



# Intonation and (re)syllabification in L2 French interrogatives produced by L1 German learners: Comparing different proficiency levels

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## Abstract

The study investigates the prosody of French interrogatives produced by L1 German learners of three different proficiency levels. Control data from French native speakers are taken into account. The materials analyzed were recorded using two different versions of a Discourse Completion Task (DCT) for the advanced learners and the native controls and a scripted version thereof in the form of a screenplay for the beginners. It is shown that despite the general difference between the intonation systems of (phrase-based) French and (word-based) German the learners mostly produce well identifiable interrogative contours, and their data do not differ significantly from the native control data regarding the use of F0, measured in terms of pitch range and variability (Pitch Dynamism Quotient, PDQ). However, the learners differ significantly from the native speakers in presenting a lower speech rate and in their way of (re)syllabifying their utterances: they produce less target-like instances of *liaison* and *enchaînement* and more word-initial glottalizations. This suggests that, at least for short speech acts such as we analyzed, the learners' challenge to produce the prosody of French interrogatives in a target-like way rather refers to the syllabic than to the intonational level.

**Index Terms:** French, German, SLA, foreign language learning, intonation, (re)syllabification, interrogatives

## 1. Introduction

French and German differ crucially with respect to their overall prosodic shape: With regard to global speech rhythm, French belongs to the group of syllable-timed languages, which are characterized by a strong preference for regular sequences of CV syllables and the absence of vowel reduction. German, by contrast, is a stress-timed language, which presents more complex syllable structures and regular reduction of unstressed vowels ([1]). As for intonation, French has a phrase-based system with the Accentual Phrase (AP) as its basic unit, which is mapped to the underlying tonal pattern /aLHiLH\*/ ([2], [3], [4]), while German is a pitch accent language with the F0 contour being determined by the positions of metrically strong syllables in prosodic words ([5], [6], [7], [8]). The noticeable prosodic difference between the two languages was also described by referring to the contrast between 'syllable languages' vs. 'word languages' ([9], [10]), the former presenting a considerably lower autonomy of the word than the latter. From this point of view, French falls into the first group of languages, and although there are tendencies that strengthen the autonomy of the French word ([11], [12]), syllable optimization processes such as *liaison* (realization of a latent final consonant in the onset position of a following vowel-initial word, e.g. *chez lui* [ʃe.lɥi] vs. *chez elle* [ʃe.zɛl] 'at his/her (house)') and *enchaînement* (realization of a fixed

final consonant in the onset position of the following vowel-initial item, e.g. *avec lui* [a.vɛk.lɥi] vs. *avec elle* [a.vɛ.kɛl] 'with him/her') continue to delete word boundaries and mask the left edge of vowel-initial words. In hiatuses, which are possible within words and across word boundaries, the contiguous vowels usually merge without any disruption (e.g. *Tu vas où ?* [ty.va.u], lit. 'You go where?') (see, e.g., [13]). In German, by contrast, vowel-initial words are usually marked by glottalization of the vowel or insertion of a glottal stop, and no (re)syllabification processes occur (e.g. *dem Affen* [dem.'ʔafɪ] or [dem.'ʔafɪ], but not \*[de.'mafɪ] 'the monkey<sub>DAT</sub>'; *die Ente* [di.'ʔɛn.tə] or [di.'ʔɛn.tə] 'the duck') ([14]).

As for the encoding of interrogativity, French presents a large array of syntactic, lexical and intonational variability, partly constrained by communicative function and register. Non-biased yes/no (y/n) questions can be phrased with declarative syntax (DECL), which implies an obligatory final rise (H%) (e.g. *Tu viens ?* lit. 'You come?'). Other structures may occur with either final H% or L% and include subject-verb inversion (INV) (e.g. *Viens-tu ?*) or the use of the lexicalized interrogative marker *est-ce que* (ECQ) (lit. 'is it that', preferably in polite contexts). Wh questions (also: pronominal or partial interrogatives) can occur as wh *in situ* interrogatives (with DECL(+wh), e.g. *Tu vas où ?* lit. 'You go where?') or present movement of the WhP (i.e. the phrase headed by the question word) to clause-initial position. The latter type either presents INV or not, i.e. *Où vas-tu ?* (formal) vs. *Où tu vas ?* (colloquial), and can be combined with ECQ as in *Où est-ce que tu vas ?* ([2], [3], [15], [16], [17], [18], [19], [20]). In German, INV is the norm for unbiased y/n and wh questions, the latter presenting wh movement. As opposed to French, declarative syntax in y/n and wh *in situ* questions marks dubiousness (and such questions also have an obligatory final rise). All other interrogative structures may occur with both final H% and L% ([6]).

## 2. Aims and hypotheses

The aim of the present paper is twofold. We first investigate the prosodic shape of French interrogatives, produced by German learners of different proficiency levels, and we deduce the following hypotheses.

As final rises (H%) are used in French and German to signal interrogativity, German learners might tend to generalize the H% pattern (and the marker ECQ) for all types of questions – in spite of the pragmatic differences between and the alluded intonational variability in both languages (see studies on interrogatives and their prosody in L2: [21], [22], [23]).

**H1** The German learners of French produce the interrogatives with a (target-like) final rise, but tend to overgeneralize H% across all interrogative structures.

Earlier research on L2 intonation has shown that learner data are characterized by a narrower pitch range and a lower degree of F0 variability (see [24] for L2 French read data produced by German learners). The same holds true for speech rate: L2 speech is known to be typically slower than L1 speech ([25]).

**H2** The German learners present a smaller F0 range and a lower variability (PDQ) as compared to the L1 speakers.

**H3** F0 range and variability increase over proficiency levels.

**H4** As compared to the French L1 speakers, the German learners present a lower speech rate, which increases over proficiency levels.

Finally, the different behavior of the two languages with respect to (re)syllabification and glottalization of vowel-initial words suggests that the L2 French utterances produced by our learners show negative transfer from their L1 (German) regarding this matter.

**H5** As compared to the L1 speakers, the learners present a lower amount of target-like *liaisons* and *enchaînements* and a strong tendency to glottalize vowel-initial words.

**H6** The rate of target-like realizations of *liaisons* and *enchaînements* increases and the glottalization rate of vowel-initial words decreases with growing proficiency.

The second aim consists in testing a simplified procedure of data elicitation for low proficiency learners (see 3.2).

### 3. Methodology

#### 3.1. Speakers

We analyzed data produced by three learner groups of different proficiency levels. Group A: 7 senior high school students (ages: 15-16; 3m, 4f; third year of instruction in French; proficiency level A1 according to the Common European Framework of Reference for Languages, CEFR, see [26]); group B: 6 university students of different subjects taking French classes (ages: 21-28; 2m, 4f; level A2/B1); group C: 6 university students of French (ages: 24-28; 2m, 4f; level C1). All learners were monolingually raised, born in Northern Germany and speak a close-to-standard (Northern) variety of German as their L1. The 9 French native control speakers (ages: 18-22; 4m, 5f) are university students recorded in Orléans (France).

#### 3.2. Materials and data collection

We collected the French L1 control data in 2009 using a Discourse Completion Task (DCT) adapted from [27]. This inductive method consists in presenting an everyday situation to the subjects asking them to react verbally in a most natural way ([28]). In (1) we give an example for the elicitation of an unbiased y/n question.

(1) Situation: *Vous entrez dans un magasin où vous n'avez jamais été avant, et vous demandez s'ils ont des mandarines* ('You enter a shop where you haven't been before and ask whether they have tangerines').

Possible verbal reactions: *Vous vendez des mandarines ? / Est-ce que vous avez des mandarines ? / Avez-vous des mandarines ?* etc.

For the recordings of the students from groups B and C (Osnabrück, 2013) we used a simplified version of this DCT, containing less situations and less complicated scenarios as compared to the full version used for the L1 recordings. As the low proficiency learners from group A (students from different

senior high schools in Northern Germany, recorded in 2016) were not yet able to react spontaneously, we transformed the DCT into a scripted version which was supposed to work like a screenplay, and the speakers were asked to present the short dialogue sequences in interaction with the interviewer. To that end, they were asked to memorize the target sentence and to produce it as naturally as possible (which is not always what they did; see section 4.3.). In (2), we provide an example for the elicitation of an unbiased y/n question:

(2) Interviewer: Dans cette scène, je suis le vendeur dans un magasin de fruits et tu es le client. Le vendeur: *Bonjour*. Le client: *Vous avez des bananes ?* ('In this scene I am the greengrocer and you are the customer. The greengrocer: *Good morning*. The customer: *Do you have bananas?*').

The materials were gathered within the context of larger data collections. For the present purpose, only subsets of these data were analyzed: 5 y/n and 5 wh questions for group A (x 7 speakers = 70 items in total), each 3 y/n and 3 wh questions for groups B and C (x 6 speakers = 72 items), and, finally, 1 y/n and 1 wh interrogative for the L1 control group (x 9 speakers = 18 items). The total number of interrogative items analyzed amounts to 160.

#### 3.3. Parameters analyzed

The recordings were transcribed orthographically and segmented with EasyAlign ([29]) using Praat ([30]); errors in the automatic segmentation were manually corrected. We first analyzed the individual utterances with respect to the **syntactic type** and **global F0 contour** (final rise or fall). In a next step, we calculated for each item the **pitch range** (in semitones, using the F0 minimum of each individual item as reference value for the conversion; see [31]) and the pitch variability in terms of the **Pitch Dynamism Quotient** (PDQ; i.e. SD/mean), based on manually corrected files (exclusion of octave jumps and wrong measurements). In accordance with the method applied by [24], we used time steps of 0.01s for male and of 0.005s for female subjects. We furthermore determined the **speech rate** (in syllables per second) for each utterance. In a last step we calculated the rate of target-like productions of *liaisons* and *enchaînements* and, following [32], the productions of **glottal stops** and/or **glottalizations** at the beginning of vowel-initial words (in all positions and phrase-initially, symbolized as [ʔ]).

### 4. Results

In this section we display the results of our empirical study. After assessing the syntactic interrogative types and the global pitch contours (4.1), we report on the results obtained from the F0-related analyses (4.2), then turn to speech rate (4.3), and finally present the outcomes of our analyses related to (re)syllabification (4.4).

#### 4.1. Syntactic types and global F0 contours

As outlined in section 2, French interrogatives display a high degree of syntactic variability. Table (1) summarizes the construction types and global F0 contours produced by the different groups of speakers for the y/n questions, i.e. structures with declarative word order (DECL), with subject-verb inversion (INV), with the phrase-initial particle *est-ce que* (ECQ), and other formulation strategies such as embedded questions. The recording of one item from group A had to be excluded from the analysis due to insufficient recording quality.

Table 1: *Construction types and global F0 contours of y/n questions.*

Types	A 6 scripted quest.	B 3 questions	C 3 questions	L1 1 question
DECL	13 H% (10) L% (3)	4 H% (4)	10 H% (10)	1 H% (1)
INV	14 H% (14)		1 H% (1)	3 H% (1) L% (2)
ECQ	14 H% (13) L% (1)	13 H% (13)	7 H% (7)	5 H% (4) L% (1)
others		1 H% (1)		
Total	41 H% (90.2%) L% (9.8%)	18 H% (100%)	18 H% (100%)	9 H% (67%) L% (33%)

The data collected from the L1 speakers show a certain amount of variability with respect to the final contour: While the only question with DECL word order produced by our native controls is realized with a final rise (H%) as expected, the syntactically and lexically marked interrogatives (INV and ECQ) show both final H% and L%. The learners from groups B and C categorically use H%, with a strong preference for ECQ in group B. The learners from group A also strongly prefer the rising contour, but three of them erroneously produce sentences with DECL word order and final L%, thus failing to encode interrogativity. As an overall trend, learners tend to generalize the final rise (H%) over all question types, regardless of syntactic or lexical marking. **H1** is thus confirmed.

Table 2 presents the results for the wh questions. Five different types occurred in our data, i.e. wh *in situ* questions (with DECL word order: DECL+wh *i.s.*), questions with wh movement and subject-verb inversion (wh+INV), questions with wh movement and no subject-verb inversion (wh+DECL), questions with wh movement and ECQ (wh+ECQ), and, finally, other types such as embedded constructions. Two items produced by speakers from group C had to be excluded from the analysis due to insufficient recording quality.

Table 2: *Construction types and global F0 contours of wh questions.*

Types	A 5 scripted quest.	B 3 questions	C 3 questions	L1 1 question
DECL +wh <i>i.s.</i>	7 H% (6) L% (1)	3 H% (2) L% (1)	3 H% (3)	
wh+INV		5 H% (3) L% (2)	3 H% (3)	2 H% (1) L% (1)
wh+DECL	14 H% (9) L% (5)	5 H% (5)	3 H% (3)	5 H% (3) L% (2)
wh+ECQ	14 H% (7) L% (7)	2 H% (2)	3 H% (3)	2 H% (2)
others		3 H% (3)	4 H% (3) L% (1)	
total	35 H% (63%) L% (37%)	18 H% (83.3%) L% (16.7%)	16 H% (94%) L% (6%)	9 H% (67%) L% (33%)

The L1 data again present a certain degree of variability regarding the final F0 contour, with a clear tendency towards H%. The same holds true for all learners, though to different degrees. The high amount of final falls in group A (37%) can mostly be traced back to inappropriate use of final L%, which, again, widely confirms **H1**.

#### 4.2. F0 measurements: Pitch range and variability (PDQ)

Figure 1 presents the results for the analysis of pitch range, given as the difference between pitch minimum and maximum for each speaker in semitones (see section 3.3). The three learner groups show the expected progression in that the learners from group C present a larger pitch range as com-

pared to those from groups B and A (C: 9.26, B: 8.51, A: 7.79; semitones, mean values). However, the narrower pitch range of the native control data (L1: 7.85) does not meet the expectations formulated in section 2. The PDQ analysis confirms this picture, showing increasing values for F0 variability in the three learner groups (A: 0.12 < B: 0.13 < C: 0.16, mean values), but an unexpectedly low value for the native controls (L1: 0.12). Yet the ANOVA ( $F(3,159)=4.49$ ,  $p = .005$ ) with a post-hoc Bonferroni test reveals that only the difference between learner groups A and C is statistically significant (\*\*,  $p = .003$ ), while there is no significant difference between the native control group and any of the learner groups. The respective results are given in Figure 2. Thus, **H2** is not confirmed, but **H3** is.

#### 4.3. Speech rate

Figure 3 presents the speech rate (in syllables per second) of the three learner groups and the native control group. As expected, speech rate is highest for the French natives (L1: 6.77; mean value) and lower for learner groups C (4.98) and B (3.34). The differences between all groups are highly significant (ANOVA ( $F(3,159)=23.38$ ,  $p = .000$ ); the post-hoc Bonferroni test reveals that groups B, C and L1 differ significantly from each other (\*\*\*,  $p = .000$ ). The fact that the values for learner group A (mean: 4.72) are not lower than those for group B can be explained as an effect of the data type: While the learners from groups B and C were obliged to phrase their utterances spontaneously (the same holds for the native controls), the learners from group A mostly read out aloud the scripted question from the short screenplay-like dialogue instead of memorizing the target sentence and producing it without the visual support of the text. Our results corroborate the outcomes of earlier research in clearly showing that speech rate increases over proficiency levels. **H4** is thus confirmed.

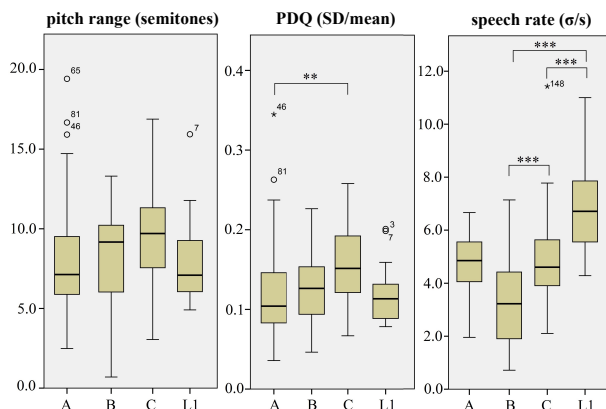


Figure 1 (left): *Pitch range in semitones*. Figure 2 (middle): *PDQ values*. Figure 3 (right): *Speech rate in syllables per second*. All figures display (from left to right) the results for the learner groups A, B, C and the L1 control speakers.

#### 4.4. (Re)syllabification

In what follows we present our results for the analyses performed on our data regarding (re)syllabification across word boundaries, i.e. the realization rates of *liaisons* and *enchaînements* as well as the production of word-initial glottal stops or glottalizations. Table (3) shows the results for the realization of *liaisons*. Only obligatory (i.e. categorical) liaisons were

taken into account. As can be seen from row 2, only a minority of the utterances produced by the speakers contain such *liaison* contexts. In row 3, we present the ratio between the correctly realized *liaisons* and the obligatory *liaison* contexts in absolute numbers; the corresponding percentages are given in brackets.

Table 3: *Realization of liaisons.*

	A	B	C	L1
utterances (total)	76	36	36	18
+/- <i>liaison</i> context	14/62	10/26	9/27	6/12
target-like production of <i>liaisons</i>	9/14 (64.3%)	7/10 (70%)	9/9 (100%)	6/6 (100%)

The realization rate continuously increases over the three proficiency levels, and the speakers from learner group C are on a par with the native controls regarding the correct realization of all obligatory *liaisons* (100%). It is worth mentioning that the *liaison* contexts occurring in the data set from group A correspond to frequent combinations of a verb, preceded or followed by a clitic, i.e. *vous avez* [vu.za.ve] ‘you have’ and *est-il* [e.til] ‘is it’. The same holds true for the utterances produced by the learners from groups B and C and the L1 controls.

Table 4 represents the realization rate of *enchaînements* produced in a target-like way. Note that the L1 control data are not included in the table, since their utterances did not contain any context of *enchaînement*.

Table 4: *Realization of enchaînements.*

	A	B	C
utterances (total)	76	36	36
+/- <i>enchaînement</i> context	27/49	19/17	21/15
target-like production of <i>enchaînements</i>	11/34 (32.4%)	14/28 (50%)	28/32 (87.5%)

Again the increasing rate of target-like *enchaînements* over the three proficiency levels meets the expectations outlined in section 2. Interestingly, the low amount in learner group A is closely connected to defective productions at the segmental level, e.g. the (non-target like) vocalization of syllable-final /ʁ/, which is typical of German learners and can be plausibly interpreted as an instance of negative transfer from their L1, e.g. *Quelle heure est-il ?* [kɛ.lœʁ.ʔe.til] ‘What time is it?’ instead of (target-like) [kɛ.lœ.ʁe.til].

In what follows we present our results on **glottalization** ([ʔ]). Table 5 gives the total amount of [ʔ] produced at the beginning of vowel-initial words, calculated as the ratio between glottalized vowel onsets and the total of vowel-initial items.

Table 5: *Glottalizations ([ʔ]) at the beginning of vowel-initial words.*

	A	B	C	L1
vowel-initial words (n)	140	94	81	46
realized [ʔ] (n)	93	55	27	11
%	66.4	59.5	33.3	23.9

The amount of glottalizations produced at the beginning of vowel-initial words decreases consistently over proficiency levels. The rate is lowest for the L1 control data, but that it attains almost 24% might surprise as “the default word-initial

vowel onset is non-glottalized” ([33]) in French. A closer look at the distribution of these glottalizations, however, reveals that 10 out of 11 (90.9%) of [ʔ] in the L1 data occur at a phrase-initial position (and/or after a pause) and thus serve as a cue of phrasing ([34], [35]). In Table 6 we singled out the number of vowel-initial words in phrase-initial or post-pausal (p-i/p-p) position and give the proportion of [ʔ] produced in these cases. The results display an increasing target-like behavior over the different proficiency levels.

Table 6: *Glottalizations in p-i/p-p position.*

	A	B	C	L1
vowel-initial words (n)	140	94	81	46
... in p-i/p-p position	56	44	24	22
%	40.0	46.8	29.6	47.8
realized [ʔ] (n, from Table 5)	93	55	27	11
... in p-i/p-p position	46	34	21	10
%	49.5	61.8	77.8	90.9

H5 and H6 are thus largely confirmed.

## 5. Discussion

The strong tendency towards a final rise and the use of ECQ in our results on the prosody (and syntax) of interrogatives in L2 French confirms the observation that learners tend to generalize structures which are perceived (or taught) as being salient or “easy”. But these tendencies decrease with higher levels of proficiency, while speech rate increases and both syllable optimization processes and glottalizations are applied in a more target-like way. All in all, the learners’ challenge to produce the prosody of French questions adequately rather refers to the syllabic than to the intonational level.

## 6. Conclusion and outlook

The applied methodology – three adapted versions of a Discourse Completion Task – allows for the collection of semi-spontaneous data from learners of different proficiency levels. The data collected from the advanced learners (B, C) and the native controls are comparable in that they thoroughly inform about the interaction between prosody and syntax. But the comparability of the data is limited as the beginners, who were presented with a scripted version of the dialogues, rather produced read speech, which displays different features. Semi-spontaneous speech, on the other hand, may lack some of the characteristics under scrutiny (as is the case for the *enchaînement* contexts in the production of the native control group). It therefore seems recommendable to exploit different data types whenever possible.

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