

# CARTOGRAPHY AND AGRAMMATIC SYNTACTIC PRODUCTION IN IBERO-ROMANCE<sup>1</sup>

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## 1. *Introduction*

Research over the last 25 years has shown that agrammatism can best be characterised in terms of a deficit affecting specific structures in the grammatical derivation. The deficit is in fact more constrained than previously thought, both in production and in comprehension; it has also been found out that the comprehension deficit differs in important ways from the deficit in production (see Grodzinsky 2000). In this paper we focus on the syntactic productions of Broca's aphasic speakers of three Ibero-Romance languages and explore extensions of former accounts of agrammatism from the cartographic perspective.

Friedmann and Grodzinsky (1997) found that a Hebrew speaker affected of agrammatism failed to produce tense markers as a healthy speaker would, but was able to produce subject-agreement markers. This finding was the source of the Tree-Pruning Hypothesis (TPH hereafter), which states that the production impairment is selective and that a given category is more or less impaired depending on its position in the syntactic tree.

- (1) *Tree-Pruning Hypothesis* (Friedmann & Grodzinsky 1997: 420)
  - a) C, T or Agr is underspecified in agrammatic production
  - b) An underspecified node cannot project any higher.

Patients vary with respect to the syntactic node that is affected (C, T, Agr in Friedmann and Grodzinsky's formulation) and this gives rise to different degrees of severity of the aphasic syndrome. In general terms pruning is a loosening on the conditions on transfer to the interface which, by hypothesis, is found in agrammatic aphasia. The question we address here is: what are the predictions of the TPH for Ibero-Romance if we assume a sentential structure as postulated in the cartographic literature, with an extended IP and CP field? If the TPH is correct, we expect the functional categories postulated for the IP field (Cinque 2006, a.o.) and the CP field (Rizzi 2002, a.o.) to behave in a differentiated manner under the condition of language disorder.

The paper proceeds as follows: in section 2, we present a set of experiments designed and conducted to address our main question; we

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provide details on the experimental subjects and we summarize the main results. In section 3 some puzzles that the results present under the hypothesis entertained are dealt with: we address one puzzle relating to the TP field and we consider the issues raised by some unexpected results in the domain of the CP field.

## 2. *A set of experiments for Catalan, Galician and Spanish*

With the purpose of testing the TPH under the cartographic perspective, we designed a series of production experiments. These were run with 15 agrammatics, 5 Catalan, 5 Galician and 5 Spanish native speakers, of ages between 27 and 83 (mean: 55), between 1 month and 11 years post-onset, all classified as mild agrammatics by standard clinical tests (see details in (2)); 15 age-matched control subjects were also tested.

### (2) Subjects

Subject	Gender/age	Edu.	Etiology	TPO	Aphasia classification
C1	m/63	3	Ischemic CVA Left fronto-insular infarction	5	Motor aphasia (mild)
C2	m/66	1	Ischemic CVA Left middle cerebral artery	4	Mixed Transcortical (mild)
C3	m/69	1	Ischemic CVA Left infarction affecting middle cerebral artery region	2	Motor aphasia (mild)
C4	m/70	3	Ischemic CVA Left middle cerebral artery	7	Global (mild)
C5	m/70	2	Ischemic CVA Left temporo-medial infarction	5	Mixed Transcortical (mild)
G1	f/76	1	Ischemic CVA Left middle cerebral artery	0.9m	Motor aphasia (mild)
G2	f/83	1	Ischemic CVA Left, cardio-embolic	0.5m	Motor aphasia (mild)
G3	f/55	1	Hemorrhagic CVA Left intraparenchymatous hemorrhage affecting basal ganglia	3	Motor aphasia (mild)
G4	m/74	2	Ischemic CVA Left infarction affecting middle cerebral artery region	1.7m	Mixed Transcortical (mild)
G5	f/56	2	Hemorrhagic CVA Left intraparenchymatous hemorrhage	2	Motor aphasia (mild)
S1	m/27	2	Cranial-Encephalic Traumatism Left fronto-temporal	3	Motor aphasia (mild)
S2	m/74	1	Ischemic CVA Left Infarction affecting pre-central area	0.4m	Motor aphasia (mild)
S3	m/61	3	Hemorrhagic CVA Left intraparenchymatous hemorrhage affecting basal ganglia	11	Motor aphasia (mild)
S4	m/64	1	Hemorrhagic CVA Left middle cerebral artery affecting basal ganglia	0.1m	Motor aphasia (mild)
S5	f/38	2	Ischemic CVA Left middle cerebral artery	7	Motor aphasia (mild)

m = male; f = female; 1 = Primary education; 2 = Secondary education; 3 = University education; TPO = Time post-onset: years, months (m); CVA = Cerebrovascular accident; CVD = Cerebrovascular disease; C = Catalan; G = Galician; S = Spanish



- (7) *Vou ir a algures e ti queres sabe-la data.*  
 go-pres.1<sup>st</sup>.sg go-INF to somewhere and you want-pres.2<sup>nd</sup>.sg know-  
 INF-the date  
 'I am going to go somewhere and you want to know the date.'  
 Expected question: *Cando vas ir?*  
 when go-pres.2<sup>nd</sup>.sg go-INF 'When are you going to go?'

Patients were also asked to produced 12 yes/no questions; the elicitation method is exemplified in (8).

- (8) *Ó mellor Pedro toca o piano, preguntamo.*  
 maybe P. play-pres.sub.3<sup>rd</sup>.sg the piano, ask-IMP-2<sup>nd</sup>.sg-me'it  
 'Maybe Peter plays piano, ask it to me.'  
 Expected question: *Toca o piano?*  
 play-pres.3<sup>rd</sup>.sg the piano 'Does he play piano?'

Finally, relatives clauses (25 items) were elicited with the method exemplified in (9) with the support of pictures.

- (9) *Éstes son os plátanos que custan tres euros.*  
 these be-pres.3<sup>rd</sup>.pl the bananas that cost-pres.3<sup>rd</sup>.pl 3 euros  
 'These are the bananas that cost three euros.'  
 Expected answer: *Éstes son os plátanos que custan dous euros.*  
 these be-pres.3<sup>rd</sup>.pl the bananas that cost-pres.3<sup>rd</sup>.pl 2 euros  
 'These are the bananas that cost two euros.'

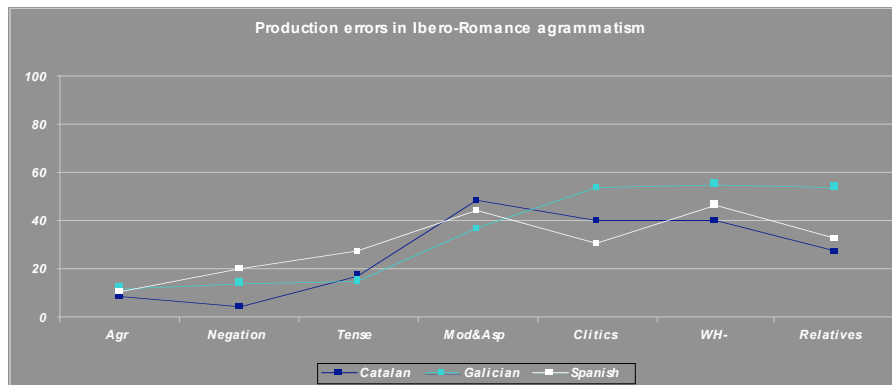
The predictions made by the TPH under the assumption of a sentence structure along the lines of the cartographic approach are that we may possibly find agrammatic speakers failing in any functional projection along the tree; whichever that category is, we then expect all higher functional projections to be impaired. If we test languages in which the sentence structure realised (out of the universal set of functional categories) is the same, the pattern of impairment is expected to be equal, given the absence of cross-linguistic differences. The results of the experiments were indeed highly consistent across languages:

- (10) Overall percentage of errors for Catalan, Galician and Spanish

	Agr	Negation	Tense	Clitics	WH-	Relatives
Catalan	8,5	4	17,6	40	40	27,2
Galician	12	14	15,2	53,85	55,38	54,4
Spanish	10,67	20	27,33	30,77	46,69	32,8

The general results are also represented in Graph 1. As can be observed, there are deficits in production as a function of the position of a syntactic projection in the tree, and this holds for the three languages examined as a

whole. While performance on the various functional projections (statistically) significantly worsened the higher the functional projection was (Wilcoxon Signed Rank test,  $p < 0.05$ ), there was no statistically significant difference between the three languages examined (Mann Whitney U Test,  $p > 0.05$ ). Differences between experimental subjects and controls turned out to be significant for every category under investigation with the exception of agreement.



Graph 1: Production errors in Catalan, Galician and Spanish

Individual results within languages appear in (11); here again it is the case for all individuals that low functional projections such as Negation are less impaired than higher ones like Tense, Tense is less impaired than interrogatives, etc.

(11) Results per language: percentage of error

Catalan	Agr	Negation	Tense	Clitics	Wh-	Relatives
C1	10	2	20	36	46,15	8
C2	6	0	26	56	30,77	48
C3	ND	0	ND	52	38,46	56
C4	6	0	14	48	53,85	8
C5	12	2	28	4	30,77	16

Galician	Agr	Negation	Tense	Clitics	Wh-	Relatives
G1	ND	0	ND	28	100	80
G2	ND	4	ND	36	53,85	40
G3	ND	2	ND	36	38,46	28
G4	16	4	40	44	46,15	72
G5	8	4	36	16	38,46	52

Spanish	Agr	Negation	Tense	Clitics	Wh-	Relatives
S1	6	0	20	52	38,46	64
S2	ND	2	ND	52	53,85	56
S3	18	14	30	44	69,23	8
S4	ND	4	ND	32	38,46	28

While structural considerations are relevant to account for the pattern of impairment, appealing to grammatical operations would not predict the facts: the operation Move, for example, does not appear to be impaired, since patients are capable of performing V-to-T movement (obligatory in the three languages examined) and raising subjects out of VP to preverbal position (*contra* Thompson et al. 1993, Bastiaanse and van Zonneveld 1998, a.o.). We therefore conclude that impairment can be described in structural terms, not in terms of failure of Move, and the results are mostly consistent with the TPH.

However, although the overall picture follows the predicted pattern, under closer scrutiny some of the results are unforeseen. The puzzles we discuss here are found in two domains: Tense/Mood/Aspect functional projections in the IP field, and interrogatives in the CP field.

### 3. *Two puzzles for the TPH*

We assume that agreement is checked in a low projection in the TP field, and Tense is more impaired than agreement (see also Gavarró & Martínez-Ferreiro 2007). However, when we compare the various Aspectual/Mood projections (assuming Cinque's 1999, 2006 hierarchy) we do not find higher projections to be more impaired than lower ones.

$$(12) \quad \dots > \text{AspP}_{\text{repetitive(I)}} > (\dots) > \text{AspP}_{\text{terminative}} > (\dots) > \text{AspP}_{\text{durative}} > (\dots) \\ > \text{AspP}_{\text{inceptive(I)}} > \text{ModP}_{\text{obligation}} > \text{ModP}_{\text{ability}} > (\dots)$$

The aspectual system of Galician is slightly different from the system in Catalan and Spanish: Galician has no compound perfect tenses (pluperfect, etc.), but presents verbal periphrases of aspectual and modal interpretation. The results, keeping Galician separate from Catalan and Spanish, are those in (13):

#### (13) Percentage of errors in verbal periphrases

	Catalan & Spanish	Galician
AspRepetitive	0 (0%)	8/20 (40%)
AspTerminative	13/40 (32.5%)	10/25 (40%)
AspDurative	14/20 (70%)	9/15 (60%)
AspInceptive	3/10 (30%)	10/25 (40%)
ModObligation	12/30 (40%)	14/30 (46.67%)
ModAbility/Possibility	5/10 (50%)	3/5 (60%)

This may indicate that, even if pruning takes place, finer grained loci of impairment cannot be identified; for example, AspPDurative is not visibly more impaired than AspPInceptive, even though it is higher in the tree, as shown in (12). Impairment appears to operate on segments of the tree,

although clearly those segments are smaller than the phase (patients are not  $\nu$ P-impaired, or CP-field-impaired).

In earlier work, Chinellato (2002) proposed that impairment occurs in portions of the tree which correspond to fields (agreement field – assumed to consist of various functional heads–, tense field, etc.):

(14) Field Damage Hypothesis (Chinellato 2002)

Whenever a feature in a syntactic field is unspecified, it blocks higher ones within the same field.

Our results back up this hypothesis, in the understanding that fields do not correspond to the TP or the CP field, since within those we found statistically significant differences in the levels of preservation.

More problematic are the facts relating to the CP field, *wh*- and *yes/no* questions in particular. The results we obtained were unexpected under the hypotheses entertained so far. In table (15) we present the results for *yes/no* question elicitation when compared to *wh*- question elicitation.

(15) Question elicitation in Ibero-Romance, percentage correct

		<i>wh</i> -		<i>yes/no</i>	
Catalan	C1	53.85%	(7/13)	100%	(12/12)
	C2	69.23%	(9/13)	83.33%	(10/12)
	C3	61.54%	(8/13)	91.67%	(11/12)
	C4	46.15%	(6/13)	75%	(9/12)
	C5	69.23%	(9/13)	8.33%	(1/12)
Mean		60%	(39/65)	71.67%	(43/60)
Galician	G1	0%	(0/13)	41.67%	(5/12)
	G2	46.15%	(6/13)	0%	(0/12)
	G3	61.54%	(8/13)	83.33%	(10/12)
	G4	53.85%	(7/13)	58.33%	(7/12)
	G5	61.54%	(8/13)	75%	(9/12)
Mean		44.61%	(29/65)	51.67%	(31/60)
Spanish	S1	61.54%	(8/13)	91.67%	(11/12)
	S2	46.15%	(6/13)	100%	(12/12)
	S3	30.77%	(4/13)	33.33%	(4/12)
	S4	61.54%	(8/13)	75%	(9/12)
	S5	61.54%	(8/13)	100%	(12/12)
Mean		52.31%	(34/65)	80%	(48/60)

As (15) shows, *yes/no* questions are impaired, although they are better preserved than *wh*- questions for most agrammatic speakers (only Catalan speaker C5 and Galician speaker G2 behave differently, with *yes/no* questions more impaired than *wh*- questions); the overall results for the three languages consequently show higher levels of disruption with *wh*- questions than with *yes/no* questions. As we show next, this result is unexpected under standard assumptions on the structure of the CP field.

### 3.1 Wh- and yes/no questions

Rizzi (1997, 2002) has argued that wh- questions are internally merged at Focus, while, according to Cruschina (2007) yes/no questions are merged at Int, in a sentential structure like (16):

(16) Force > (\*Top) > **Int** > (\*Top) > **Focus** > (\*Mod) > (\*Top) > Fin

The question that emerges is then: do we have grounds to question the hierarchy in (16) given our results from agrammatism? To address this question we briefly review the kind of evidence used to support (16). Here we illustrate the word order phenomena considered by Rizzi for Italian in Catalan (Galician and Spanish behave in the same way unless otherwise stated). A focused element follows the Force marker *que* (capitals indicate focus marking):

- (17) a. *Crec que AIXÒ haguessis hagut de dir-li (no una altra cosa).*  
Believe-1s that THIS should-2s have said-to him (not something else)  
b. *\*Crec AIXÒ que haguessis hagut de dir-li (no una altra cosa).*

A focused element also follows an overt interrogative marker such as *si* 'if'; if it precedes it, this gives rise to ill-formedness, as in (18b):

- (18) a. *Em pregunto si AIXÒ li volien dir (no una altra cosa).*  
I wonder if THIS to-them wanted to say (not something else)  
b. *\*Em pregunto AIXÒ si li volien dir (no una altra cosa).*

The interrogative marker may appear before or after a topicalised element *al Joan* 'to Joan', as shown in (19).

- (19) a. *No sé si al Joan haurien d'haver-li dit la veritat.*  
Neg know-1s if to J. should-3pl have said the truth  
b. *No sé al Joan si haurien d'haver-li dit la veritat.*

The cooccurrence of a Force marker and an interrogative marker are non standard, but clearly when the two markers cooccur Force precedes Int:

- (20) a. *La Maria pregunta que si anirem al cinema.*  
D Maria asks that if go-1pl to the cinema  
b. *\*La Maria pregunta si que anirem al cinema.*

Sentences with a topic, an overt interrogative marker and a focused element are possible, in fact common:



- (21) *Em pregunto, al Joan, si ahir AIXÒ, al final de la reunió, hauriem pogut dir-li.*  
 I wonder to Joan if yesterday THIS at the end of the meeting could-1pl have said to him

Non-embedded yes/no questions present, in colloquial Catalan, an overt interrogative marker *que* (also found e.g. in Sicilian, Cruschina 2007).

- (22) *Que no ve, la Maria?*  
 Int Neg come-3sD Maria ‘Isn’t Maria coming?’

This overt marker can follow or precede a topicalised element (23), but is incompatible with a focused element (24).

- (23) a. *Això, que no ho veu, la Maria?*  
 this that Neg it see-3sD Maria  
 b. *Que, això, no ho veu, la Maria?*  
 that Neg it see-3s this D Maria  
 ‘Doesn’t Maria see it?’
- (24) a. *\*AIXÒ que no veu, la Maria?*  
 THIS that Neg see-3s D Maria  
 b. *\*Que AIXÒ no veu, la Maria?*

On the basis of (23) we would place *que* in Int (Top>Int>Top); however, its incompatibility with a focused element weakens the argument – it might indicate that *que* is in FocP.

Let us now turn to wh- elements. A focused element appears to be incompatible with a wh- element, both in Italian (Rizzi 2002) and in Catalan (25):

- (25) a. *\*A qui, AIXÒ, li han dit (i no una altra cosa)?*  
 To whom THIS to-him have-3pl said (and not something else)  
 b. *\*AIXÒ, a qui li han dit (i no una altra cosa)?*

This generalisation is weakened in embedded clauses in Italian, where focus and wh- can both be present. The (a) variants of (26) and (27) appear to be better than the (b) variants (Rizzi judges the Italian analogue of (27a) good). All are degraded in Catalan.

- (26) a. *\*Em pregunto AIXÒ a qui li han dit.*  
 I wonder THIS to whom to him have-3pl said  
 b. *\*Em pregunto a qui AIXÒ li han dit.*  
 I wonder to whom THIS to him have-3pl said

- (27) a. \**Em pregunto AL JOAN què li han dit.*  
I wonder TO JOAN what to him have-3pl said  
b. \**Em pregunto què AL JOAN li han dit.*  
I wonder what TO JOAN to him have-3pl said

From these facts Rizzi (2001) concludes that *wh*- elements in main questions move to the specifier of Foc, not so in embedded questions. The specifier of Foc is therefore not available for focalised elements, as (28) shows:

- (28) a. \**AL JOAN què li han dit?*  
TO JOAN what to-him have-3pl said  
b. \**Què AL JOAN li han dit?*  
What TO JOAN to-him have-3pl said

### 3.2 'Why' as a differentiated *wh*- element

As has been pointed out in the literature, *why* and e.g. its Romance analogues *perchè* and *pourquoi* are quite different from other *wh*- elements. In French, *pourquoi* can only appear in the left periphery of the clause, and not to the right of the verb as other in-situ *wh*- elements; compare (29) and (30).

- (29) *Comment a-t-il parlé ?*      *Il a parlé comment?*  
How did he speak ?      He spoke how?  
(30) *Pourquoi a-t-il parlé ?*      \**Il a parlé pourquoi ?*  
Why did he speak ?      He spoke why?

In Catalan (and Italian) the subject cannot intervene between a *wh*- word and the verb (31), but this restriction does not hold with *per què* 'why' (32), nor with *com és que* 'how come' (33):

- (31) a. *Què fa el Joan?*      *On va el Joan?*  
what does D Joan      where goes D Joan  
'What is Joan doing?'      'Where is Joan going?'  
b. \**Què el Joan fa?*      \**On el Joan va?*  
what D Joan does      where D Joan goes  
(32) a. *Per què sempre arriba tard, el Joan?*  
why always arrives late D Joan  
b. *Per què el Joan sempre arriba tard?*  
why      D Joan always arrives late

- (33) a. *Com és que sempre arriba tard, el Joan?*  
 how come that always arrives late D Joan  
 b. *Com és que el Joan sempre arriba tard?*  
 how is that D Joan always arrives late

The claim by Rizzi (2002) is that *perchè* and interrogatives like it (amongst which we would include *com és que* ‘how come that’ in Catalan) are merged in Int rather than Foc, hence their compatibility with a focused element:

- (34) a. *Perché QUESTO avremmo dovuto dirgli, non qualcos'altro?*  
 Why THIS we should have said to him, not something else  
 b. *\*QUESTO perché avremmo dovuto dirgli, nonqualcos'altro?*  
 THIS why we should have said to him, not something else

Judgements in Catalan are not quite the same, since (35) is not as good as (34) is in Italian:

- (35) a. *?Per què AIXÒ hauriem hagut de dir-li, i no una altra cosa?*  
 Why THIS should-1pl have said to him, and not something else  
 b. *?Com és que EL MEU ARTICLE li has donat, no el teu?*  
 How come MY ARTICLE to him have-2s given and not yours

But, like in Italian, the examples are degraded if the focused element precedes *per què* or *com és que*:

- (36) a. *\*AIXÒ per què hauriem hagut de dir-li, i no una altra cosa?*  
 THIS why should-1pl have said to him and not something else  
 b. *\*EL MEU ARTICLE com és que li has donat, i no el teu?*  
 MY ARTICLE how come that to him have-2s given and not yours

The word order pattern illustrated so far for main clauses also holds for embedded clauses, both in Italian (Rizzi 2001) and in Catalan:

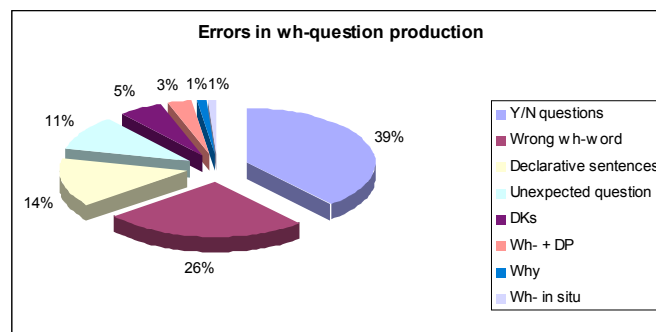
- (37) a. *Mi domando perché QUESTO avremmo dovuto dirgli, non qualcos'altro.*  
 ‘I wonder why THIS we should have said to him, not something else’  
 b. *Non so come mai IL MIO LIBRO gli ha dato, non il tuo.*  
 ‘I don’t know how come MY BOOK you gave to him, not yours’

- (38) a. *Em demano perquè AIXÒ hauríem hagut de dir-li, i no una altra cosa.*  
 I wonder why THIS should-1pl have said and not something else
- b. *?Em demano AIXÒ perquè hauríem hagut de dir-li, enlloc d'una altra cosa.*

To conclude, these results advocate for the order *per què* > Foc for Catalan the same as for Italian. As for wh- and yes/no questions, the evidence provided by the judgments of healthy Romance adults gives support to the structure postulated in the literature.

### 3.3 Agrammatic results and consequences for linguistic theory

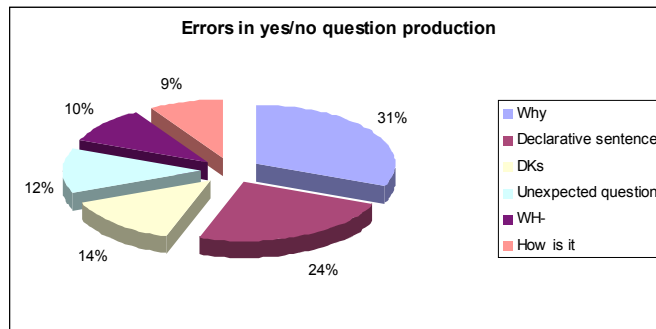
Turning to our original results on agrammatism, what is surprising is not only that yes/no questions are less impaired than wh- questions (as shown in (15) above), but also that erroneous answers in wh- question production were yes/no questions.



Graph 2: wh- question production

Graph 2 indicates the errors produced by the subjects in the elicitation of wh- questions: in 26% of cases, they produced an erroneous wh- word, and in 39% of cases produced a yes/no question; if we analyse these cases as genuine yes/no questions, patients seem to have produced a structure ranging higher than the expected one (up to IntP).

In the error analysis of the experiment eliciting yes/no questions, again we find a trade-off with wh-questions: these are unduly produced 50% of the time.



Graph 3: yes/no question production

Note, however, that in this case patients resorted most of the time to ‘why’ as wh- marker (31% of the time), and the equivalent of ‘how come’ (9% of cases). The fact that our patients produce ‘why’ and ‘how come’ interrogatives instead of yes/no questions means they have resorted to another interrogative marker, merged in the same slot in the structure. This trade-off is not in contradiction with the TPH and, furthermore, it provides another argument for a projection where ‘why’, ‘how come’ and yes/no question markers are merged.

What still remains to be explained are the results for wh- question production by agrammatics: Why should agrammatic speakers resort (39% of the time) to yes/no questions instead of wh- questions, if these require higher nodes in the structure? Is it possible that agrammatic patients are merging these yes/no questions in Foc rather than Int? Note that this kind of argument has been made for the derivation of embedded ‘why’ questions.<sup>2</sup>

<sup>2</sup> In embedded clauses *perchè/por qué* elements have been claimed to raise to Foc, instead of being merged in Int. Contreras (1989) observed that ambiguity emerges in the Spanish interrogatives in (i) only when the subject does not appear between *por qué* and the verb:

- (i) a. *Por qué Juan ha dicho que dimitirá?*  
 Why Juan has said that will-resign-3s  
 Non-ambiguous: ‘Why did he say it?’  
 b. *Por qué ha dicho Juan que dimitirá?*  
 Why has said Juan that will-resign-3s  
 Ambiguous

The facts are the same in Italian and Catalan: a focused element after *perchè/per què* gives rise to a non-ambiguous sentence, while its absence gives rise to ambiguity:

- (ii) a. *Per què AL JOAN li han dit que dimitirà?*  
 Why TO JOAN to him have-3pl said that will-resign-3s  
 Non-ambiguous  
 b. *Per què li han dit que dimitirà?*  
 Why to him have-3pl said that will-resign-3s  
 Ambiguous

The ambiguous questions result from raising of *per què* to Foc (from the embedded clause or the main clause), while with an element in Foc *perquè/per què* is merged in Int and has scope over the main clause only. The conclusion we can draw from this analysis of *per què* and the like is that there is room for variation in the locus of interrogative elements even within one language.

Following this line of thought, suppose that agrammatic patients resort to Foc for the projection of all interrogative elements in Catalan, Galician and Spanish. Then we predict that wh- elements, yes-no questions and 'why' interrogatives will all be equally impaired, and interchangeable. Errors in the production of wh- questions give rise to yes/no questions indeed, but for the rest these predictions are not borne out: yes/no questions are less impaired than wh- questions, and errors in yes/no question production include 'why' and 'how come' questions, but rarely wh-questions. So this analysis can be ruled out.

Alternatively, we could solve the puzzle by analysing our agrammatic speaker's yes/no questions as not involving Int, but rather being declaratives with no involvement of the higher parts of the tree, therefore better preserved than wh- interrogatives involving Foc. This is the analysis adopted by Friedmann (2002) for Hebrew. In Ibero-Romance there is an additional argument in favour of this analysis: the fact that in the productions of yes/no questions patients turn to SV(O) order (with interrogative intonation), the same that is found in declaratives in a high proportion of cases (94.5%), instead of the more common inversion VS order (found in 64% of cases in the healthy controls, only in 5.5% in the agrammatic subjects' productions).

To summarise, the facts of agrammatism unveiled here give strong support to the existence of a functional projection where 'why', 'how come' and yes/no questions are merged. Tree-pruning accounts for the fact that wh- questions are systematically more impaired than negation, tense, aspectual and mood markers and clitics, and this holds for the three languages under investigation and all patients. The fact that errors in the production of wh- questions involve yes/no questions, and that wh-questions are more impaired than yes/no question remains to be accounted for, unless we take the agrammatics' yes/no questions to be concealed declaratives. Nevertheless, the overall results back up an analysis of the impairment proper of agrammatic production as structurally driven and selective. Furthermore, damage provides evidence for the cartographic projection of the syntactic tree, while appeal to phases is not necessary.

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