focus), of the form *Tu as réservé quel resto pour jeudi soir* ? lit. 'You have booked which restaurant for Thursday evening?'

Preceding the *wh*-phrase

As shown in Figure 8, the Echo Tune and the Narrow focus Tune have lower pitch than the Broad focus Tune in the part of the utterance preceding the *wh*-phrase. At the participle ('participle high'), this difference is significant for both the Echo Tune [1.9 st] and the Narrow focus Tune [-2.3 st]. The F0 of the Echo Tune and the Narrow focus Tune does not differ in this part of the utterance. At the auxiliary ('auxiliary low'), the Echo Tune is also significantly lower than the Broad focus Tune [-1.1 st], but the Narrow focus Tune only marginally so [-0.7 st].

***Wh*-word *quel* 'which'**

At the *wh*-word *quel* 'which' ('*wh*-word high' in Figure 8), the F0 maximum in the Echo Tune and the Broad focus Tune are equal in height. However, consistent with the observation that there is no peak or a much lower one in the Narrow focus Tune (Section 4.1), the F0 maximum is significantly lower in that tune than in the other two [-4.0 st 'Broad focus Tune, -3.8 st Echo Tune].

Following the *wh*-phrase

From the final syllable of the *wh*-phrase onwards, the tonal movements in all tunes seem to be the same, but the F0 in the Echo Tune is elevated. The high point on the final syllable of the *wh*-phrase ('final *wh*-phrase high' in Figure 8) is much higher in the Echo Tune than in both other tunes [Broad focus Tune 4.1 st, Narrow focus Tune 4.3 st]. The F0 remains much higher: on the F0 minimum of the antepenultimate syllable ('antepenultimate low'), the F0 minimum of the penultimate syllable ('penultimate low') and the F0 maximum of the final syllable of the utterance ('ultimate high'). These F0 differences between the Echo Tune and the other two tunes are large: they range between 3.9 and 6 st and are highly significant.

The Narrow focus Tune and the Broad focus Tune behave similarly in this part of the utterance, with the exception of the final syllable. There, the Narrow focus Tune has significantly higher pitch than the Broad focus Tune [1.8 st].

I now turn to the difference in F0 between certain points in the utterance, which can still be found in Figure 8 above.

Pitch range

I first report on the pitch range, which was measured as the difference between the F0 maximum on the final syllable of the *wh*-phrase ('final *wh*-phrase high') and the F0 minimum at the auxiliary ('auxiliary low'). This pitch range is much larger in the Echo Tune [8.5 st] than in the Broad focus Tune [3.2 st] and the Narrow focus Tune [3.6 st]. The larger pitch range in the Echo Tune is mostly due to the high F0 from the final syllable of the *wh*-phrase onwards. It is exacerbated by the low F0 in the area preceding the *wh*-phrase. The pitch range does not differ significantly between the Narrow focus Tune and the Broad focus Tune.

Tone copying

Recall from Section 2.1 that a correlate of narrow focus in French is tone copying, which would result in very similar F0 values on the final syllable of the focus and the final syllable of the utterance. I therefore compared

the F0 maximum on the final syllable of the *wh*-phrase ('final *wh*-phrase high'), i.e. the focus in echo and narrow focus questions, and the F0 maximum on the final syllable of the utterance ('ultimate high'). Indeed, the F0 maximum of these syllables is extremely similar in the Echo Tune and the Narrow focus Tune. The average difference between them is 0.6 st (Echo Tune) and only 0.1 st (Narrow focus Tune) respectively. The difference is not particularly small in the Broad focus Tune: on average 2.5 st. The difference between the Echo Tune and the Broad focus Tune is significant, as well as the difference between the Narrow focus Tune and the Broad focus Tune. Yet, the Narrow focus Tune and the Echo Tune do not differ significantly.

The cause of the difference between the Narrow focus Tune and the Broad focus Tune is the higher F0 maximum on the final syllable of the utterance in the Narrow focus Tune ('ultimate high'). The F0 maximum on the final syllable of the *wh*-phrase ('final *wh*-phrase high') does not differ between these two tunes.

Sentence-final pitch movement

Finally, I measured the difference between the F0 maximum on the final syllable of the utterance ('ultimate high') and the F0 minimum of the penultimate syllable ('penultimate low') as an indication of the sentence-final pitch movement. This value is on average 3.4 st in the Broad focus Tune, 5.0 st in the Echo Tune and 5.3 st in the Narrow focus Tune. These values indicate the presence of a rise rather than a fall in all tunes. Still, the rise is significantly larger in both the Echo Tune and the Narrow focus Tune than in the Broad focus Tune, while it does not differ between the Echo Tune and the Narrow focus Tune. The larger rise in the Narrow focus Tune is again due to the higher F0 maximum on the final syllable of the utterance. The average F0 minimum of the penultimate syllable is the same in the Narrow focus Tune and the Broad focus Tune.

4.3 Comparisons of the three characteristic tunes: duration and intensity

In general, duration and intensity measurements were less informative than F0 regarding the differences between the three tunes. However, there are two observations to be made concerning duration. (The details of the statistics are reported in Tables 3 and 4 in Appendix B.)

Firstly, as is visualized in Figure 9, the *wh*-word *quel* 'which' is significantly longer in the Echo Tune (203 ms) than in both other tunes (177 and 175 ms). There is also some lengthening of the syllable preceding the *wh*-word, which was the final syllable of the participle, compared to the Broad focus Tune. (The *wh*-phrase as a whole also has longer duration in the Echo Tune, 36 ms longer than in the Broad focus Tune and 38 ms longer than in the Narrow focus Tune.)

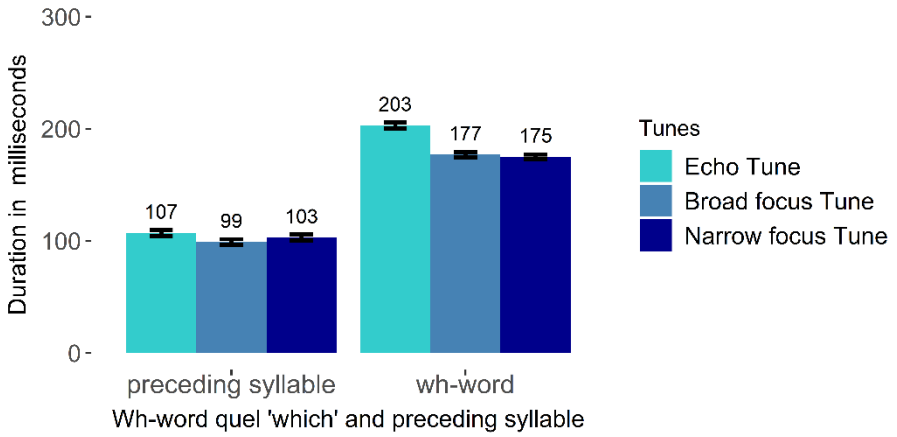

Figure 9. Average duration of the *wh*-word *quel* 'which' and the preceding syllable in the characteristic tunes of utterances elicited in Condition A (echo question), Condition B (broad focus) and Condition C (narrow focus), of the form *Tu as réservé quel resto pour jeudi soir* ? lit. 'You have booked which restaurant for Thursday evening?'

Secondly, as is shown in Figure 10, both the final and the penultimate syllables of the utterance are shortened in the Echo Tune. The final syllable of the utterance is also shortened in the Narrow focus Tune as compared to the Broad focus Tune. The Narrow focus Tune and the Echo Tune pattern together on this final syllable and do not differ significantly.

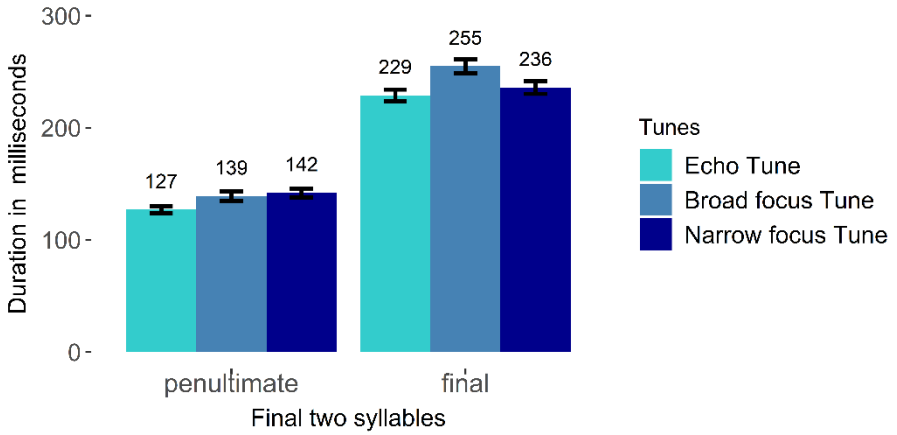

Figure 10. Average duration of the final two syllables of the utterance in the characteristic tunes of utterances elicited in Condition A (echo question), Condition B (broad focus) and Condition C (narrow focus), of the form *Tu as réservé quel resto pour jeudi soir* ? lit. 'You have booked which restaurant for Thursday evening?'

The role of intensity in distinguishing the three tunes is not very clear.

I examined whether the Echo Tune had higher intensity than the other two tunes on the *wh*-word *quel* 'which' or the final syllable of the utterance, since this has been reported for German (Repp & Rosin 2015). This was however not the case. The intensity on the *wh*-word in the Echo Tune was even lower than in the Broad focus Tune [-1.2 dB] and the Narrow focus Tune [-1.1 dB] (see Table 5 in Appendix B).

The sentences uttered with both the Echo Tune and the Narrow focus Tune displayed on average less intensity than the ones uttered with the Broad focus Tune (see Table 6 in Appendix B). The lower intensity was manifested in many different syllables. These were situated in the pre-focal area, the post-focal area and the focus (the *wh*-phrase) itself, i.e. scattered across the sentence.

4.4 Summary of the results

In sum, the main properties of the three tunes are the following:

ALL THREE TUNES

- There is a high point associated with the end of the *wh*-phrase, followed by a fall on the PP.
- There is at least a very small sentence-final rise.

ECHO TUNE AND NARROW FOCUS TUNE (COMPARED TO BROAD FOCUS TUNE)

- The pitch is lower in the area preceding the *wh*-phrase.
- There is a strong similarity in pitch between the F0 maximum on the final syllable of the *wh*-phrase (the focus) and the F0 maximum of the final syllable of the utterance.
- The sentence-final rise is larger.
- The final syllable of the utterance has a shorter duration.

ONLY ECHO TUNE

- The F0 values are elevated from the final syllable of the *wh*-phrase onwards.
- As the pitch in the area preceding the *wh*-phrase is low, the pitch range is extremely large.
- The *wh*-word has a longer duration.
- (The Echo Tune is not uttered with higher intensity.)

ONLY NARROW FOCUS TUNE

- There is no, or a much lower high point on the *wh*-word *quel* 'which'.

5 Discussion

The analyses were built on the sentences uttered with the characteristic tune of every condition: the 87% of the cases elicited in Condition A uttered with the Echo Tune, the 70% of the cases elicited in Condition B uttered with the Broad focus Tune and the 69% of the cases elicited in Condition C uttered with the Narrow focus Tune. Assuming that these tunes are representative of questions uttered in their respective discourse contexts, I now analyse their prosodic properties. In what follows, I

consider the effects of information structure (RQ A.; Section 5.1) and the effect of a reading as an echo versus an information seeking question (RQ B.; Section 5.2). Lastly, I discuss some prosodic properties of French *wh*-in-situ questions that are not affected by these contextual factors (RQ C.; Section 5.3).

5.1 The influence of information structure

In this section, I discuss to what extent information structure is reflected in the prosody of French *wh*-in-situ questions (RQ A.). If information structure is marked prosodically, this should result in prosodic features that are present in both echo and narrow focus questions but absent in broad focus questions. Several such features were indeed found in the data.

Importantly, the final syllable of the *wh*-phrase and the final syllable of the utterance display a similar F0 maximum in both the Echo Tune and the Narrow focus Tune, but not in the Broad focus Tune. The average difference between these two values in an utterance was 0.6 st in echo questions and 0.1 st in information seeking narrow focus questions, but 2.5 st in broad focus questions. I consider this to be a clear indication of tone copying ((4), repeated here as (10)), i.e. the copying of the high tone (in interrogatives) at the final syllable of the focus to the final syllable of the utterance.[35]

(10) *Tone copying*

a. Declarative

[[… focus]$_{L\%}$ …]$_{L\%}$

└ COPYING ┘

[35] Interestingly, the tone that is 'copied' seems to be the tone at the end of the *wh*-phrase, while the focus proper is only on the *wh*-word. This provides evidence for the idea that the tone that marks a focus in French is a phrasal boundary tone (cf. Beyssade et al 2004b; Féry 2001; 2013) rather than a nuclear pitch accent (Di Cristo 2016).

b. Interrogative

[[… focus]$_{H\%}$ …]$_{H\%}$

└ COPYING ┘

The results show that tone copying, which is a known correlate of narrow focus marking in declaratives and yes/no questions in French, also marks narrow focus in *wh*-in-situ questions. They also confirm experimentally that what is copied is not a high tone in an abstract sense, but an absolute F0 value. In (echo) questions with narrow focus on the *wh*-word, the F0 maximum on the final syllable of the utterance is an exact copy of the F0 maximum of the final syllable of the focus, defying declination, which provides experimental support to the initial claim by Martin (1981).

The tone copying phenomenon appears to have a significant side effect. Recall the disagreement in the literature on whether or not French *wh*-in-situ questions display a large sentence-final rise (see also Chapter 2). In line with observations made by Reinhardt (2019), I only observed a large final rise in part of the data. A new observation made in this study is that the presence of a large sentence-final rise is correlated with focus width. Information seeking questions with broad focus displayed only a very small rise, while both echo and narrow focus questions displayed a rise with a larger pitch excursion, induced by the higher F0 values on the final syllable of the utterance. In turn, these higher F0 values seem to be due to tone copying. When the high F0 maximum at the end of the focus gets copied to the final syllable, it raises the pitch on the final syllable of the utterance. Therefore, the data show that the presence of a large sentence-final rise in French *wh*-in-situ questions may well be the result of narrow focus marking. As I further explain in Chapter 6, this accounts for some of the disagreement in the literature regarding the presence of a large sentence-final rise: French *wh*-in-situ questions may or may not display such a rise, depending on their focus structure.

Another observation is that tone copying seems to be accompanied by durational cues. The final syllable of the utterance has a shorter duration in both echo and narrow focus questions than in broad focus questions. In echo questions, the penultimate syllable is also shortened. This

shortening may well be a correlate of the copied tone, which has not, to my knowledge, previously been described in the literature.

Regarding the area preceding the *wh*-phrase, recall that it is not yet clear whether given material preceding the focus is prosodically marked in French ((6), repeated as (11)).

(11) [[[given pre-focus] focus]$_{H\%}$ …]$_{H\%}$ (interrogative)

In the current experiment, the area preceding the *wh*-phrase is expected to be part of the focus in broad focus questions, but precedes the focus in echo and narrow focus questions. The results show that the participle that precedes the *wh*-phrase has lower pitch in both echo and narrow focus questions than in broad focus questions. This is evidence of pitch compression in the given area preceding the focus, in line with findings by Touati (1987), Dohen and Lœvenbruck (2004) and Jun and Fougeron (2000), but contra Beyssade et al. (2004b). In echo questions, pitch compression was also present on the auxiliary.

The restriction of the *wh*-phrase, e.g. *resto* 'restaurant' in *quel resto* 'which restaurant', was *given* in narrow focus questions but not in broad focus questions. Recall that given material following a focus is not always compressed in French. Indeed, the restriction of the *wh*-phrase showed no pitch compression in narrow focus compared to broad focus questions. An explanation that comes to mind for this is that the restriction in itself is not a phonological phrase. Recall that unlike in the Germanic languages, post-focal givenness compression seems to occur mainly in material that forms its own (maximal) phonological phrase (Destruel & Féry 2015; Féry 2014; Hamlaoui et al. 2012). However, there were no indications of post-focal givenness compression of the PP either. Compared to the PP in broad focus questions, the PP in narrow focus questions did not display a lower F0 or a shorter duration. As the PP followed a prosodic boundary, this should form its own phonological phrase. Therefore an observation by Féry (2014) seems a more likely explanation for the absence of post-focal pitch compression. She suggests that post-focal compression is optional in French (even in complete phonological phrases). In other words, unlike givenness deaccentuation

in the Germanic languages, post-focal givenness compression in French is not always present. The current results are in line with this observation.

As I explained in Chapter 3, a common assumption in the literature is that in *wh*-questions, the *wh*-phrase is the focus. Under this view, the context preceding a *wh*-question is not predicted to affect its information structure, unlike in declaratives. I argued in Chapter 3 that in certain languages, the context may also affect what is focused in *wh*-questions. The results of the experiment show that this is indeed the case. Tone copying is a known correlate of narrow focus marking in French, which has often been observed in declaratives and yes/no questions. Its presence in French *wh*-in-situ questions with narrow focus, as opposed to those with broad focus, therefore shows that focus is marked in French *wh*-in-situ questions as well. Consequently, the results of the experiment provide supporting evidence in favour of the approach adopted in the dissertation, following Jacobs (1994; 1991), Beyssade (2006), and Beyssade et al. (2007).

In addition, I mentioned in Chapter 3 that according to Ladd (2009), languages fall into one of two groups with respect to whether they mark the *wh*-phrase as the focus of a *wh*-question. I suggested that French belongs to the group of languages that does not mark the *wh*-phrase as the focus, which is based on the behaviour of *wh*-fronted questions (Beyssade 2006; Beyssade et al. 2007). According to Ladd (2009: 227), *wh*-in-situ questions in *wh*-in-situ languages like Turkish or restricted *wh*-in-situ in *wh*-fronting languages like English tend to fall in the other group, in which the *wh*-phrase is marked as the focus. Yet the results show that French *wh*-in-situ questions pattern with the *wh*-fronted questions of the language. Consequently, the data conflict with the idea that the focus in French *wh*-in-situ questions equals the *wh*-phrase (Mathieu 2016) as well as with the proposal that French *wh*-in-situ questions have a narrow focus on the *wh*-phrase while *wh*-fronted questions display a broad focus (Hamlaoui 2011).

5.2 The influence of an echo versus an information seeking question

I now consider whether the distinction between echo and information seeking questions is reflected in the prosody of French *wh*-in-situ questions (RQ B.). If this is the case, the prosody of echo questions should differ from those of information seeking questions, including those with the same information structure. The results show that this is indeed the case. In what follows, I discuss the prosodic features of echo questions that are absent in information seeking questions with either broad or narrow focus.

Most importantly, the F0 of echo questions is much higher than in information seeking questions, but only from the final syllable of the *wh*-phrase onwards (12).

(12)

Tu	as	réservé	quel	resto	pour	jeudi	soir ?
you	have	booked	which	restaurant	for	Thursday	evening?

This is only partly consistent with the descriptions by Di Cristo (1998) and Boeckx (1999), who describe echo questions as displaying a high pitch overall. The difference in pitch with information seeking questions is very large here: on average approximately 4 semitones. Apart from this elevation of the pitch, the utterance seems to perform the same tonal movements as in information seeking questions with the same information structure. Since the area preceding the *wh*-phrase has low pitch, like in information seeking narrow focus questions, the pitch range within echo questions is extremely large: on average 8.2 semitones.

Interestingly, the *wh*-word *quel* 'which' does not have a higher pitch than in information seeking questions with broad focus. This is thus not a distinguishing feature of echo questions, despite previous claims (Chang 1997: 17; Mathieu 2002). However, the *wh*-word *quel* 'which' and the preceding syllable are lengthened, as is the *wh*-phrase as a whole (e.g. *quel resto* 'which restaurant'), as predicted by Engdahl (2006). This longer duration is what distinguishes the *wh*-word in echo questions from the one in broad focus questions.

A feature that is consistently mentioned in the previous literature as a property of echo questions in French is a sentence-final rise (e.g. Déprez et al. 2013; Di Cristo 1998; Mathieu 2002). The current results confirm the presence of a rise, but show that it is not a distinguishing feature of echo questions. Moreover, although the pitch movement ends higher in echo questions, the rise does not seem to be larger than in information seeking questions with the same information structure. The rise simply starts and ends higher. As suggested by González and Reglero (2018) for Spanish, the impression of a more prominent rise in echo questions might have been caused by their larger pitch range. Also, as some previous studies have considered questions in which the *wh*-phrase was the final element of the utterance, the sentence-final pitch movement may in some cases have been confounded with the pitch movements associated with the *wh*-phrase.

French echo questions were not differentiated from information seeking questions by higher intensity, differently from their German counterparts (Repp & Rosin 2015). On the *wh*-word, echo questions even had less intensity than both types of information seeking questions.

These results show that speakers of French mark echo questions with a prosody that is different from information seeking questions. A distinct prosody for echo questions has been established for various other (unrelated) languages as well (see Chapter 3). However, the current study on French is the first one (to my knowledge) that explicitly compared echo questions to information seeking questions with the same information structure, which excludes this as a potential confound, thus strengthening the result.

In Chapter 3, I presented a tentative generalisation regarding the prosodic properties of echo versus information seeking questions, based on the small sample of languages available. I suggested that in languages with a falling sentence-final intonation in *wh*-in-situ information seeking questions, echo questions seem to display a sentence-final rise, while in languages with a sentence-final rise in information seeking questions, echo questions also display an expanded pitch range. This generalisation also holds for French. It falls neatly in the second category, with a

sentence-final rise in both question types and an expanded pitch range in echo questions expressing auditory failure.

Sobin (1990, 2010), in two influential papers, labelled the rising intonation of echo questions in general 'surprise intonation'. Yet the results of this study show that, for echo questions to be marked with a particular prosody, surprise is not needed. It is a question for further research to what extent the prosody of echo questions expressing surprise is different from those investigated here. In some other languages in which both types of echo questions have been studied, their prosody was only subtly different, e.g. in American English and German (Bartels 1997; Repp & Rosin 2015). In other languages, the prosodic features of echo questions expressing surprise were more pronounced, e.g. a more expanded pitch range as in North-Central Peninsular Spanish (González & Reglero 2018) or uttered at a higher pitch register as in Shingazidja (Patin 2011). In investigating this for French, it should be kept in mind that a larger pitch range can be a marker of surprise (Hirschberg & Ward 1992) or emotion in general (Bänziger & Scherer 2005), as well as one of the main features of French echo questions expressing auditory failure.

5.3 Prosodic properties that were unaffected by context

The results show that broad focus information seeking questions display a high point associated with the wh-word, a high point followed by a fall (a prosodic boundary) at the end of the wh-phrase and a small rise at the end of the utterance. The final rise was already discussed above in relation to the tone copying phenomenon. Here, I discuss the prosodic boundary and the accent on the *wh*-word, which were not affected by either of the two factors discussed in this chapter (RQ C.).

Questions elicited in all three conditions exhibited a prosodic boundary between the in-situ *wh*-phrase and the subsequent PP. This is in line with findings by Mathieu (2016) (Section 2.1; see also Chapter 2). Mathieu took the prosodic boundary at the end of an in-situ *wh*-phrase to be a correlate of focus marking, assuming that the *wh*-phrase equals the focus in *wh*-questions, cf. (2), repeated as (13).

(13) [[... focus]$_{\text{TONE}}$ ...]

However, the F0 maximum of the final syllable of the *wh*-phrase, the location of the prosodic boundary, was the same in questions with broad and narrow focus. This shows that the prosodic boundary was also present in broad focus questions, in which the focus extended beyond the location of the boundary, as confirmed by the lack of tone copying. I conclude therefore that the mere presence of a prosodic boundary between the *wh*-phrase and the subsequent PP is not in itself a correlate of focus marking.

A second feature that was not affected by the two factors discussed in this chapter was the accent on the *wh*-word in broad focus and echo questions. This is very similar to the results described in Gryllia et al. (2016) (cf. Wunderli 1983). It differs from the results described in Baunaz (2016) and Baunaz and Patin (2011), who did not find an accent on the *wh*-word in questions similarly uttered in an out of the blue context (cf. Wunderli 1982; Wunderli & Braselmann 1980). A possible reason for this difference might be the relatively short *wh*-phrases and/or short target stimuli used in these latter studies, as compared to the ones used in Gryllia et al. (2016), Wunderli (1983) and the current study.

In the narrow focus questions, the accent on the *wh*-word was either absent or significantly lower than in both broad focus and echo questions. The fact that the accent is diminished in the only condition where a contrastive topic precedes the utterance raises the question whether the lack of accentuation and the presence of the contrastive topic are related. A contrastive topic in French is associated with a rise, which Beyssade et al. 2004a;b) analyse as a pragmatic accent, which they call a 'C accent'. A C accent marks the use of a complex discourse strategy, such as a topic shift. The accent on in-situ *wh*-expressions has also been analysed as such a C accent. In sentences with several C accents, only one (usually the highest one in the syntactic tree) is obligatory (Beyssade et al. 2004a;b). This is illustrated in (14), which contains an obligatory C accent on the contrastive topic *le dimanche* 'on Sunday' (14a,b) and an optional one on *des cigarettes* 'cigarettes' (14b).

(14) A: Que fume Bernard ?
'What does Bernard smoke?'

B: a. Le **DI**manche, Bernard fume des cigarettes
(, le reste de la semaine, il fume la pipe).

b. Le **DI**manche, Bernard fume des **CI**garettes
(, le reste de la semaine, il fume la pipe).

'On Sunday, Bernard smokes cigarettes
(, the rest of the week he smokes his pipe).'

[adapted from Beyssade et al. 2004b: 494, ex. 28b]

This seems to fit the data of the current experiment. If following Beyssade et al. (2004b), the *wh*-word does not obligatorily receive an accent because of the preceding accent on the contrastive topic, this explains why the high tone associated with the *wh*-word is often absent in questions elicited in the narrow focus condition.[36,37]

[36] The presence of the contrastive topic may also have influenced some other aspects of the results, which seem less relevant. Firstly, the initial syllable (the pronoun) had a longer duration than in both other conditions and the second syllable (the auxiliary) to some degree as well. Secondly, while echo questions had a lower F0 than broad focus questions on both the auxiliary and the participle, this was only significant on the participle for narrow focus questions. It seems likely that this lack of significance is due to the high point associated with the contrastive topic, after which the F0 was in some cases lowered gradually over the first syllables of the utterance.

[37] To be precise, the high tone is in some cases absent and in some cases considerably lower than in the other two conditions.

6 Conclusions

This chapter investigated the prosody of French *wh*-in situ questions. In particular, I investigated the influence of two aspects that relate to context: the information structure of the question and the distinction between echo and information seeking questions. The results show that both affect the prosody of French *wh*-in situ questions.

Broad focus information seeking questions display a high point associated with the *wh*-word, a high point followed by a fall (a prosodic boundary) at the end of the *wh*-phrase and a small rise at the end of the utterance. The presence of a prosodic boundary between the *wh*-phrase and the subsequent material was not in itself a correlate of focus marking (contra Mathieu 2016), as a boundary was also present in broad focus questions.

Yet, focus is clearly marked in French *wh*-in situ questions. The F0 maximum of the final syllable of the focus is copied to the final syllable of the utterance. This 'tone copying' is a known correlate of focus marking in declaratives and yes/no questions in French. In addition, the given material preceding the focus is compressed, confirming Touati (1987) and Dohen and Lœvenbruck (2004). Yet, given material following the focus showed no pitch compression, in line with the observation that post-focal compression is not always present in French (Féry 2014).

Regarding tone copying, the study confirms experimentally that what is copied is not an abstract tone but an absolute F0 value (defying declination), as already suggested by Martin (1981). Moreover, it shows that tone copying is accompanied by a shortening of the final syllable of the utterance. Furthermore, tone copying has a significant side effect. As the copied tone raises the pitch on the final syllable of the utterance, it creates a large sentence-final rise in *wh*-in-situ questions with narrow focus. The study therefore confirms Reinhardt's (2019) observation that a large final rise is present in part of the French *wh*-in-situ questions and adds that the rise is a correlate of narrow focus marking.

In Chapter 3, I discussed the common idea in the literature that the *wh*-phrase equals the focus in *wh*-questions, regardless of the preceding

context. I argued that in certain languages, the context may also affect what is focused in *wh*-questions. I suggested that at least with respect to *wh*-fronting questions, French is one of these languages (Beyssade 2006; Beyssade et al. 2007). Based on the prosodic properties of questions preceded by different contexts, the results of the experiment demonstrate that focus may indeed be marked in *wh*-questions (cf. Beyssade 2006; Beyssade et al. 2007; Jacobs 1994; 1991 and contra Mathieu 2016; Hamlaoui 2011). In addition, the chapter shows that for French, the this also the case in *wh*-in-situ questions.

The prosody of French *wh*-in-situ questions is also affected by the distinction between echo and information seeking questions. The pitch in echo questions is elevated from the final syllable of the *wh*-phrase onwards, resulting in a much larger pitch range. Also, the *wh*-word has a longer duration. French echo questions are not marked by a higher intensity, nor by a sentence-final rise with a larger pitch excursion. The prosody of French echo questions falls neatly in the tentative generalisation I proposed in Chapter 3: in languages such as French, in which information seeking questions display a sentence-final rise, echo questions are marked by an expanded pitch range. The results show that echo questions are prosodically distinct from information seeking questions, even if their information structure is the same. The distinct prosody is unrelated to the emotion of surprise. This sets echo questions apart as a separate question type in terms of prosody.