A PILOT STUDY ON PERCEPTION OF DECLARATIVE AND INTERROGATIVE INTONATION OF SPANISH

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ABSTRACT

This study attempts to answer two questions on Spanish prosody: first, whether there is some cue in the beginning of an utterance that allows a listener to determine if a sentence is declarative or interrogative; and second, whether there is some prosodic key for the perception of the type of embedded sentence before it appears.

Results of a perceptual experiment with 140 stimuli and 47 informants suggest that listening to the beginning of a sentence is often enough to perceive to which sentence type belongs and which type of subordinate clause comes afterwards.

Keywords: Spanish, declarative, interrogative, perception, intonation

1. INTRODUCTION

This study attempts to answer two questions: first, whether there is some cue in the beginning of an utterance that makes it possible to determine a sentence as declarative or interrogative.

It is a well-known fact that in forming Spanish interrogatives it is not necessary to apply grammatical transformations such as a subject verb inversion or auxiliary verbs. For example, although sentences (a) and (b) have the same words in the same order, their different meanings can only be distinguished by prosodic cues.

(a) Mary habla español. (declarative)
(Mary speaks Spanish.)

(b) ¿Mary habla español? (interrogative)
(Does Mary speak Spanish?)

In general, as illustrated in the Spanish Yes-No questions above, a final rising intonation pattern seems to play an important role in the perception of the utterance as an interrogative. Although the relevance of the final rise in a question is undeniable, we suppose that there may be other prosodic cues in different parts of the utterance.

For example, Sensui's pilot case study [3] found that subjects could determine if an utterance was declarative or not (especially in case of rising interrogative intonation) with high accuracy even when part of the sentence (including the ending) cannot be heard (also see Mora, *et al.* [2], which demonstrates that declarative or interrogative intonation patterns were recognized only by acoustic cues). These results suggest that listeners can distinguish whether a sentence is declarative or interrogative without access to the full utterance. Testing the validity of this proposition is one of the objectives of this study.

The second topic to be treated is whether there is some prosodic key which aids in the perception of the type of embedded clause (declarative/interrogative, nominal/adverbial) before this element appears. In Spanish, there are pairs of particles which introduce subordinate clauses and are distinguished orthographically only by the presence of an accent mark. For example, "cuando" (= "when", conjunctive) and "cuándo" (= "when", interrogative, introducing subordinate nominal clause) in phrases (c) and (d) have different meanings and grammatical functions.

(c) Me contestó cuando vino.
(He replied when [= in the moment] he came.)

(d) Me contestó cuándo vino.
(He replied when [= at what time] he came.)

This distinction is quite difficult for elementary and intermediate level learners, and can be easily misunderstood by native speakers.

As shown in Kimura, *et al.* [1] and Sensui, *et al.* [4], it was demonstrated that a particular intonation pattern (which we call *HLH**) affects native speakers' perception and allows them to anticipate

the occurrence of a boundary after that tone. From this observation we started wondering whether there were also perceptual keys which could denote in advance which type of subordinate clause follows it. In order to treat the two aforementioned questions, a perceptual experiment was designed and executed.

2. METHOD

2.1. Materials

A list consisting of 14 sentences (found in the Appendix) was recorded with a PCM recorder (SONY PCM-D1) using a stereo microphone (SONY ECM-MS957) in the Phonetics Laboratory of Sophia University, Tokyo, Japan, by a male native speaker of European Spanish, from Cuenca. The informant read the entire list of sentences 10 times (resulting in a total of 140 utterances). The parts which in the Appendix appear in brackets were later digitally removed using computer software, resulting in the truncated sentences used as stimuli in the experiment. The stimuli were then sorted randomly, and concatenated in a wave-format digital audio file.

2.2. Subjects

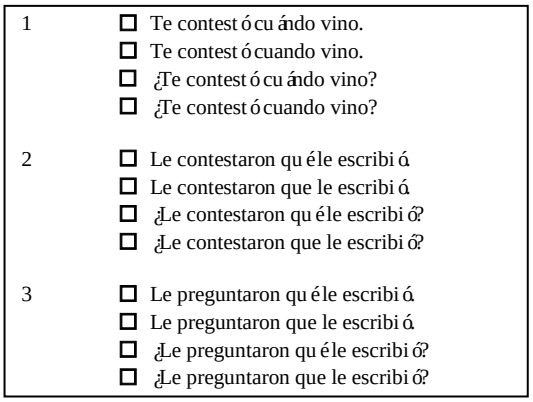
47 informants (15 male, 32 female) took part in the experiment. Most of them came from the central part of Spain (Castilla y León: 29, Madrid: 4, Castilla La Mancha: 1), but some participants were from other parts as well (Extremadura: 4, Islas Canarias: 2, Andalucía: 1, Andorra: 1, Asturias: 1, Canada: 1, Galicia: 1, Islas Baleares: 1, Valencia: 1). All of them are native speakers of European Spanish. The informant born in Andorra is a bilingual speaker of Castilian and Catalan, and the collaborator born in Canada moved to Spain at the age of 3.

2.3. Procedure

The informants listened to the stimuli through headphones in a classroom of the Centro Cultural Hispano-Japonés of Salamanca University, Spain. During each session, no more than 4 participants were present at the same time. The classroom was not soundproof and sometimes noises from outside were heard, but they were not loud enough to interrupt or affect the experiment.

The informants were asked to mark one of four possibilities as seen in Figure 1 each time they listened to a stimulus, without leaving any items unanswered.

Figure 1: Excerpt of answer sheet.



A recess of five minutes was provided in the middle of the session, after item number 70, to avoid fatiguing the informants.

3. RESULTS

Frequency and percentage of the informants' responses are shown in Table 1. Based on this data, Table 2 indicates the percentage of correct identification of each sentence in descending order.

With the data from Table 1, we calculated the frequency and the percentage of each sentence perceived as declarative or interrogative as shown in Table 3. Table 4 shows the percentage of correct identifications of sentence type for each sentence in descending order.

Table 1: Frequency and percentage of the informants' response for each sentence.

No.	Resp.	1		2		3		4		Total	
	Ans.	Fq.	%	Fq.	%	Fq.	%	Fq.	%	Fq.	%
1	1	105	**22.34**	312	66.38	22	4.68	31	6.6	470	100
2	2	75	15.96	349	**74.26**	34	7.23	12	2.55	470	100
3	3	53	11.28	131	27.87	152	**32.34**	134	28.51	470	100
4	4	93	19.79	195	41.49	98	20.85	84	**17.87**	470	100
5	1	156	**33.19**	135	28.72	105	22.34	74	15.74	470	100
6	2	77	16.38	274	**58.3**	56	11.91	63	13.4	470	100
7	1	78	**16.6**	252	53.62	87	18.51	53	11.28	470	100
8	3	60	12.77	28	5.96	317	**67.45**	65	13.83	470	100
9	4	37	7.87	115	24.47	185	39.36	133	**28.3**	470	100
10	3	26	5.53	59	12.55	261	**55.53**	124	26.38	470	100
11	1	254	**54.04**	146	31.06	52	11.06	18	3.83	470	100
12	2	271	57.66	149	**31.7**	40	8.51	10	2.13	470	100
13	3	70	14.89	54	11.49	301	**64.04**	45	9.57	470	100
14	4	145	30.85	109	23.19	180	38.3	36	**7.66**	470	100

Ans. = Answer (For each sentence the answer 1 is a declara-tive with an interrogative (e.g. Te contestó cuándo vino.), 2 is a declarative with a conjunction (e.g. Te contestó cuando vino.), 3 is a Yes-No question with an interrogative (e.g. ¿Te contestó cuándo vino?), and 4 is a Yes-No question with a conjunction (e.g. ¿Te contestó cuando vino?)

* Shadowed cells indicate percentage of correct identification.

** Bold-lined cells indicate where the highest percentage of response for the correspondent stimulus was recorded.

Table 2: Correct identification of each sentence by percentage in descending order.

No.	Sentences	%
2	Me contestó [cuando vino].	74.26
8	¿Le preguntaron [quién le escribió]?	67.45
13	¿Te explicó [cómo le respondieron]?	64.04
6	Le contestaron [que le escribió].	58.30
10	¿Le contestaron [quién le escribió]?	55.53
11	Me explicó [cómo le respondieron].	54.04
5	Le preguntaron [quién le escribió].	33.19
3	¿Te contestó [cuándo vino]?	32.34
12	Me explicó [como le respondieron].	31.70
9	¿Le contestaron [que le escribió]?	28.30
1	Me contestó [cuándo vino].	22.34
4	¿Te contestó [cuando vino]?	17.87
7	Le contestaron [quién le escribió].	16.60
14	¿Te explicó [como le respondieron]?	7.66

Table 3: Frequency and percentage of each sentence perceived as declarative (1+2) or interrogative (3+4).

		Frequency			Percentage		
No.	Ans.	1+2	3+4	Total	1+2	3+4	Total
1	1	417	53	470	**88.72**	11.28	100
2	2	424	46	470	**90.21**	9.79	100
3	3	184	286	470	39.15	**60.85**	100
4	4	288	182	470	61.28	**38.72**	100
5	1	291	179	470	**61.91**	38.09	100
6	2	351	119	470	**74.68**	25.32	100
7	1	330	140	470	**70.21**	29.79	100
8	3	88	382	470	18.72	**81.28**	100
9	4	152	318	470	32.34	**67.66**	100
10	3	85	385	470	18.09	**81.91**	100
11	1	400	70	470	**85.11**	14.89	100
12	2	420	50	470	**89.36**	10.64	100
13	3	124	346	470	26.38	**73.62**	100
14	4	254	216	470	54.04	**45.96**	100

* Shadowed cells indicate percentage of correct identification of sentence type (declarative or interrogative).

** Bold-lined cells indicate where the higher percentage of response for the correspondent sentence was recorded.

Table 4: Correct identification of sentence type of each sentence by percentage in descending order.

No.	Sentences	%
2	Me contestó [cuando vino].	90.21
12	Me explicó [como le respondieron].	89.36
1	Me contestó [cuándo vino].	88.72
11	Me explicó [cómo le respondieron].	85.11
10	¿Le contestaron [quién le escribió]?	81.91
8	¿Le preguntaron [quién le escribió]?	81.28
6	Le contestaron [que le escribió].	74.68
13	¿Te explicó [cómo le respondieron]?	73.62
7	Le contestaron [quién le escribió].	70.21
9	¿Le contestaron [que le escribió]?	67.66
5	Le preguntaron [quién le escribió].	61.91
3	¿Te contestó [cuándo vino]?	60.85
14	¿Te explicó [como le respondieron]?	45.96
4	¿Te contestó [cuando vino]?	38.72

Table 5 shows the frequency and the percentage of each sentence perceived as having interrogative or non-interrogative subordinate clauses. Finally, Table 6 indicates the percentage of correct identifications of the subordinate clause type in descending order.

Table 5: Frequency and percentage of each sentence perceived as having interrogative (1+3) or non-interrogative subordinate clause (2+4).

		Frequency			Percentage		
No.	Ans.	1+3	2+4	Total	1+3	2+4	Total
1	1	127	343	470	**27.02**	72.98	100
2	2	109	361	470	23.19	**76.81**	100
3	3	205	265	470	**43.62**	56.38	100
4	4	191	279	470	40.64	**59.36**	100
5	1	261	209	470	**55.53**	44.47	100
6	2	133	337	470	28.3	**71.70**	100
7	1	165	305	470	**35.11**	64.89	100
8	3	377	93	470	**80.21**	19.79	100
9	4	222	248	470	47.23	**52.77**	100
10	3	287	183	470	**61.06**	38.94	100
11	1	306	164	470	**65.11**	34.89	100
12	2	311	159	470	66.17	**33.83**	100
13	3	371	99	470	**78.94**	21.06	100
14	4	325	145	470	69.15	**30.85**	100

* Shadowed cells indicate percentage of correct identification of type of subordinate clause (interrogative or non-interrogative).

** Bold-lined cells indicate where the higher percentage of response for the correspondent sentence was recorded.

Table 6: Correct identification of subordinate clause type of each sentence by percentage in descending order.

No.	Sentences	%
8	¿Le preguntaron [quién le escribió]?	80.21
13	¿Te explicó [cómo le respondieron]?	78.94
2	Me contestó [cuando vino].	76.81
6	Le contestaron [que le escribió].	71.70
11	Me explicó [cómo le respondieron].	65.11
10	¿Le contestaron [quién le escribió]?	61.06
4	¿Te contestó [cuando vino]?	59.36
5	Le preguntaron [quién le escribió].	55.53
9	¿Le contestaron [que le escribió]?	52.77
3	¿Te contestó [cuándo vino]?	43.62
7	Le contestaron [quién le escribió].	35.11
12	Me explicó [como le respondieron].	33.83
14	¿Te explicó [como le respondieron]?	30.85
1	Me contestó [cuándo vino].	27.02

4. DISCUSSION

According to the results indicated in Tables 3 and 4, there seems to be a high rate of correct identification for sentence type (declarative or interrogative) even when the subordinate clause is not present. This fact suggests that informants were able to distinguish these two types just by listening to first part of each stimulus.

On the other hand, there are two sentences (numbers 4 and 14, see Table 4) in which the percentage of correct answer was not as high as in the remaining sentences. These results might be caused by two reasons. First, both of them have stress on the last syllable of the verb. Ascending pitch contour, influenced by the stress on the last syllable, could affect the informants' perception of these two stimuli. Second, they were originally (that is, before deleting the subordinate clauses) interrogative sentences and, at the same time, they had non-interrogative subordinate clauses (see below).

As for Tables 5 and 6, informants were able to perceive the type of subordinate clause (interrogative or non-interrogative) with relatively high accu-racy, although there is a weaker tendency than that observed in the case of recognizing entire sen-tences as declarative or interrogative. Interestingly, those sentences which show a low percentage of correct identification tend to have a stress on the last syllable of the main verb, just before the deleted part.

Finally, Tables 1 and 2 indicate that there seems to be two types of identification. While sentences number 2, 6, 8, 10, 11 and 13 have relatively high rate of identification, the percentage of correct answers for the other sentences is much lower.

One possible explanation for this phenomenon, as we saw above, is the disagreement of phrase type between main clause and subordinate one, which probably affected the informants' perception. That is, in the case of the first group, only in item number 11 is there a disagreement between the sentence type of the main clause (declarative) and the subordinate (interrogative). Other stimuli have a combination of sentences of the same type (either declarative-declarative or interrogative-interrogative). The second group is quite the opposite. Only two stimuli (number 3 and 12) have a pair of clauses of the same type, while the others have a combination of different types.

5. CONCLUSIONS

The results presented above suggest that:

- Listening to the first part of a sentence is enough to distinguish its type.
- Subjects were able to anticipate which type of subordinate clause would follow, even if this part was not heard.

It is needless to say that further research is needed to support these conclusions. First, more acoustic phonetic analysis is necessary to see concretely what kind of contour can influence sentence type perception. Second, experiments which manipulate the stimuli in other ways, such as changing the part of the sentence to be removed or manipulating the pitch contour, are also required. Finally, the results analyzed this time come only from a descriptive statistical point of view. A more detailed analysis based on inferential statistics to derive general indications is needed.

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7. APPENDIX

Sentence list

1. Me contestó [cuándo vino]. 2. Me contestó [cuando vino]. 3. ¿Te contestó [cuándo vino]? 4. ¿Te contestó [cuando vino]? 5. Le preguntaron [qué le escribió]. 6. Le contestaron [que le escribió]. 7. Le contestaron [qué le escribió]. 8. ¿Le preguntaron [qué le escribió]? 9. ¿Le contestaron [que le escribió]? 10. ¿Le contestaron [qué le escribió]? 11. Me explicó [cómo le respondieron]. 12. Me explicó [como le respondieron]. 13. ¿Te explicó [cómo le respondieron]? 14. ¿Te explicó [como le respondieron]?

(Phrases in brackets were digitally removed from the original recordings before editing the files for experiment.)

8. REFERENCES

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