The discrimination of intonational contours in Broca's aphasia

Keywords: perception, intonation, Catalan, Broca's aphasia, declaratives, yes-no questions, topicalisations, contrastive focus

Abstract

The observation has been made that agrammatic speakers fail in the comprehension of various sentence types, and this behaviour has been attributed to diminished syntactic capabilities, under the unverified assumption that perception of intonation is intact. Here we reexamine this assumption experimentally with a language, Catalan, which allows for intonation to be the only variable over four sentence types (declaratives, yes-no questions, topicalisations and contrastive focus constructions). We conducted a discrimination task with ten agrammatic and ten age- and education-matched control subjects. The subjects were asked to decide whether sentence pairs were identical or not. The overall agrammatic performance was very accurate (89.1% vs. 95.6% correct of the controls). The aphasic participants performed above chance in six out of seven conditions. The results indicate that agrammatic individuals succeeded in the task and that their perception of intonation is spared. We conclude that failure in comprehension in agrammatism cannot be attributed to prosodic disruption.

1. Introduction: Intonation in Broca's aphasia

Although there are numerous neuroimaging studies on the involvement of the right and left hemispheres in phonological processing, there is little work on the behaviour of aphasic patients in prosodic perception.

In their metastudy, Meyer and Jäncke (2006) reviewed fMRI and positron emission tomography studies published between 1992 and 2004 on auditory function, all based on right-handed speakers. Even though traditionally musical processing has been attributed to the right hemisphere and phonological processing has been attributed to the left hemisphere, the studies point to recruitment of both right and left hemispheres for both functions. Still, the frontal speculum of the left hemisphere is primarily (not solely) entrusted with phonological processing, and the right with so called paralinguistic processing (music, speech complexity, affective prosody, sound perception). Tone languages like Chinese and Thai, as well as intonational languages were investigated by Gandour, Wong, Hsieh, Weinzapfel, Van Lancker and Hutchins (2000), Gandour, Wong, Lowe, Dzemidzic, Satthamnuwong, Tong et al. (2002), and Gandour, Dzemidzic, Wong, Lowe, Tong, Hsieh et al. (2003). Their imaging studies indicate nine activational clusters, six (67%) in the left hemisphere, and three (33%) in the right hemisphere. While the processing of lexical tone (in tone languages) showed an increase in activation only in the left hemisphere, the perception of intonation triggered bilateral and right hemisphere activation. Pitch and tone perception activated clusters in the left hemisphere (57%) and the right hemisphere 43%), but the areas involved corresponded to the dorsomedial area of the pars opercularis – so it is not the frontal operculum which supports these functions. The studies by Meyer, Alter, Friederici, Lohmann and von Cramon (2002) and Meyer, Steinhauer, Alter, Friederici and von Cramon (2004) on sentential intonational contours observed involvement of the right Rolandic operculum.

In Friederici's neurocognitive model of sentence processing (Friederici 2006), phonological segmentation takes place in the first phase ('phase 0') of sentence processing, occurring in the first 100 ms, and is supported by Brodmann's area 44. Yet, intonation is a supralexical phenomenon that may not be included in phonological segmentation as understood in more traditional (as opposed to suprasegmental) terms.

Hence although there has been progress in our understanding of linguistic functions and their physical substrate (as summarised by Meyer and Jäncke 2006), one may still wonder whether the perception of intonation is intact in Broca's aphasia or not, given the different loci that are invoked in the literature when intonation is considered. Here we approach the perception of intonation from a behavioural point of view. The question is particularly relevant given that Broca's aphasics are known to experience comprehension deficits (see, for an overview, Grodzinsky 2006). It is also known that sentential meaning is partly conveyed by intonation. As a consequence, should there be a deficit in the perception of intonation in Broca's aphasia, the prediction would be made that a comprehension deficit may occur as a consequence without having to postulate any deficit in syntax/semantics. We address this problem by reference to Catalan, a language particularly suited for the testing of intonation, as we shall see.

The paper proceeds as follows. The remainder of this section addresses the background to the study, consisting of work on intonation and word order in English and German, and argues for the need for our study. Section 2 presents a description of intonation in Catalan discusses and details the experimental design, subjects and procedure. In section 3 the results of the experiment are presented, and in section 4 we draw our conclusions.

1. 1. Background studies

The aphasiology literature contains many examples of research that address the ability to discriminate intonational contours in left hemisphere damaged subjects. Bryan (1989) designed thirteen tasks related to prosody in English, one of them testing the ability to distinguish between interrogative and declarative sentences; the left-hemisphere damaged patients were impaired in fewer tasks than the right-hemisphere damaged patients, but still performed more poorly than the healthy controls. Heilman, Bowers, Speedie and Coslett (1984) designed an identification task including declarative, interrogative and imperative sentences; their results with left- and right-hemisphere damaged patients led them to conclude that intonation may be bilaterally controlled. Notice that English declarative and yes-no interrogative sentences display different superficial word order due to subject inversion in interrogatives (*Mary read the book* vs. *Did Mary read the book?*). Imperatives are characterised by the absence of an overt subject (*Read the book!*), otherwise obligatory.

Also investigating English, Pell and Baum (1997) tested nine right- and ten left-hemisphere damaged patients, plus controls, under three condition types: well-formed sequences (in which prosody and semantics matched each other), nonsense sequences (meaningless utterances with well-formed prosodic shape) and filtered sequences (low-pass filtered sequences retaining prosodic shape); the subjects had to assert whether the sequences heard were different or the same. The left-hemisphere damaged patients showed a behaviour similar to that of the other two groups, but slightly poorer specifically in the linguistic prosodic tasks (as opposed to the affective prosodic). Although relatively underinvestigated, a summary of work on sentential prosody up to the end of the 90s can be found in Baum and Pell (1999).

There are few published works dealing with intonation specifically in agrammatic aphasia. Raithel (2005) is an extensive study comparing comprehension in twenty Broca's (as well as twenty Wernicke's aphasics) and healthy subjects by means of two experiments. The first

consisted of a task in which subjects had to identify six-word German sentences as questions or statements. German syntax forces word order alternations, so declaratives present the verb in second position (V2) as in (1a), while interrogatives are verb initial, as in (1b):

(1) a. Du kannst mir helfen.
you can 1sDAT help 'You can help me.'

b. Kannst du mir helfen?
can you 1sDAT help 'Can you help me?'

Raithel tested well-formed utterances like the ones in (1), and also 'incongruous' utterances in which the intonation did not match the word order (e.g. declarative word order with a rising intonational contour appropriate for an interrogative). The same sentences with a low-pass filter masking the lexical content were also tested. Broca's aphasics were above chance in most conditions, but significantly different from the healthy controls.

The second experiment compared declarative sentences with narrow focus sentences (with the focus artificially manipulated); this was a discrimination task in which subjects only had to state whether two utterances were identical or not; there were eight sentences pairs, of which seven were identical. All groups performed below chance (healthy controls: 42.14% correct; Broca's patients: 34.43% correct). A second part of the experiment tested the same sentences but required subjects to execute what they were being instructed to do (e.g. 'Point to the BLUE circle!'). Here healthy controls performed at ceiling for four out of five structures, the fifth being the most complex (e.g. 'Put the yellow circle next to the GREEN circle!'); performance for all groups performance worsened as a function of the instructions' complexity (an extralinguistic factor). The experiment as designed gave mixed results, although Raithel concluded that aphasic individuals are able to identify intonational contours. The fact that the

performance was poor under some conditions even for healthy subjects calls into question the experimental design.

Burchert, Weidlich and de Bleser (2005) designed an experiment to see if aphasic patients use prosody as a cue to comprehension. They tested four Broca's aphasics for their comprehension of sentences with contrastive focus (2) through a sentence-picture matching task.

(2) Den Vater sucht der Sohn.
the-AC father looked-for the-NOM son
'It was for the father that the son looked.'

The 44 sentences tested included 22 OVS sentences (like that in (2)) and 22 SVO sentences; in all cases, the arguments were overtly case marked (with NOMINATIVE or ACCUSATIVE markers) such that for a healthy subject no ambiguity arose. The results obtained were compared to sentences without contrastive focus and the same word order from a previous study. The subjects performed above chance in the canonical SVO sentences, and at chance in the OVS condition, independently of whether the first element was contrastively focused or not. Only one patient had an improved performance in OVS when O was contrastively focused. From this, the authors concluded that prosody does not enhance comprehension in Broca's aphasia (specifically, a contrastively focused constituent is not better understood than one belonging to an unmarked contour).

For English, Seddoh (2006) investigated the contrast between a declarative and an echo question (*John went with Jane* vs. *John went with Jane?*) and asked fluent and non-fluent aphasic subjects (as well as controls) to identify the sequences as declarative or interrogative; in a second experiment, the stimuli consisted of only the terminal or the preterminal contour

areas of the stimuli in the first experiment. Mild to moderate non-fluent aphasic patients performed well on the identification of declaratives, but not on the identification of interrogatives; in the second experiment they performed like the control subjects in the identification of terminal contours, but not in the identification of preterminal contours. Seddoh (2006) suggested that the discrepancy between reception of declaratives and echo interrogatives may be due to the fact that echo interrogatives signal surprise and incredulity, and so these last stimuli may involve emotional prosody as much as linguistic prosody. The results were interpreted as indicating that F0 information is available to non-fluent aphasic subjects (as witnessed by the accurate identification of declaratives), but some components of the F0 contours may be poorly identified (as shown by the performance in the second experiment).

1. 2. Goals of the study

As we have seen, there are relatively few behavioral studies on the perception of intonation in Broca's aphasia, hence the need for new studies to be conducted. Furthermore, there are some respects in which Catalan, by its properties, allows us to explore prosody more neatly than German or English. By virtue of the fact that Catalan syntax is not constrained in the same way that German or English syntax are, the same word order can be found in declaratives, interrogatives, topicalisations, etc. The only overt marker of a declarative vs. interrogative feature is the intonational contour. The hypothesis we attempt to falsify here is that in (3), and to that end we designed a task for Catalan.

(3) The perception of intonational contours is preserved in Broca's aphasia.

This hypothesis is tacitly accepted in current studies of Broca's comprehension deficits, but seldomly overtly expressed or questioned – one further reason to motivate our study.

2. Experimental design

2. 1. Catalan intonation

Catalan is a language which allows for testing of intonation in the absence of word order variation. To illustrate, let us take a sentence like (4), which displays the basic Catalan word order, SVO; (4) is declarative in meaning, with the first argument corresponding to the AGENT subject and the second corresponding to the THEME object. The same word order is found in the corresponding yes-no interrogative sentence (5), which differs from (4) only in its intonational contour.

(4) En Pere toca el piano.
the Pere plays the piano 'Pere is playing the piano.'

(5) En Pere toca el piano?
the Pere plays the piano 'Does Pere play the piano?'

Sentences with focused and with topicalised subject also display the same D(eterminer)P(hrase) V DP order:

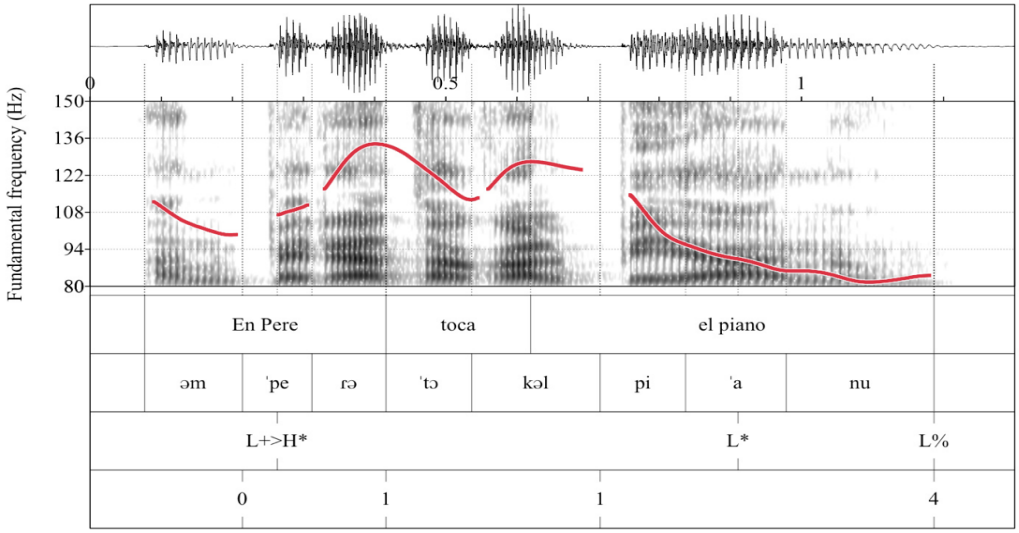
(6) EN PERE toca el piano.
the Pere plays the piano 'It is Pere who is playing the piano.'

(7) En Pere, toca el piano.
the Pere plays the piano 'As for Peter, he is playing the piano.'

Sentences (4) and (5) contrast sharply in their interpretation, since only the declarative has truth conditions. The truth conditional semantics of (4), (6) and (7), on the other hand, are the same, since these three sentence types only differ in their pragmatics, in informational packaging in particular.

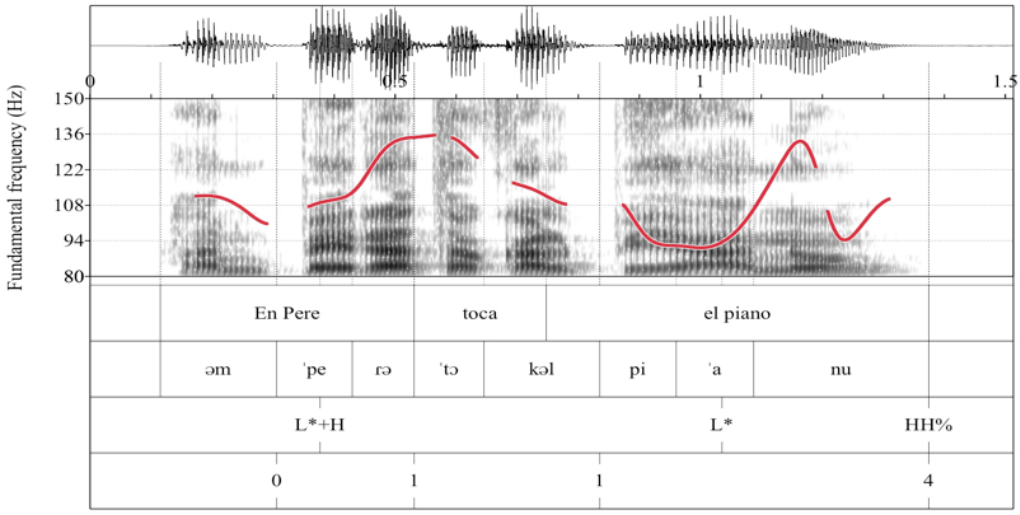
Neutral declaratives (4) are used in a context in which the whole sentence is new information (they would constitute an appropriate answer to the question 'What is happening?'); in Catalan, the typical intonation of this sentence type is a general falling F0. The prenuclear contour is characterized by a rising pitch accent on the first stressed syllable, which consists of a low pitch accent that extends through the accented syllable produced at a high pitch. The prenuclear configuration is followed by a low pitch accent on the nuclear stressed syllable. Then the pitch falls to the end of the intonational phrase and ends with a low final boundary tone. The intonational contour of (4) appears in figure 1.

Figure 1: Neutral declarative



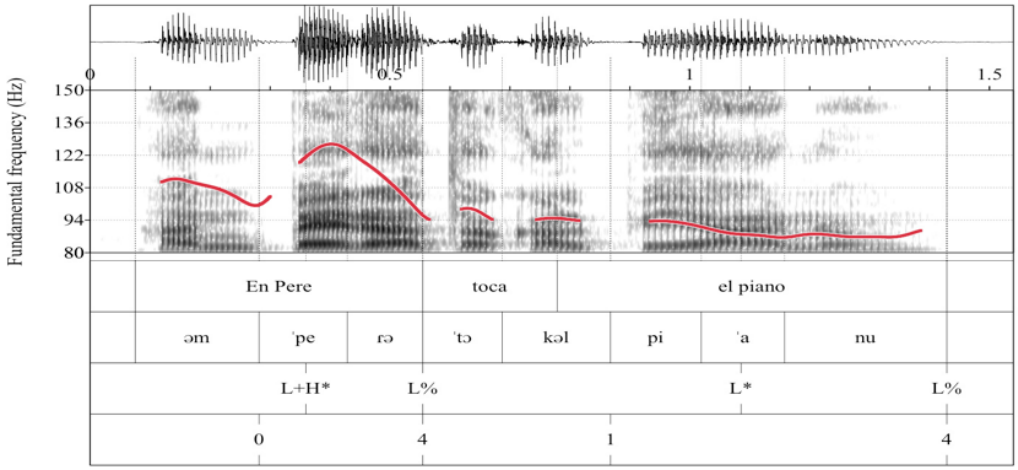
Yes-no questions (5) present the opposite contour, a rising F0. The contour starts with a slight fall that finishes on the first stressed syllable, to slightly fall again. The nuclear syllable consists of a low pitch accent and final rising contour. This is illustrated for (5) in figure 2.

Figure 2: Yes-no question



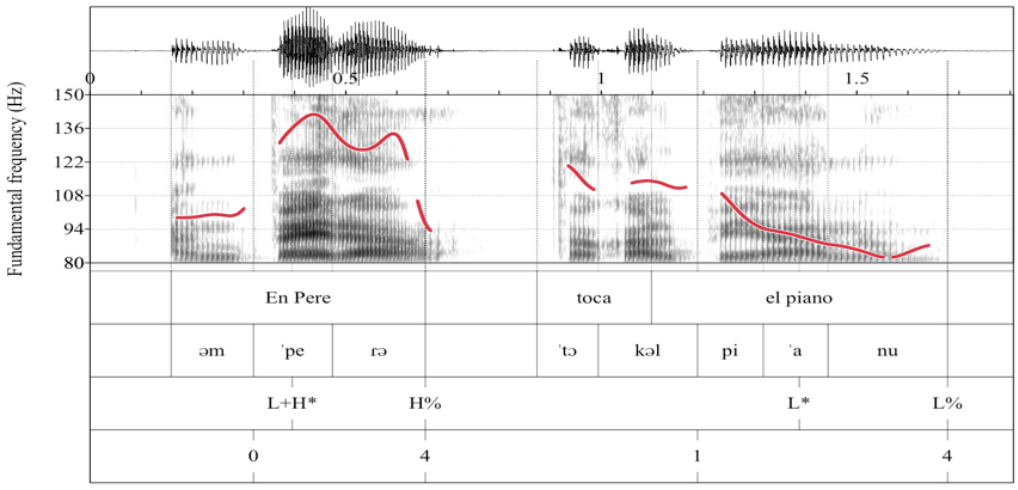
Contrastive focus sentences (6) involve an element in focus position in the left periphery of the sentence that contrasts with a previously mentioned element; their typical contour is characterized by a prominent stress on the focused element. The stressed syllable of the focused element is accented with an emphatic high pitch tone, preceded by a rising low F0. After it, the F0 falls immediately to reach low frequency. The second prosodic unit, after the focus, is deaccented. This is illustrated for the sentence in (6) in figure 3.

Figure 3: Contrastive focus



Topicalisations (7) also involve an element in the left periphery of the sentence, but that element is old, background information. The topic is prosodically marked and constitutes an independent prosodic unit; an optional pause may appear between the topic and the rest of the sentence. The first prosodic unit includes the topic and has a rising F0; the second prosodic unit, which introduces new information, typically has a falling contour similar to that of neutral declaratives. This is exemplified in figure 4 for the sentence in (7).

Figure 4: Topicalisation



2.2. Method and materials

For the purpose of falsifying (3) we designed a discrimination experiment in which subjects had to discriminate sentences differing only in intonation, i.e. with intonation as the only variable, an experimental method first used, to our knowledge, by Weintraub et al. (1981) with right-hemisphere damaged patients in the comparison of declarative and interrogative sentences. We used recorded natural speech input and increased the number and variety of experimental items with respect to previous experiments.

We aimed at evaluating the agrammatic subject's sensitivity to different intonational contours, in Catalan we had the possibility to test them directly with existing sentences, and need not resort to masking of any kind, as in Raithel's (2006) first experiment. We refrained from asking about the properties of the sentences (or fragments of sentences) in contrast with Seddoh (2006) and Raithel's (2005) first experiment, as we were not addressing the metalinguistic competence of Broca's aphasics. Rather, as in Raithel's second experiment, we designed a discrimination task. This matches the capacities that a native speaker would have to recruit in language comprehension in a natural setting. We also avoided contours with associated affective meaning, to focus on linguistic meaning.

The experimental items included the four sentence types already illustrated in Section 2.1: neutral declaratives (4), yes-no interrogatives (5), contrastive focus sentences (6) and topicalisations (7). The experiment consisted of 32 sentence pairs of matched sentences. Twelve of those were pairs of declarative/interrogative and were used as controls, given the salience of the contrast between the declarative and the interrogative; it was considered that if a patient could not perceive the difference between these two contours, the experiment should not be pursued (although, upon completion, no patient fell into that category). The remaining 24 were the experimental items: 12 pairs of identical contours (declarative/declarative, contrastive focus/contrastive focus, topicalisation/topicalisation) and 12 pairs of different

contours (contrastive focus/declarative, declarative/topicalisation, topicalisation/contrastive focus). The pairs of identical contours were in fact identical tokens, so that no difference in phonetic detail, syllable shape, etc., could induce the subjects to judge them different. All sentences were of similar length (six to eight syllables, five words) and recorded by the same male voice in an anechoic chamber.

The items were presented in pseudorandom order (see Appendix 1) on a laptop with PsyScope software.

Subjects

We tested ten agrammatic patients, all native speakers of Catalan. They were selected from the patient pool of the Associació Sant Pau of language disorders in Barcelona. They were all diagnosed with the Catalan version of the Western Aphasia Battery (Kertesz 1982, Spanish version Kertesz et al. 1990); the severity of their impairment was determined by a speech therapist in the neurological board in the Hospital de Sant Pau. None of the participants had a history of drug abuse, hospitalisation due to psychiatric disorders, speech/language disorders or learning disabilities before the stroke. None of the participants suffered from articulatory impairment. They were all right-handed except for MP and EC, who are left-handed. Details of age, education, etiology, time post-onset of their condition and the clinical diagnosis they were given appear in table 2.

	Subject	Gender/Age	Education	Etiology	TPO (years)	Aphasia class.
1	MM	m/34	Secondary	Ischemic CVA	4	Broca (moderate)

2	FM	m/59	Primary	Left fronto-temporal ischemic CVA	6	Broca (moderate)
3	GM	f/23	Secondary	Ischemic CVA	7	Broca (moderate)
4	JV	m/76	University	Left middle cerebral artery ischemic CVA	12	Global (mild)
5	MP	f/53	University	Left middle cerebral artery bifurcation hemorrhagic CVA	18	Broca (moderate)
6	MF	f/69	University	Left middle cerebral artery bifurcation ischemic CVA	18	Broca (mild)
7	EC	f/57	University	Left middle cerebral	5	Broca (moderate)

				artery ischemic CVA		
8	AR	m/68	University	Left middle cerebral artery ischemic CVA	11	Broca (mild)
9	JR	m/74	Primary	Left middle cerebral artery ischemic CVA	11	Broca (mild)
10	RE	m/81	Primary	CVA	15	Broca

Table 2: Subjects

Based on age and education, they were matched with ten healthy subjects who acted as controls – see table 3.

	Gender/Age	Education	Subject matched
C1	m/34	Secondary	1
C2	m/59	Primary	2
C3	f/23	Secondary	3
C4	m/76	University	4

C5	f/53	University	5
C6	f/69	University	6
C7	f/57	University	7
C8	m/68	University	8
C9	m/74	Primary	9
C10	m/81	Primary	10

Table 3: Control subjects

Procedure

The subjects sat in front of the laptop. All they could see was a dot on the screen for each experimental pair of items; shortly after the appearance of the dot, a pair of sentences could be heard through the loudspeakers; as this happened, the dot on the screen gradually disappeared. Subjects were asked if the two sentences they had just heard were identical or not. If they regarded the sentences as identical, they had to press a green key on the keyboard, and if they regarded the sentences as non-identical they had to press a red key. PsyScope allowed for reaction times to be recorded as well, although the results will not be reported here.

Patients were tested individually in a quiet room in the premises of the Associació Sant Pau in Barcelona and controls were tested in their homes or at university.

The experimental phase was preceded by a training phase, consisting of three items (one declarative/interrogative pair, one pair of identical sentences, one pair of different sentences), so that subjects could familiarize themselves with the procedure; no further training was required in any case.

Coding and statistical measures

Given that each pair of items could be judged identical or not, the answers were coded as correct or incorrect. We also computed separately correct and incorrect anwers depending on whether the expected answer was afirmative or negative, and so answers were also coded as: hits, misses, correct rejections or false alarms. XXXX

The statistical analyses were obtained using SAS (version 9.2; SAS Institute Inc., Cary, NC, USA). They were carried out taking into account repeated measures coming from the individuals tested; the significance level was set at 0.05.

3. Results

The overall results for control and aphasic subjects appear in table 4. As can observed, the performance of the aphasic subjects is well above chance.

Subjects	Broca's aphasia	Controls
Correct answers	89.1%	95.6%

Table 4: Overall percentage correct responses for both Broca's patients and control subjects

The statistical analysis indicates that there is a statistically significant difference between the performances of the aphasic and the control group ($\chi^2 = 6.23$, $p < 0.05$), even if the performance of the aphasic subjects is good.

The results for the control (declarative/interrogative) condition appear in table 5.

Condition	D–D	D–I
Broca's aphasia	97.5%	96.25%
Control subjects	100%	97.75%

Table 5: Percentage correct responses for the control conditions; D = declarative, I = interrogative

The results for the experimental conditions appear in table 6.

Condition	F–F	T–T	D–T	T–F	F–D
Broca's aphasia	92.5%	92.5%	82.5%	85%	70%
Control subjects	97.5%	97.5%	95%	95%	92.5%

Table 6: Percentage correct responses for the experimental conditions; F = contrastive focus; T = topicalisation; D = declarative; I = interrogative

Here we see that all identical sentence pairs are correctly judged as such by the aphasic group. For the dissimilar pairs, the control condition, which includes an interrogative and a declarative sentence, is also correctly identified; the topicalised/contrastive focus condition is identified as dissimilar both by the aphasic and the control group equally. There are two conditions in which aphasics do not perform as well as the controls: the declarative/topicalisation condition and the contrastive focus/declarative condition; these are the only two cases in which the difference in performance is statistically significant (respectively $\chi^2 = 15.81$ and $\chi^2 = 5.07$, $p < 0.05$). The two contours which are less proficiently discriminated share several prosodic properties: they are characterised by a rising intonation in the first part followed by a general falling pattern. Still, performance is 70% correct in the contrastive focus/declarative condition, and over 80% correct in the declarative/topicalisation condition. Notice that if a speaker did not perceive the

difference between these intonational pairs, we would expect him/her to perform at chance, given that the choice is between two options (+/– identical). The result is different from chance in the declarative/topicalisation condition (Mean Estimate=0.33, CI 95% (0.14, 0.60)), but not in the contrastive focus/declarative condition. The difference reaches significance probably due to the size of the sample, and might disappear if more subjects were tested. We can conclude that the agrammatic subjects in our sample are able to discriminate intonational contours in six out of seven conditions.

Focusing on the individual results, results for aphasic subjects and their matched controls appear in figure 5.

Figure 5: Individual results for aphasic subjects and matched controls

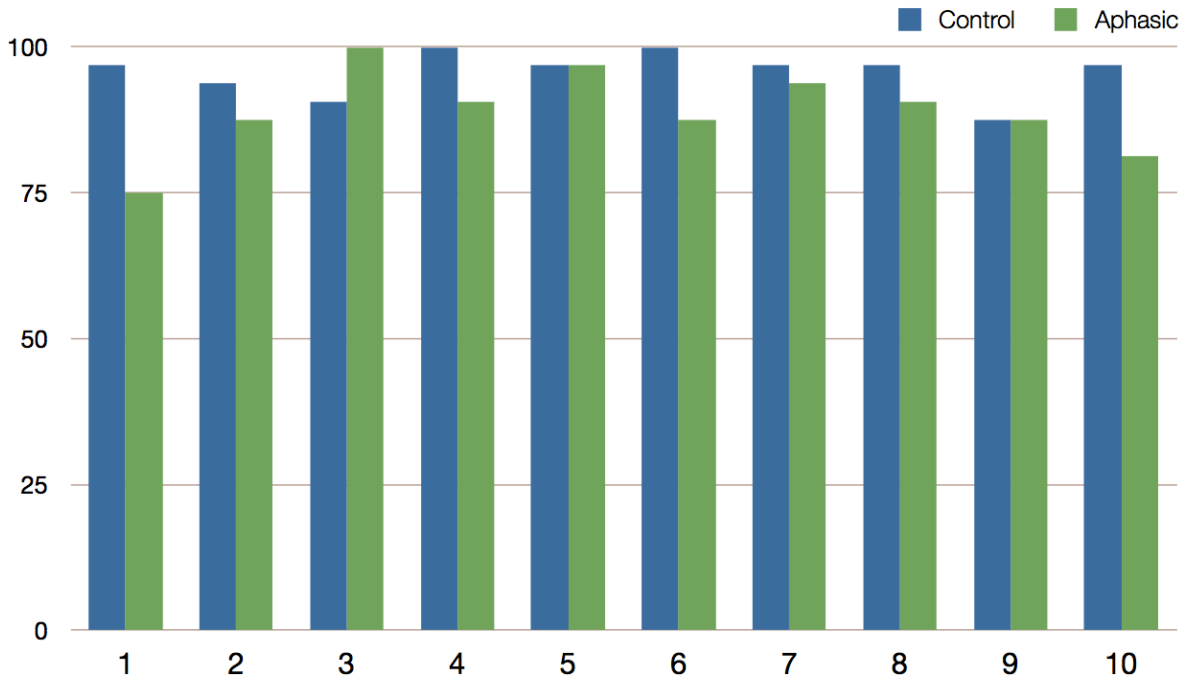


Figure 5 shows that the performance of the agrammatic subjects is quite consistent: they all answer correctly between 75% and 100% of the time. If we compare each individual with his/her control, performance is similar, with the difference being fairly pronounced only in the

case of subject 1. Note that in one instance (subject 3) the aphasic patient actually outperforms the control subject.

4. Discussion

Comprehension deficits in agrammatism have been identified in English and a number of other languages (Zurif, Caramazza & Myerson 1972, Caramazza & Zurif 1976, Kean 1977, Schwartz, Saffran& Marin 1980, Caplan & Futter 1986, Grodzinsky 1990, Grodzinsky 2000 et sequentia; also Gavarró 2005 for Catalan). The interpretation of a sentence rests on the identification of a word sequence as well as the identification of an intonational contour superimposed on the word sequence. It is on the basis of both that the speaker can build a grammatical representation of the sentence from which the interpretation is drawn. Therefore, the possibility remains that poor comprehension in agrammatism is partially or totally due to misperception of intonational patterns. Here we have examined this possibility, and formulated the hypothesis (3) that intonational contours are discriminated in agrammatic aphasia. The experiment reported here bears directly on this issue as Catalan (much as other Romance languages) allows for intonational variation on the same word order sequences – unlike German and English, the previously investigated languages.

The results show no difference between healthy, control subjects and agrammatic aphasic subjects in five of the seven conditions tested, so that the hypothesis in (3) is not falsified. For two other conditions, there are statistically significant differences between the two groups, but agrammatic subjects perform well above chance in one of these two conditions. Hence again (3) is not falsified by the results of the declarative/topicalisation contrast, since we would expect agrammatics to perform at chance if their perception of intonation failed (in the experimental items, nothing but intonation varies and there is no other cue to assist the subjects

in their performance). The hypothesis can only be marginally rejected for the contrastive focus/declarative condition, although sample size may be responsible for the fact that a 70% correct response rate is not different from chance in our model. An anonymous reviewer points to the possibility that patients may have been able to perform well in our experiment because of preserved ability to discriminate melodic-musical contours; although this cannot be be excluded, and further experimentation would be needed to rule out that possibility, the zero hypothesis in the field is that aphasic subjects grammatical and processing mechanisms are the same as those of healthy subjects unless we have evidence to the contrary. To our knowledge, there no evidence in this case that Broca's aphasia subjects resort to melodic-musical discrimination to perceive entonation. We conclude that it is justified to assume, as tacitly done in the literature, that the perception of intonation is broadly spared in agrammatism. Should it be found in further research that aphasic subjects entrust the perception of intonation to the areas that discriminate melody and music, it would still hold that deficits in comprehension must arise elsewhere in the grammar.

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Declaration of interest

The authors report no conflict of interest. The authors alone, listed alphabetically, are responsible for the research reported and the writing of this paper.

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Appendix: Experimental items

(D = declarative; F = contrastive focus; I = interrogative; T = topicalisation)

1.	ID	La mare veu el pare[L SEP] 'The mother sees the father'
2.	DF	El senyor compra el diari 'The man buys the newspaper'
3.	TD	La veïna pentina el fill[L SEP] 'The neighbour combs the son'
4.	DD	El senyor compra el diari 'The man buys the newspaper'
5.	FF	La mare veu el pare[L SEP][I SEP] 'The mother sees the father'

6. ID La veïna pentina el fill‘The neighbour combs the son’s hair’

7. DT La mare veu el pare ‘The mother sees the father’

8. FT El senyor compra el diari ‘The man buys the newspaper’

9. DD La mare veu el pare‘The mother sees the father’

10. DD La veïna pentina el fill ‘The neighbour combs the son’s hair’

11. FD En Pere toca el piano‘Pere plays the piano’

12. TT En Pere toca el piano‘Pere plays the piano’

13. DI El barret tapa el gerro ‘The hat covers the jar’

14. TF En Pere toca el piano‘Pere plays the piano’

15. FF El senyor compra el diari ‘The man buys the newspaper’

16. FF En Pere toca el piano‘Pere plays the piano’

17. DI La Rosa crida el Joan ‘Rosa calls Joan’

18. DT En Pere toca el piano ‘Pere plays the piano’

19. TT La veïna pentina el fill ‘The neighbour combs the son’s hair’

20. FT La veïna pentina el fill‘The neighbour combs the son’s hair’

21. ID En Pere toca el piano ‘Pere plays the piano’

22. FD La mare veu el pare ‘The mother sees the father’

23. DD En Pere toca el piano ‘Pere plays the piano’

24. TD El senyor compra el diari ‘The man buys the newspaper’

25. ID El senyor compra el diari ‘The man buys the newspaper’

26. TT La mare veu el pare ‘The mother sees the father’

27. DF La veïna pentina el fill ‘The neighbour combs the son’s hair’

28. DI La nena menja patates ‘The girl eats potatoes’

29. FF La veïna pentina el fill ‘The neighbour combs the son’s hair’

30. TF La mare veu el pare‘The mother sees the father’

31. ID El nen fa els deures ‘The child does the homework’

32. TT El senyor compra el diari ‘The man buys the newspaper’