De-syntacticising Syntax? Concerns on the Architecture of Grammar and the Role of Interface Components

Aritz Irurtzun

Main argument

We need more interaction between subfields in order to discover the possible interactions between components.

4 potential ways of interaction

1. The "radical externalization" thesis.
2. Derivational interactions between interface components and syntax.
3. Interface components as (nonperfectly) reflecting syntax.
4. Interface components as imposing legibility conditions.

1 and 2 argue for a de-syntactisation of phenomena that were thought to pertain to the syntactic component.

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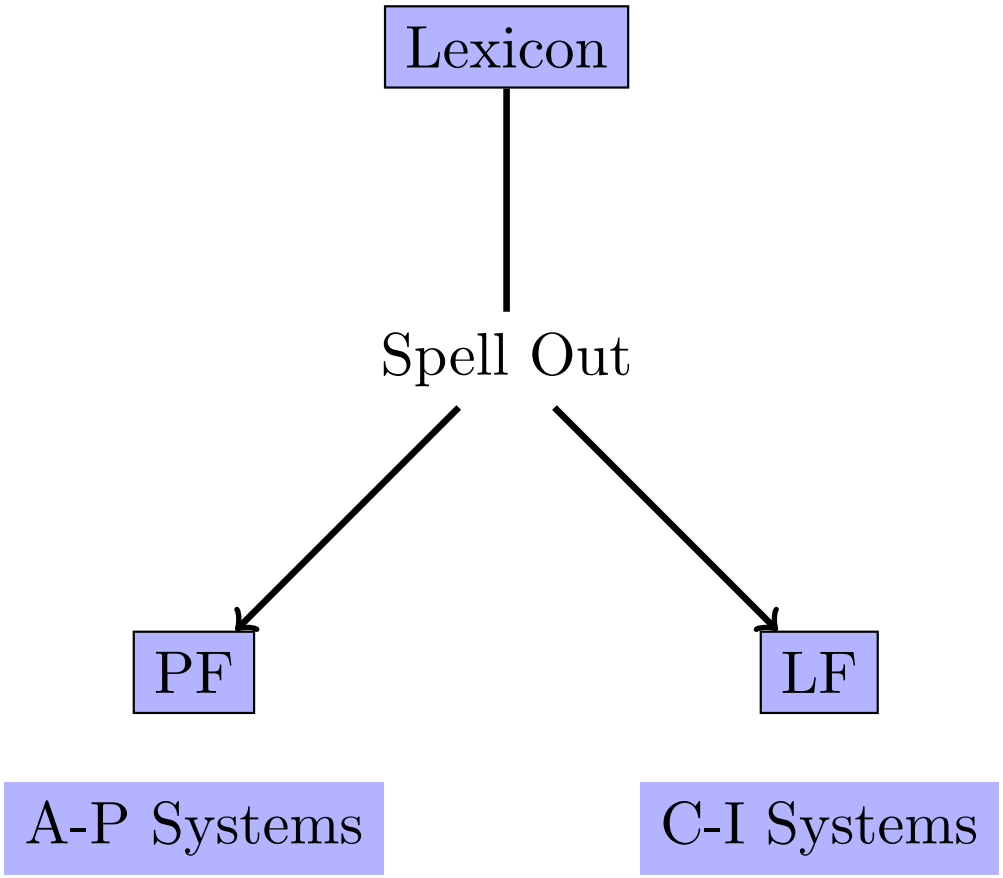
Variation as externalization

cf. Berwick & Chomsky (2011), Boeckx (2011, 2015), Leivada (2015)

- Dissatisfaction with the P&P framework.
- Dissatisfaction with the cartographic approach.
- Universality of the syntactic component (SUT): Merge.
- All cross-linguistic variation is a matter of externalization.

The Architecture of Grammar

cf. Chomsky (1995)



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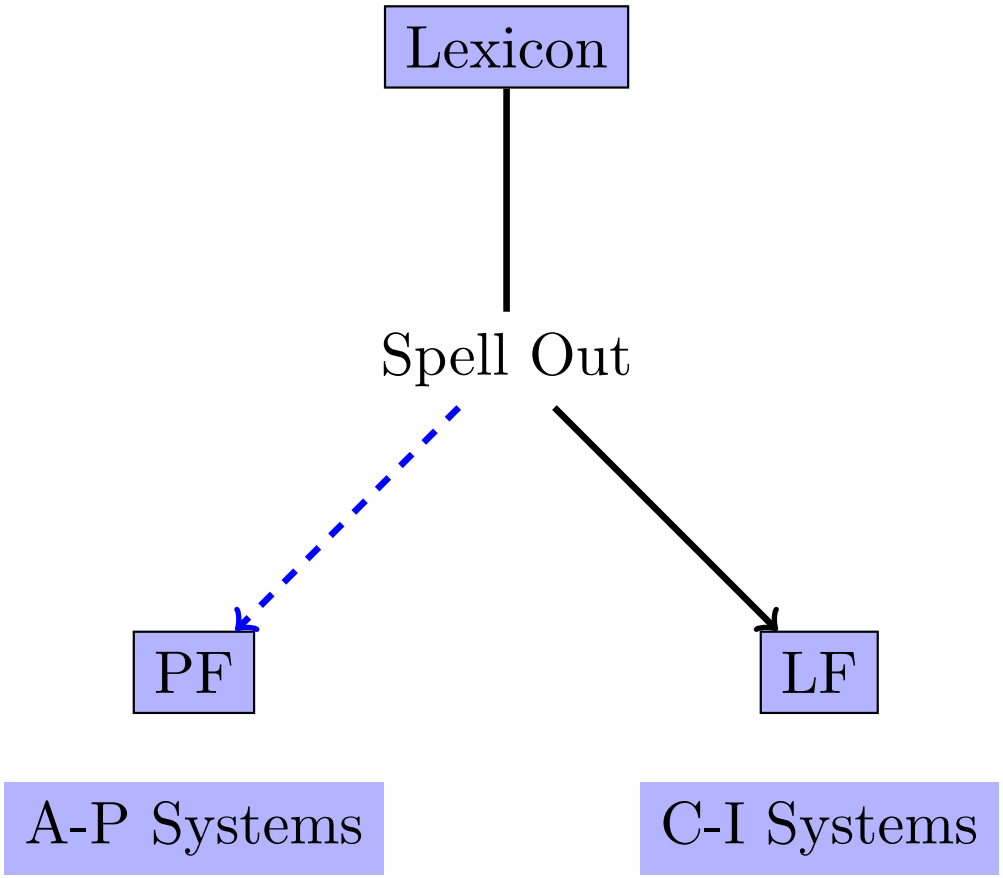

Objections

- Argue that Mathieu's (2016) 'radical externalization' proposal for the licensing of *wh in situ* in French has a number of problems (*cf.* Irurtzun & Duguine (2016)).
- Provide further arguments against the externalization conception of cross-linguistic variability.

Mathieu (2016)

A 'radical externalization' approach

"the wh parameter is completely relegated to PF" (Mathieu, 2016: 252).
$\leadsto$ the interrogative strategy that can be used in particular languages depends on the prosodic properties (prominence).

Two types of languages *wrt* the way they express prominence:

1. *Culminative languages* (*e.g.* Germanic and (most) Romance): these languages "have lexical stress and always link the prominence of the focused constituent to a stressed syllable" (Mathieu (2016: 264)).
2. *Demarcative languages* (*e.g.* Korean and Japanese): these languages "resort to the insertion of boundaries either to the left or right (or both) of the intonational phrase to mark focus without any pitch accent on a particular syllable" (Mathieu (2016: 264)).

Mathieu (2016)

Observation

"[w]hile it is true that many languages that use the culminative strategy also make use of the demarcative strategy, the reverse is not true" Mathieu (2016: 264)

Generalisation

"wh-in-situ languages tend to be languages that use the demarcative strategy only" Mathieu (2016: 264)

Mathieu (2016)

"French is a wh-in-situ language because of its inherent prosodic properties and in particular because of the way focus is realized in the language. More generally, [he argues] that, whereas wh movement languages tend to use pitch accents followed by deaccenting to express focus, wh-in-situ languages tend to use prosodic phrasing. Languages in the first group usually have lexical stress, whereas those in the second one do not. In other words, the option to move or not to move in a given language is constrained by the limits imposed by the phonology of the language. Variation is thus not part of syntax but completely external to it"

(Mathieu, 2016: 281)

Three criticisms

- Tendencies $\not\approx$ predictions.
- No clear ground for the typological distinction between "culminative" and "demarcative" languages.
- The existence of the cross-linguistic tendencies is not obvious.

No room for a dichotomy "culminative" *vs.* "demarcative"

- Languages that employ pitch accents also employ phonological phrasing.

"[w]hile it is true that many languages that use the culminative strategy also make use of the demarcative strategy, the reverse is not true".

No room for a dichotomy "culminative" *vs.* "demarcative"

- The claim that languages classified as demarcative do not employ pitch accents seems to be unwarranted:

> "In Japanese, pitch accents are the most straightforward component of an intonation contour [...] The place of the accent is lexically contrastive, as in *ka'mi* 'god' vs. *kami'* 'paper', and therefore must be specified in the lexicon".
>
> Beckman & Pierrehumbert (1986: 256)

No room for a dichotomy "culminative" *vs.* "demarcative"

- Languages classified as demarcative also employ pitch accents and other local prosodic events.

Higher F0 excursion in pitch accents & TBUs, elongated moraic/syllabic duration, higher intensity values, and gestural hyperarticulation in "demarcative" languages:

- Japanese: Pierrehumbert & Beckman, 1986, 1988; Fujisaki & Kawai, 1988; Maekawa, 1999; Kubozono, 2007; Venditti, Maekawa & Beckman, 2008; Ishihara 2011, 2015.
- Korean: Hwang, 2006; Lee, 2007; Hwang, 2011; Kim & Jun, 2009.
- French: Dahan & Bernard, 1996; Jun & Fougeron, 2000; Dohen & Lœvenbruck, 2004; Ménard, Lœvenbruck & Savariaux, 2006; Perrone-Bertolotti et al., 2013.
- Mandarin: Xu, 1999; Gu, Mori & Kasuya, 2003; Liu & Xu, 2005; Chen & Gussenhoven, 2008; and Lee, Wang & Liberman, 2016.

Unwarranted predictions

Concentrating on Basque: Mathieu's (2016) proposal leaves without explanation existing patterns and predicts inexistent ones:

- Languages with wh-in-situ are not expected to be of the stress-accent type. But Labourdin Basque is a stress-accent language (*cf.* Gaminde & Salaberria, 1997; Hualde, 1999, 2003), hence a culminative language under Mathieu's (2016) typology, yet it has optional wh-in-situ (Duguine & Irurtzun (2014)).
- In Basque we find the inverse case in a different variety: similarities between the word-prosodic systems of Northern Bizkaian Basque and Tokyo Japanese (see, *i.a.* Elordieta, 1998; Hualde, Elordieta, Gaminde & Smiljanić, 2002; Ito, 2002; Gussenhoven, 2004):
  - a lexical distinction between lexically accented and unaccented words,
  - a phrase-initial rise,
  - no durational correlates of accent.

Similarities between NBB & Tokyo Japanese

"the striking coincidence between some Basque varieties (NB) and Tokyo Japanese in a number of important prosodic properties suggests that this set of common properties can be used to characterize a prosodic prototype: T-type pitch-accent"

Hualde, Elordieta, Gaminde & Smiljanić (2002: 578)

Prediction

Northern Bizkaian Basque should be a *wh-in-situ* variety.

- ⊛ Contrary to fact: NBB is an obligatory *wh*-movement variety (*cf.* Hualde, Elordieta & Elordieta, 1994)

Not restricted to Basque

Other examples that cast doubt on the grounds for Mathieu's (2016) typological generalization:

- Hindi has stress-accent and wh-in-situ (Patil et. al. 2008; Dayal, 1996),
- just like Amharic (Haile, 1987; Eilam, 2008),
- Pashto (Tegey & Robson, 1996; David, 2014)),
- Marathi (Wali, 2005; Dhongde & Wali, 2009),
- or Ancash Quechua (Hintz, 2006; Cole & Hermon, 1994).

Conclusion

Mathieu's (2016) "radical externalization" proposal is based on a typology that lacks empirical support, and the number of cross-linguistic exceptions cast doubt on its explanatory power.

General problems for the externalization hypothesis

Impossibility to account for variation in the semantic component.

Some examples

- Interpretative differences between wh-movement and wh in situ.
- Possibility to generate 'telic pairs'.
- Scope differences deriving from V movement.

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Semantic differences between wh-movement and wh in situ

cf. Bošković (2003)

Observation

wh in situ languages allow for the Pair-List interpretation of multiple *wh*-question sentences.

(1) A. Dare-ga nani-o katta no?
who-NOM what-ACC bought Q
Who bought what?

B. Hanako-ga wain-o katta, Miki-ga
Hanako-NOM wine-ACC bought, Miki-NOM
biru-o katta...
beer-ACC bought...
Hanako bought wine, Miki bought beer...

Wh-movement languages allow the PL reading

(2) A. Who bought what?

B. Mary bought wine, Susan bought beer...

Wh in situ languages vs. wh movement languages

The difference between *wh in situ* languages and obligatory *wh*-movement languages is that multiple questions in *wh in situ* languages allow for SP answers, whereas their counterparts in *wh*-movement languages do not.

Context

John is in a store and in the distance sees somebody buying a piece of clothing, but does not see who it is and does not see exactly what the person is buying. He goes to the sales clerk and asks the question "Who bought what?"

✓ Japanese.

* English.

Not a matter of languages but of derivations

French

(3) a. Il a donné quoi à qui?
he AUX given what to whom
What did he give to whom?
[✓PL & ✓SP]

b. Qu'a-t-il donné à qui?
what.has.he given to whom
What did he give to whom?
[✓PL, but *SP]

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Possibility to generate 'telic pairs'

cf. Higginbotham (2009)

(4) The boat is floating under the bridge (ambiguous).

(5) La barca galleggia sotto il ponte.
the boat float under the bridge
The boat is floating under the bridge (stative/*motion).

Resultatives

(6) I wiped the table clean.

(7) *Ho pulito il tavolo pulito.
AUX clean the table clean
I wiped the table clean.

A semantic parameter

English allows for a combinatorial operation that generates telic pairs of events, whereas Italian doesn't.

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Interpretive differences of verb rising

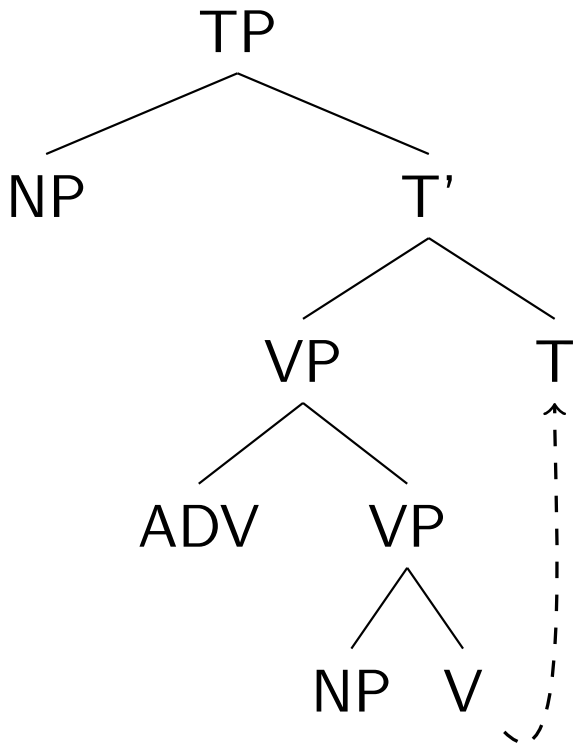
cf. Han *et al.* (2016)

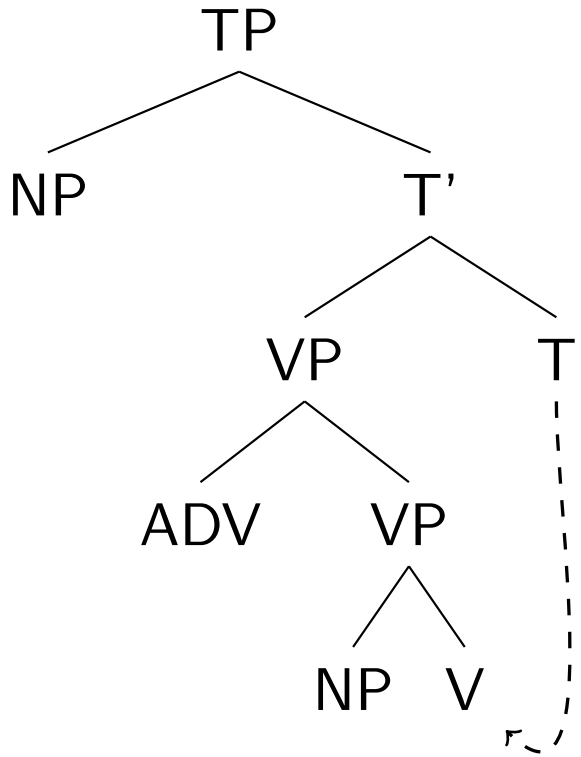
Variability with respect to verb rising observed across Korean idiolects:

(8) Kim-i cacwu Lee-lul piphanha-n-ta
Kim-NOM often Lee-ACC criticize-PRES-DECL
Kim often criticizes Lee

Interpretive differences of verb rising

cf. Han *et al.* (2016)





Ambiguous trings: #SˆADVˆOˆV#

Interpretive differences of verb rising

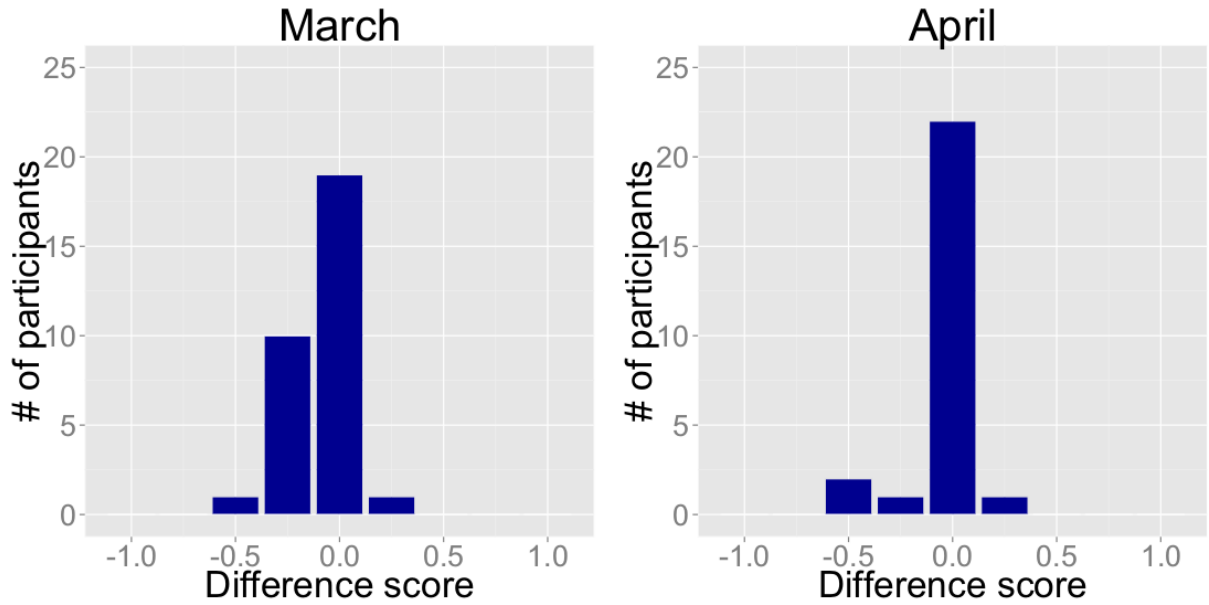
cf. Han *et al.* (2016)

- The relative scope between negation and object QPs provides an appropriate diagnostic for the position of the verb:
  1. If there is verb raising, negation moves with it and as a consequence it outscopes the object QP.
  2. If there is no verb-raising, the object QP takes scope over negation.

Interpretive differences of verb rising

cf. Han *et al.* (2016)

- Preceding literature provides a blurred image.
- Han *et al.* (2016): There are two varieties of Korean: (i) verb rising, (ii) tense lowering:
  - Speakers have stable judgments across test items and across experimental sessions.



Conclusion

This type of facts are is not easily amenable to an "externalization" analysis.

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Two types of proposals

1. Association between focus/interrogatives and nuclear stress.
2. Association between interrogatives and p-phrasing.

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1. Association between focus/interrogatives and nuclear stress.
2. Association between interrogatives and p-phrasing.

Association between focus/interrogatives and nuclear stress

An ideal setting:

- Tease apart language-specific universals (UG) from paralinguistic universals (not specific to language).

A common candidate

Extra effort (Articulatory Phonetics)

$\Downarrow$

Pitch excursion (Acoustic Phonetics)

$\Downarrow$

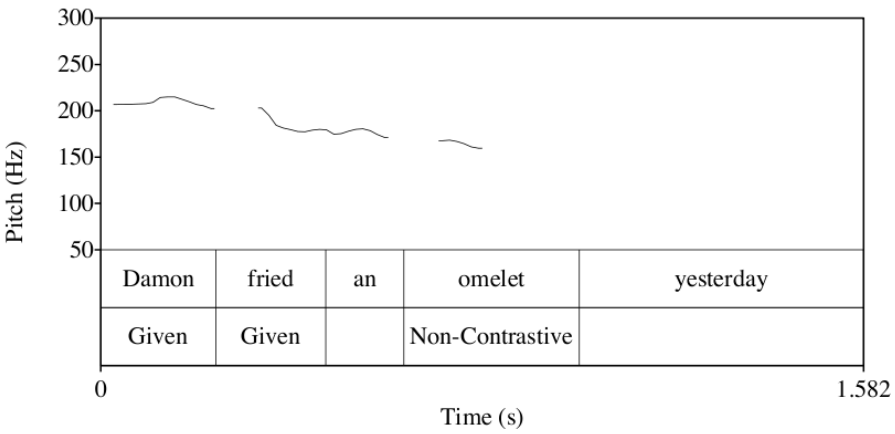
Nuclear Stress (I-language Phonology)

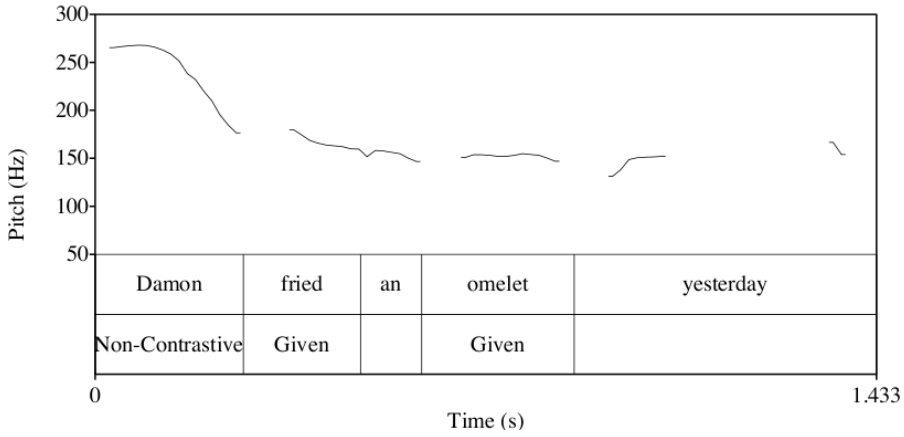
$\Downarrow$

Contrast and exhaustiveness (I-language Semantics).

Strong accents in English

cf. Breen *et al.* (2010)





- Greater intensity (*Db.*), longer duration (*ms.*), and higher mean and maximum F0 (*Hertz*).

The effort code and higher pitch

cf. Ladefoged (2004)

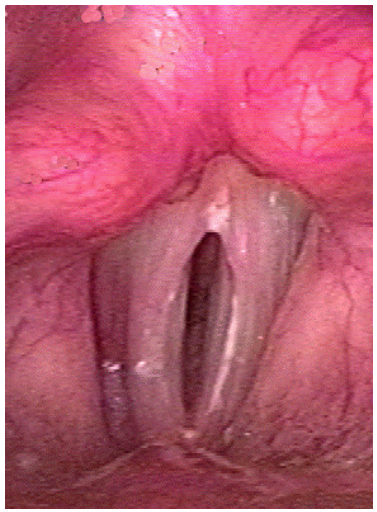


Figure: 120 Hz.

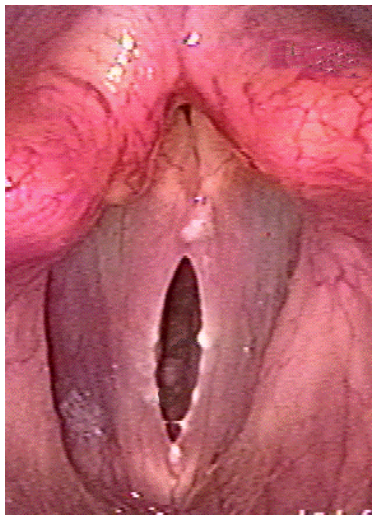


Figure: 160 Hz.

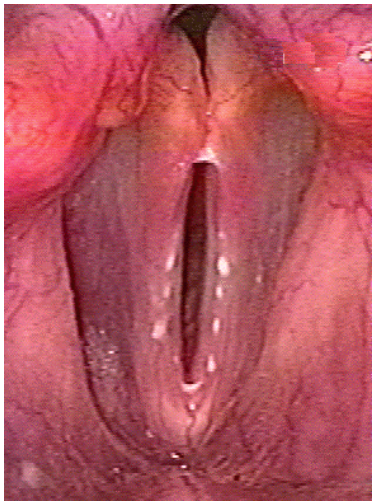
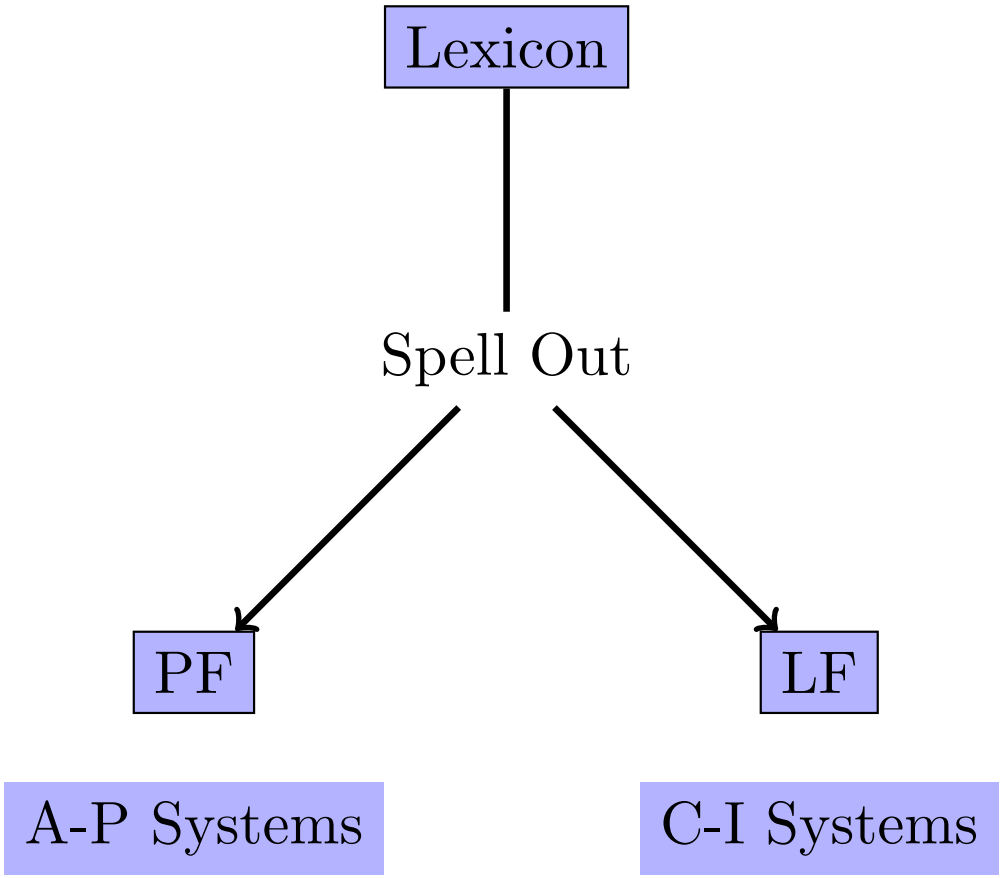


Figure: 200 Hz.

- More tension on the vocal folds amounts to more vibration ⇒ higher F0 values.

The Architecture of Grammar

cf. Chomsky (1995)



The Architecture of Grammar

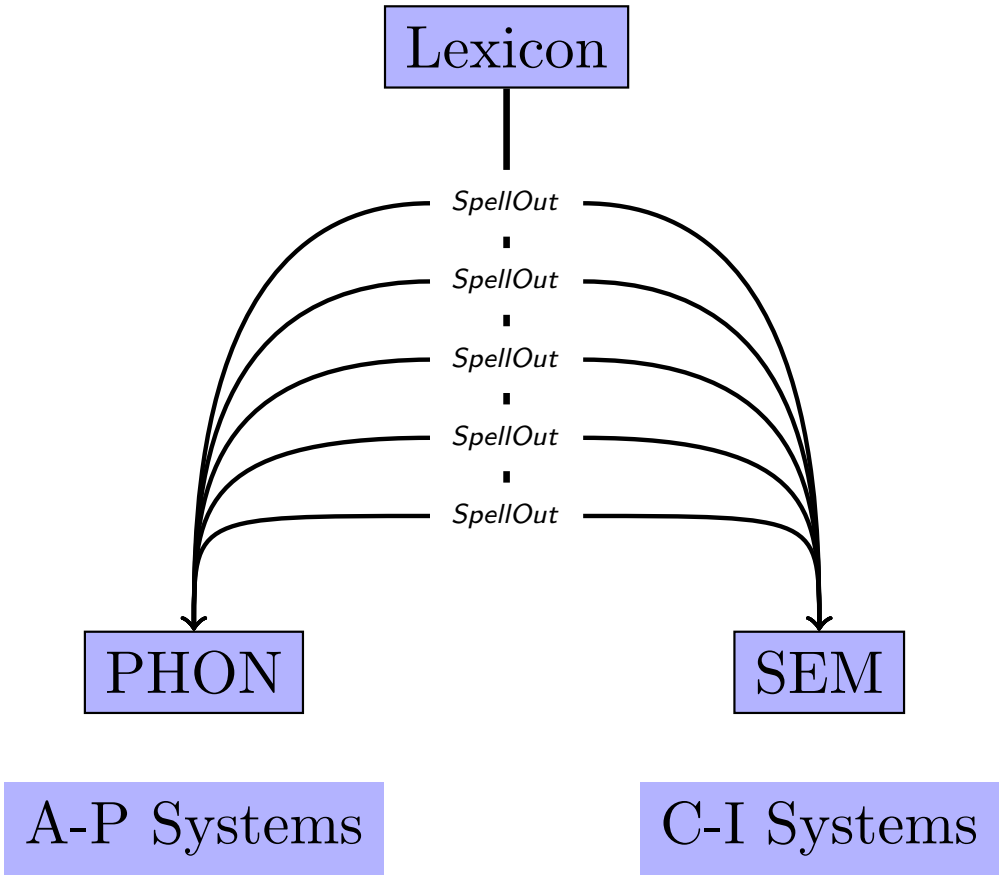
cf. Chomsky (1995)

"Notice that I am sweeping under the rug questions of considerable significance, notably, questions about what in the earlier Extended Standard Theory (EST) framework were called "surface effects" on the interpretation. These are manifold, involving topic-focus and theme-rheme structures, figure ground properties, effects of adjacency and linearity and many others."

[Chomsky 1995: 220]

The Architecture of Grammar

cf. Uriagereka (1999), Chomsky (2000, 2001), Kratzer & Selkirk (2007)



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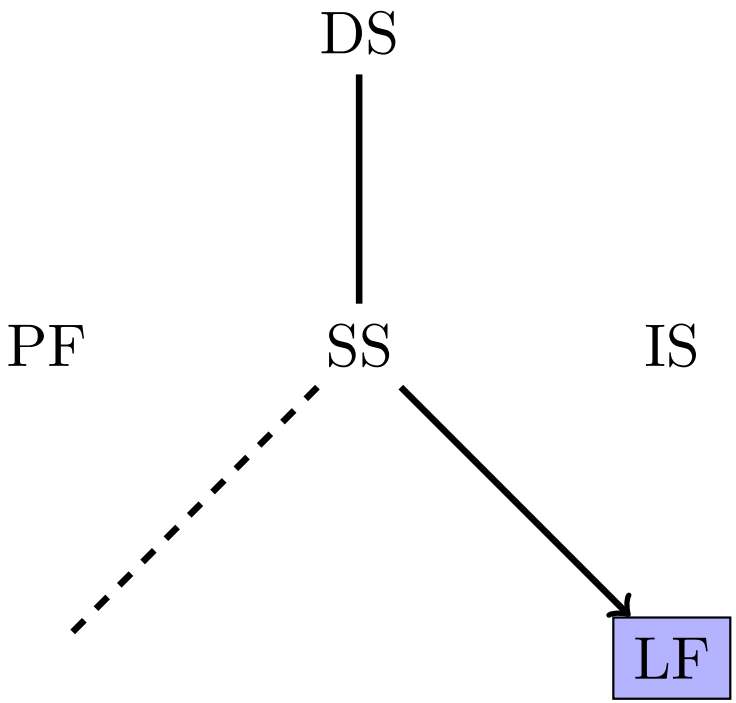
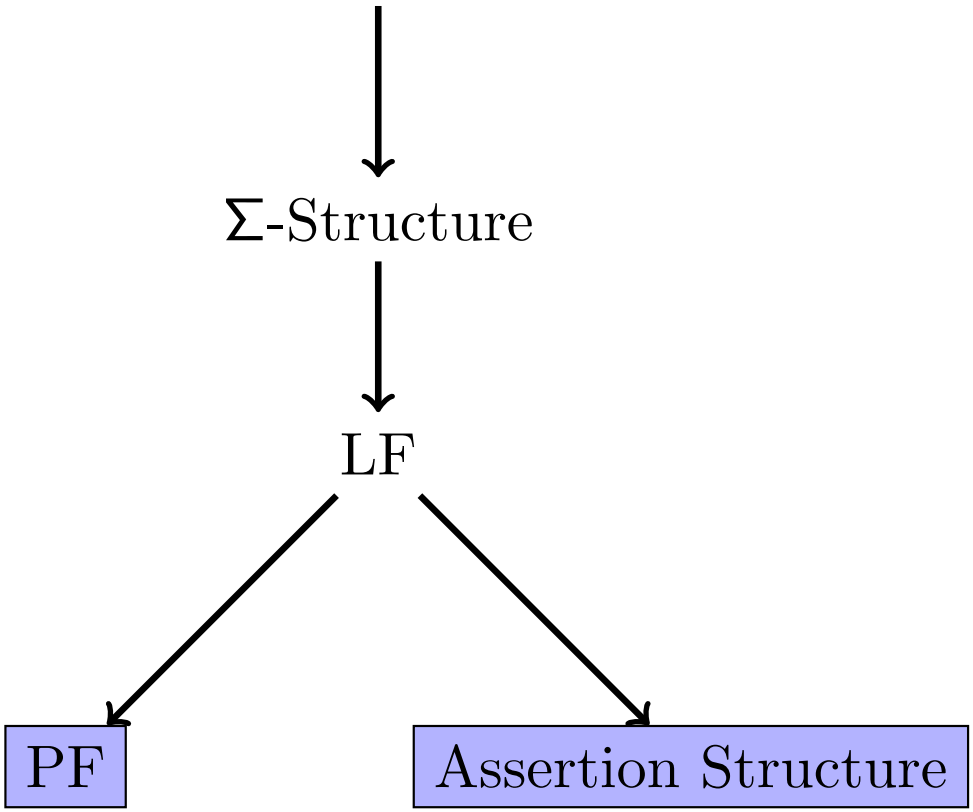
cf. Vallduví (1995)



The Architecture of Grammar

cf. Zubizarreta (1998)



The Architecture of Grammar: The Parallel Model

cf. Jackendoff (1987, *et seq.*)

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In Defense of Theory

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Abstract

Formal theories of mental representation have receded from the importance they had in the early days of cognitive science. I argue that such theories are crucial in any mental domain, not just for their own sake, but to guide experimental inquiry, as well as to integrate the domain into the mind as a whole. To illustrate the criteria of adequacy for theories of mental representation, I compare two theoretical approaches to language: classical generative grammar (Chomsky, 1965, 1981, 1995) and the parallel architecture (Jackendoff, 1997, 2002). The grounds for comparison include (a) the internal coherence of the theory across phonology, syntax, and semantics; (b) the relation of language to other mental faculties; (c) the relationship between grammar and lexicon; (d) relevance to theories of language processing; and (e) the possibility of languages with little or no syntax.

Keywords: Mental representation; Syntax; Lexicon; Rules of grammar; Language processing

1. Theories of mental representations

At the beginnings of cognitive science in the 1970s, when an interdisciplinary community of researchers began taking seriously the idea of the brain as a kind of information processing device, one of the important philosophical issues the field tried to confront was how to think about mental representations—the information the brain is encoding and computing (e.g., Dennett, 1978; Fodor, 1983; Haugeland, 1981; Margolis & Laurence, 1999). Over the years, my deepest concerns have remained with these basic questions.†

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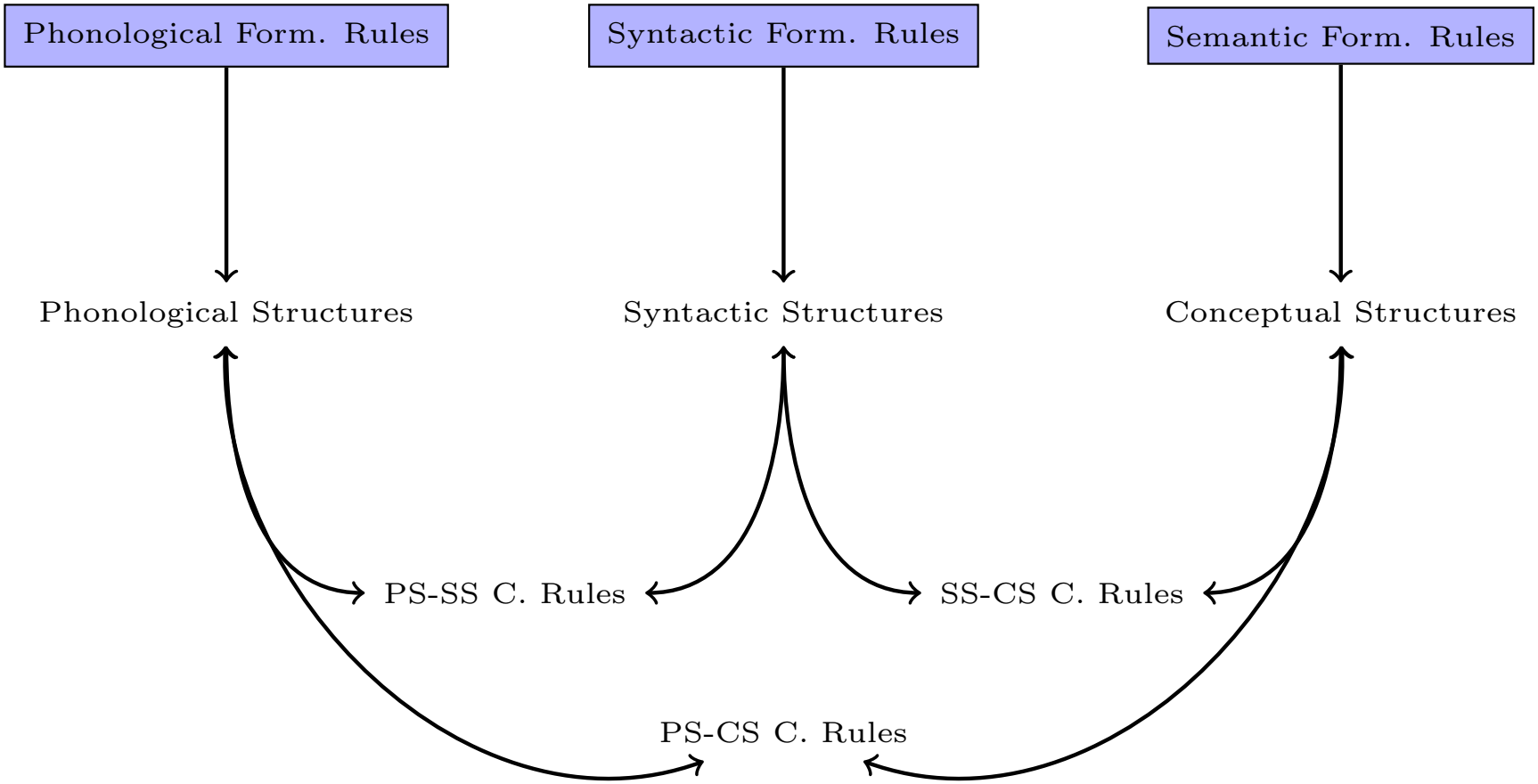
†This article is largely based on my Rumelhart Prize lecture of the same title. I am deeply honored by this award, and I wish to express my profound thanks to the Cognitive Science Society and the selection committee, as well to Bob Glushko and the Glushko-Samuelson Foundation, who have made this prize possible. I am grateful to Peter Culicover, Eva Wittenberg, Steven Pinker, Jenny Audring, and an anonymous reviewer for many valuable comments on content and style.

- Phonology, syntax, and semantics are on an equal footing.
- Each of the structures has its own combinatorial principles.
- Structures are linked by interface correspondency rules.

The Architecture of Grammar: The Parallel Model

cf. Jackendoff (1987, *et seq.*)



A whole framework has developped in order to analyse the correspondency between focus and nuclear stress.

The Nuclear Stress Rule

cf. Halle & Vergnaud (1987)

1. The Parameter settings on line N (N$\geq$3) of the Metrical Grid are [-BND, +HT, right].
2. Interpret boundaries of syntactic constituents composed of two or more stressed words as metrical boundaries.
3. Locate the heads of line N constituents on line N+1.

The Nuclear Stress Rule

cf. Halle & Vergnaud (1987)

(9) Jesus preached to the people of Judea.

.	.	.	*	Line 6
(.	.	.	*)	Line 5
.	(.	.	*)	Line 4
*	*	(*	*)	Line 3
[Jesus	[preached to the	[people of	Judea]]]	

The Nuclear Stress Rule

cf. Cinque (1993)

With the phonological parametrization of the NSR we are loosing a generalization.

(10) John bought WATER.

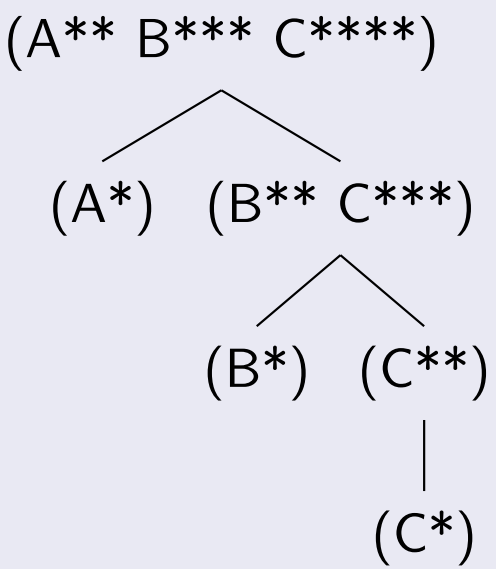
(11) Jonek URA erosi du.
Jon water buy AUX
John bought water.

Nuclear Stress Rule

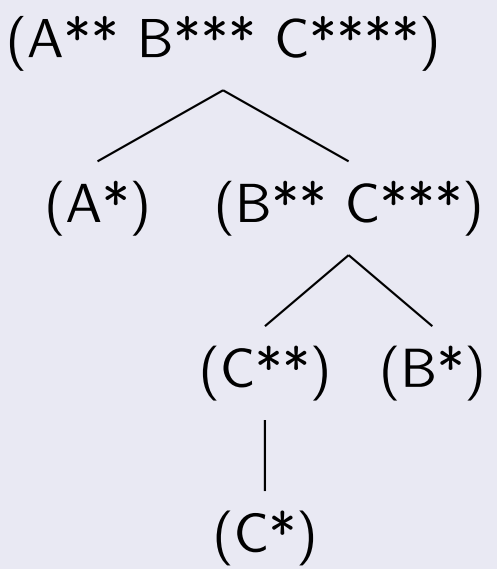
1. Interpret boundaries of syntactic constituents as metrical boundaries.
2. Locate the heads of line N constituents on line N+1.
3. Each rule applies to a maximal string containing no internal boundaries.
4. An asterisk on line N must correspond to an asterisk on line N+1.

Syntax-Phonology Interface

English/Spanish



Basque/Japanese



F-projection facts

(12) John bought [WATER]$_F$

(13) John [bought WATER]$_F$

(14) [John bought WATER]$_F$

(15) [JOHN]$_F$ bought water.

(16) John [BOUGHT]$_F$ water.

The basics

- Observation: Focus-to-Stress correspondence.
- Postulation: There is a legibility condition requiring focus to have NS at PF.
- Technical Implementation (Cinque 1993): Syntactic phrases correspond to phonological phrases. NS is assigned to the most deeply embedded element (the one with most grid marks).

Focus to Stress Principle

The idea: Focus is 'inferred' from the NS placement.

The focus set (Reinhart 2006: 158)

The focus set of a derivation D includes all and only the constituents that contain the main stress of D.

The focus set

(17)

[S [[Ó] V]]
[S [[Ó] V]]
[S [[Ó] V]]
[S [[Ó] V]]

Focus set of 17: {O, VP, TP, CP}

Ambiguous F-Structure

Nuclear Stress on the O gives rise to a focus set.

Typology of languages

- English-type: different NS placements: stress shift.
- Basque-type: phonological displacements.

English-type languages

Different stress placements: stress shift.

(18) [Ś [V [O]]]

The operations

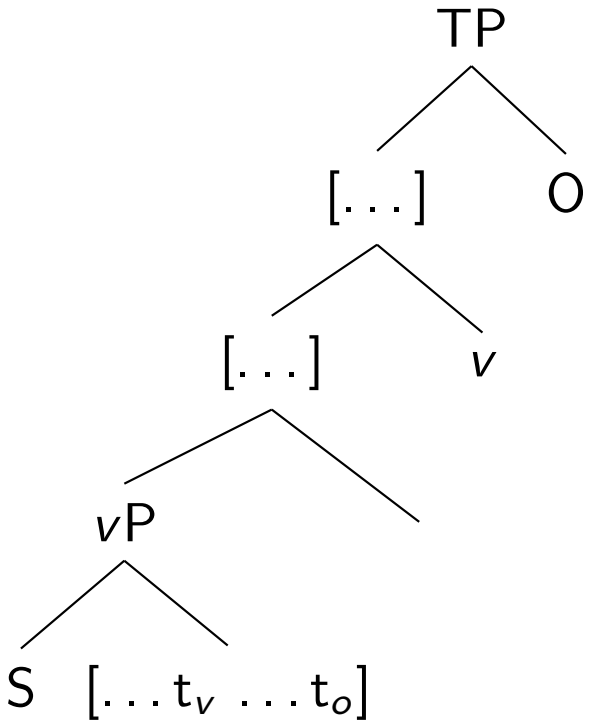
Step1 (base) ⇒ SVO
Step2 (NSR) ⇒ SVÓ
Step3 (focus set) ⇒ {O, VP, TP, CP}
Step4 (deaccentuation) ⇒ SVO
Step5 (marked stress placement) ⇒ ŚVO
Step6 (focus set) ⇒ {S, *TP, CP*}

Economy Principle

CP-focus could be obtained from the F-projection from the O, thus it is antieconomical to resort to the marked operation of stress shift in order to get a CP-focus.

Basque-type languages

Nonfocal material moves to guarantee that the focus ends up being the most embedded element and hence can be assigned NS.

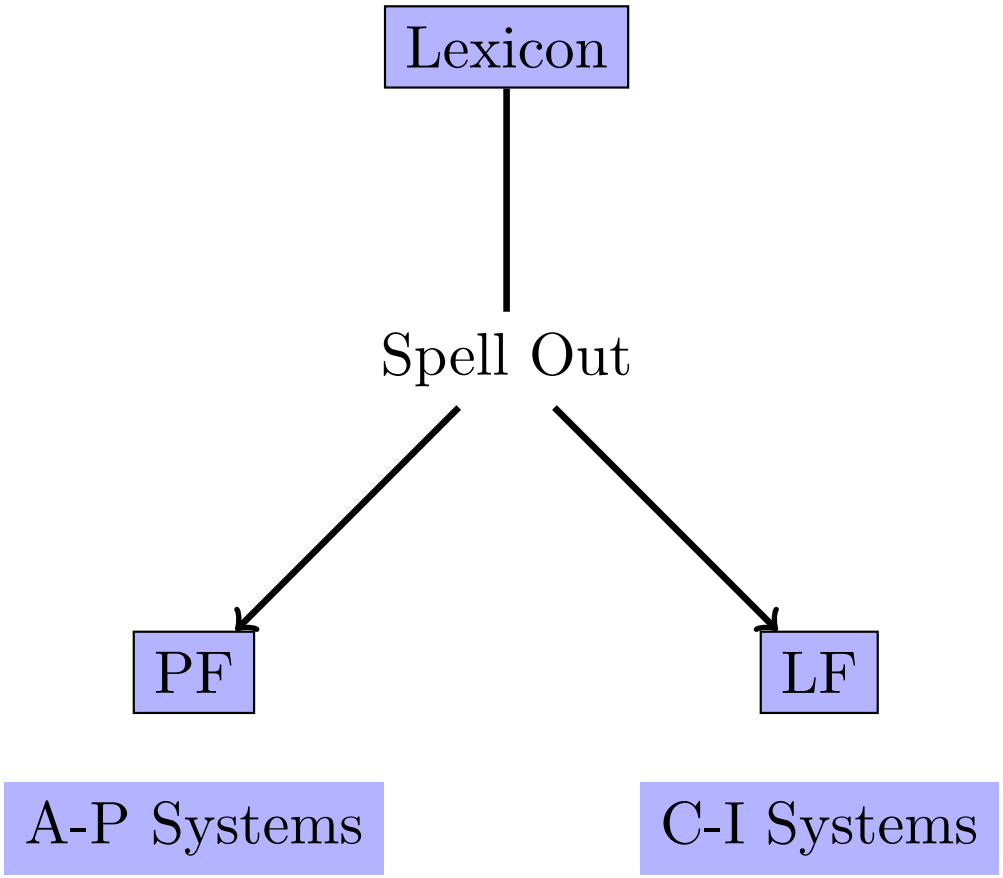


The operations

Step1 (base) ⇒ SOV
Step2 (NSR) ⇒ SÓV
Step3 (focus set) ⇒ {O, VP, TP, CP}
Step4 (deaccentuation) ⇒ SOV
Step5 (scrambling of O) ⇒ SVO
Step6 (NSR) ⇒ ŚVO
Step7 (focus set) ⇒ {S, *TP, CP*}

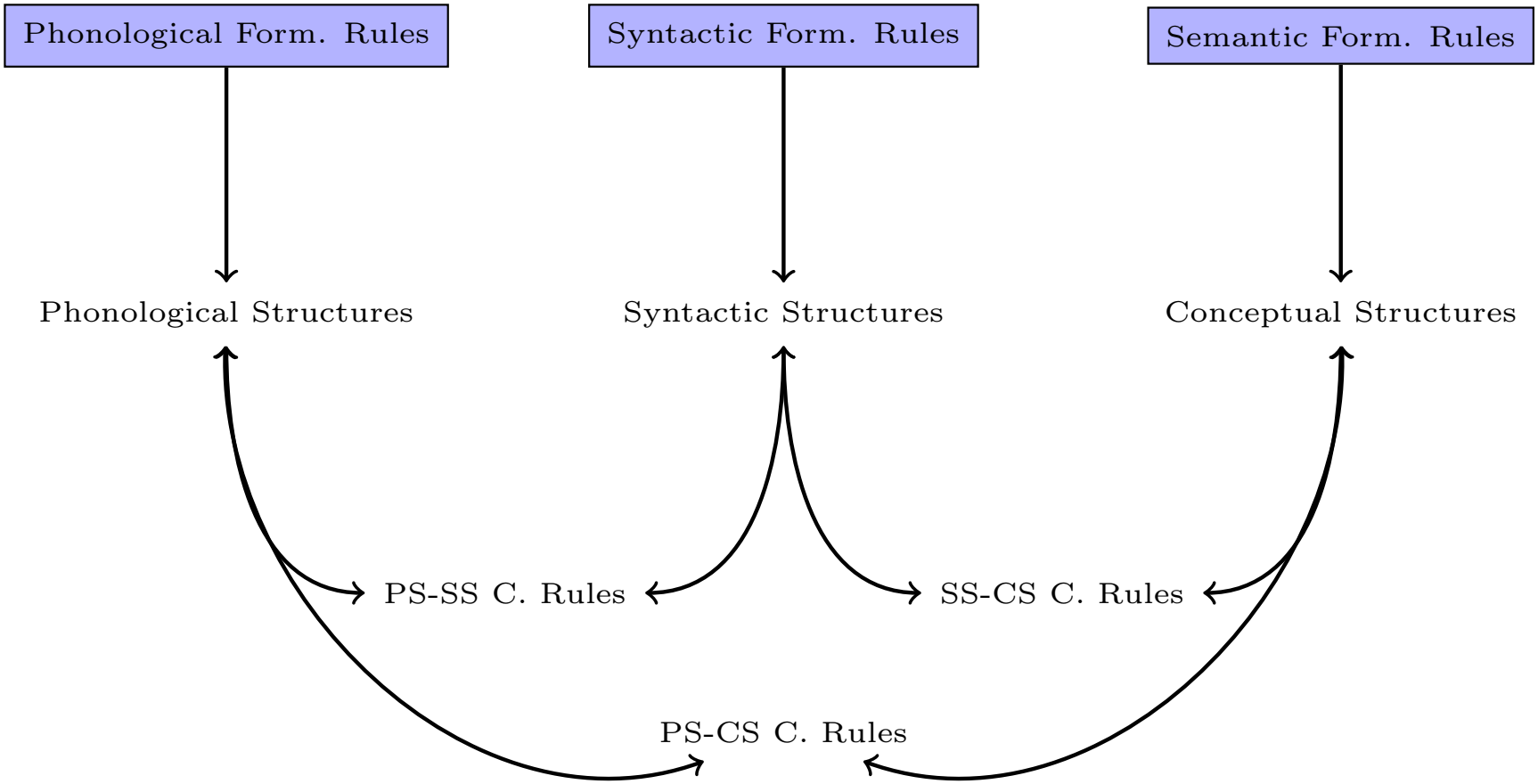
The Architecture of Grammar

cf. Chomsky (1995)



The Architecture of Grammar: The Parallel Model

cf. Jackendoff (1987, *et seq.*)



Conclusions

- An analysis of the 'emergence' of the F-Structure.
- Neat analysis of the syntax-phonology interface.
- Captures the F-Projection facts.

Arguments against the NSR-based aproach

1. Circularity.
2. Wrong empirical predictions.
3. The nature of the purported stress-to-focus requirement.

Circularity

1. Focus to Stress Correspondence: Any phrase containing the nuclear stress might be interpreted as focus.

2. Stress to Focus Correspondence: Focal material has to bear nuclear stress at PF.

Look ahead

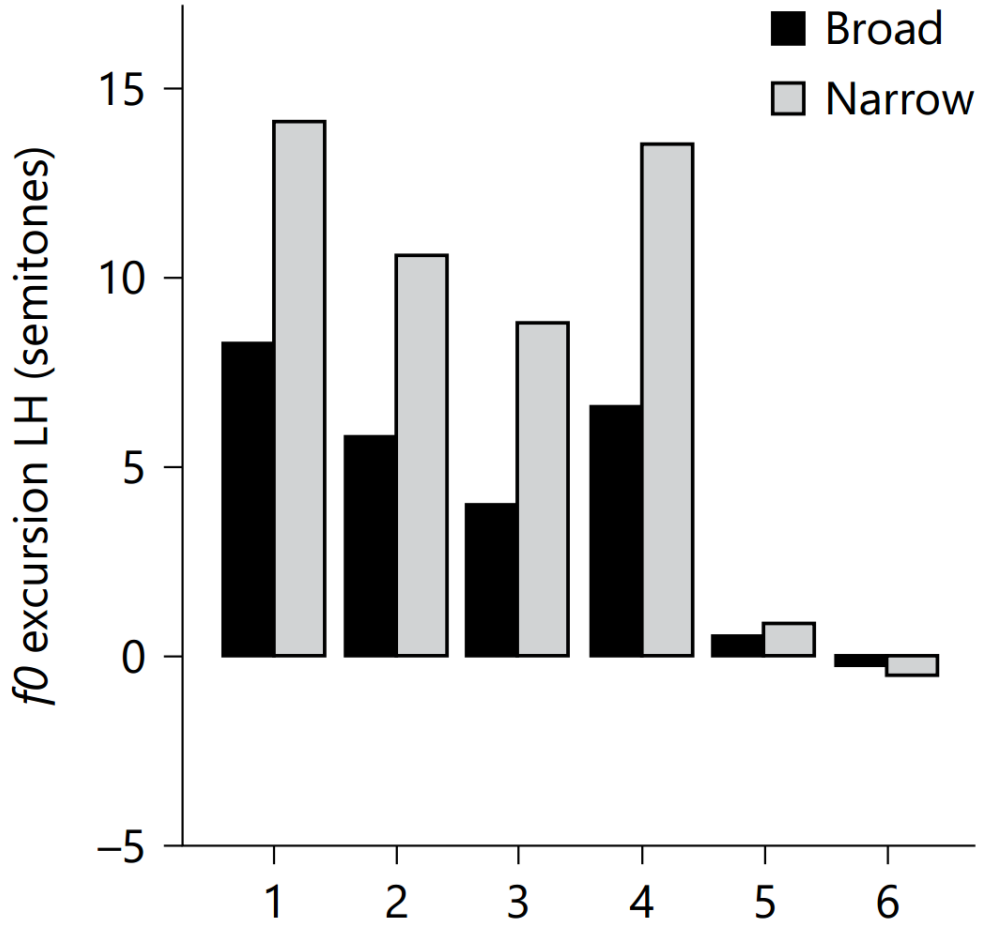
There is a global look ahead in the *NSR*-based approach.

Empirical Problems

Categorially different pitch accents for Broad and Narrow Foci:
English (Selkirk (2002)), Bengali (Hayes & Lahiri (1991)), Italian (D'Imperio (2002)), European Portuguese (variety of Lisbon) (Frota (2000)), Greek (Baltazani (2002)), Madrid Spanish (Face (2002)), Central Basque (Irurtzun (2003), Bulgarian (Andreeva *et al.* (2017))...

Bulgarian

cf. Andreeva *et al.* (2017)



Empirical Problems

Focus-induced phonological phrasing:

Left Alignment: Tokyo Japanese (Pierrehumbert & Beckman (1988), Bengali (Hayes & Lahiri (1991), Selkirk (2006)), Korean (Jun (1993)), Greek (Condoravdi (1990)), Lekeitio Basque (Elordieta (1997, 2007))...

Right Alignment: Swedish (Bruce (1977)), Chichewa (Kannerva (1990), Truckenbrodt (1995, 1999)), English (Selkirk (2000), Brazilian Portuguese (Sandalo & Truckenbrodt (2001))...

Empirical Problems

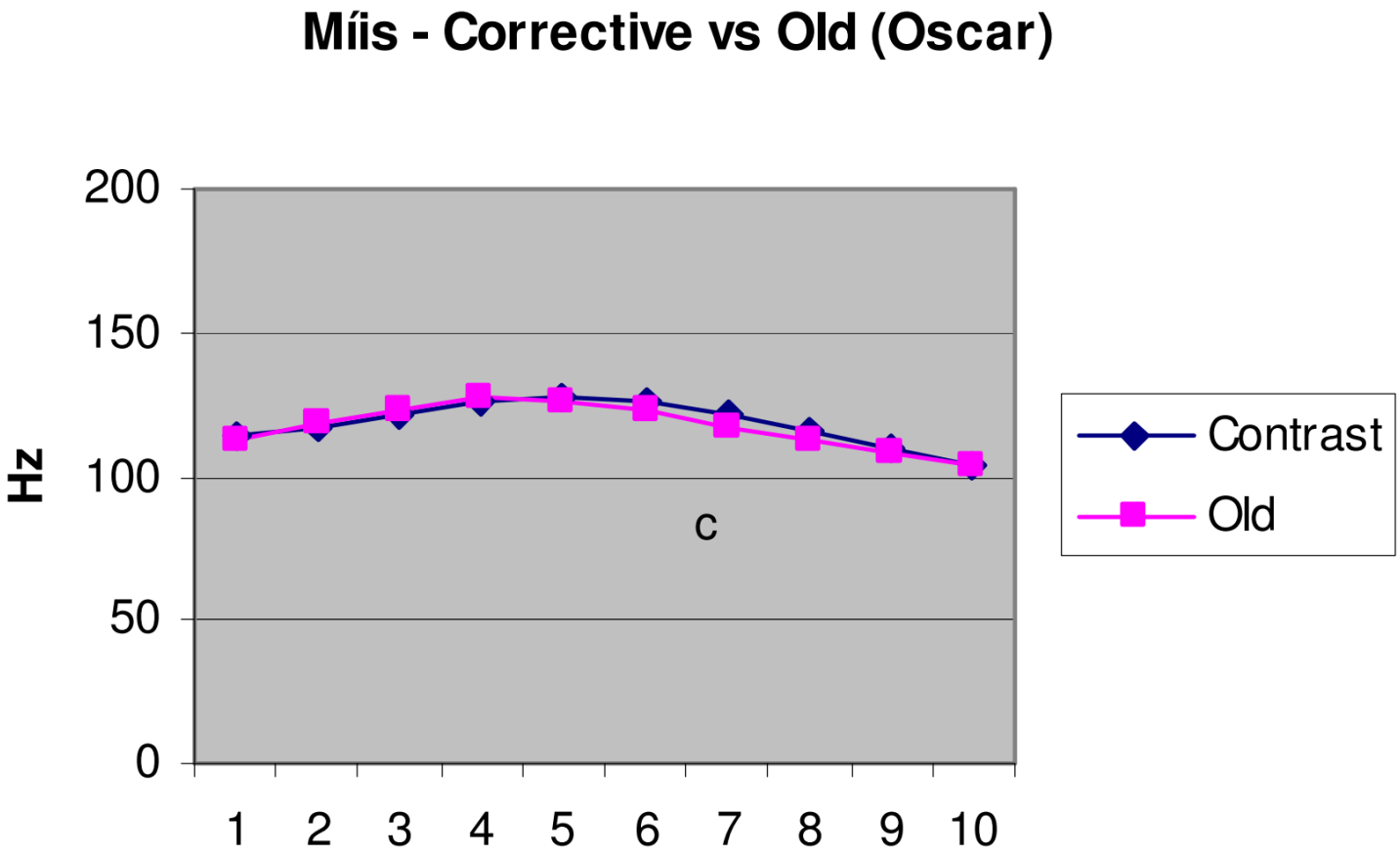
No pitch-accent conveying focus:
Hyxkariana (Derbyshire (1985)), Yucatec Maya (Gussenhoven (2008)), West Greenlandic (Arnhold (2007)), Navajo (Hale *et al.* (2003)), Guyanese English Creole (Bickerton (1993)), French (Féry (2001)), Egyptian Arabic (Hellmuth (2007)), Aghem (Watters (1979)), Wolof (Rialland & Robert (2001)), Ewe (Jannedy & Fiedler (2007)), Chichewa, Chitumbuka and Durban (Zulu Downing (2007)), Akan (Kügler & Genzen (2012), as well as some constructions of Russian (King (1995)) and Northern Bizkaian Basque (G. Elordieta (1997, 2007)...

Empirical Problems

No pitch-accent conveying focus:
Hyman (1999: 166):
"In no case [...] have we seen what can be called a "direct mapping" from focus to tone. That is, I am unaware of a "pure" example where semantic focus (and only semantic focus) unambiguously conditions a [+focus] tonal effect, or where the absence of semantic focus (and only its absence) conditions a [-focus] tonal effect"

Yucatec Mayan

cf. Gussenhoven & Teeuw (2008)

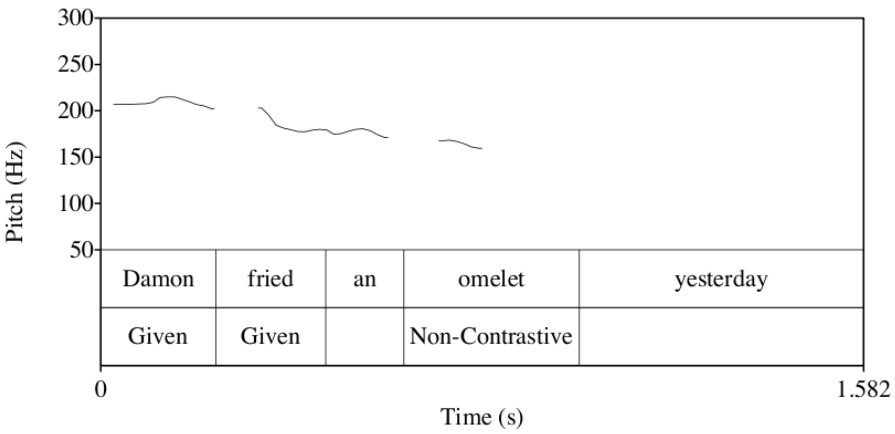


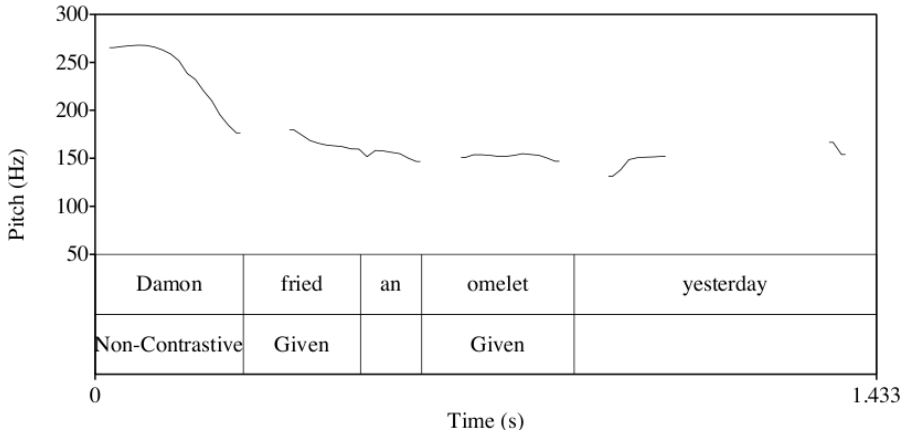
The nature of the purported stress-to-focus requirement

- 'Weakening' the requirement (≈focus has to be highlighted) would be gratuitous and non-explanatory.

Strong accents in English

cf. Breen *et al.* (2010)

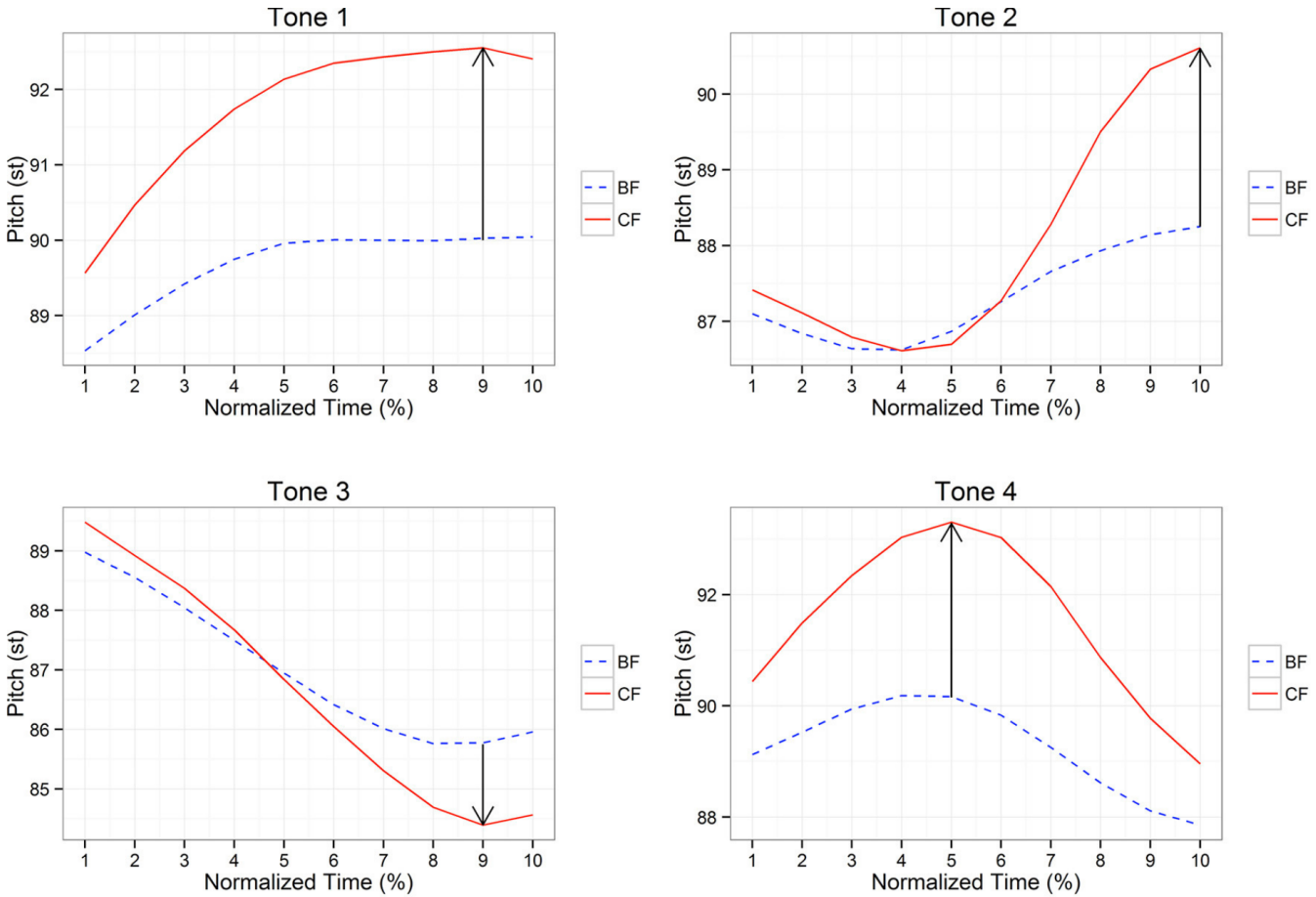




- Greater intensity (*Db.*), longer duration (*ms.*), and higher mean and maximum F0 (*Hertz*).

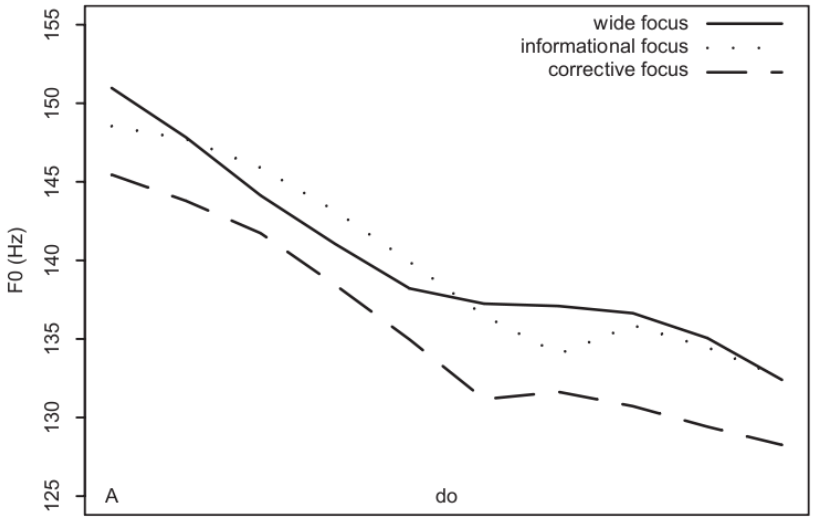
Tone 3 focus in Mandarin Chinese

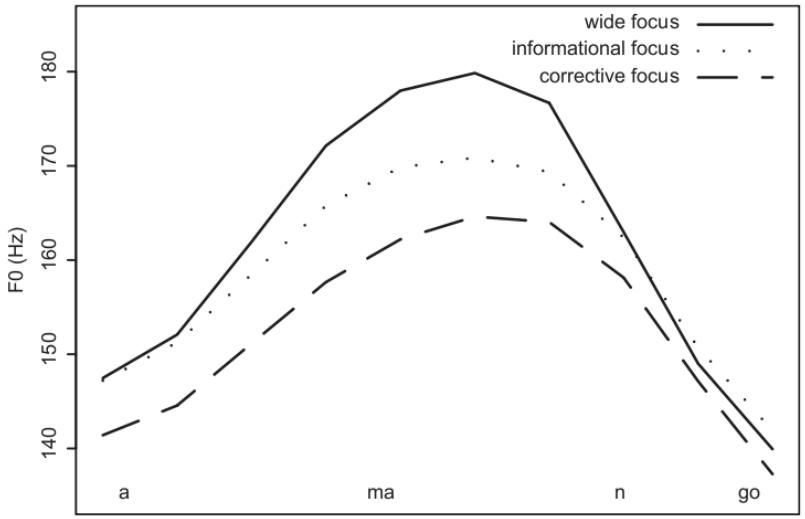
cf. Lee *et al.* 2016



Lower register in Akan

cf. Kügler & Genzel (2012)





- Not an instantiation of the 'effort code' (*cf.* Gussenhoven (2004)).

The nature of the purported stress-to-focus requirement

- 'Weakening' the requirement (≈focus has to be highlighted) would be gratuitous and non-explanatory.

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*No stress, no pitch accent, no prosodic focus: the case of Ambonese Malay**

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Carlos Gussenhoven
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Empirical Problems

Failure to meet the 'most embeddednes' condition (≈the Sentence Final Requirement of Reglero & Ticio (2013)):

(19) Y tú le diste a María [QUÉ libro]$_{DP}$?
and you CL give to María what book
And which book did you give to María?

(20) [Peiori]$_{F}$ esan du Jonek [t eman diotela dirua].
Peio.DAT say AUX Jon.ERG give AUX.C money.ABS
Jon said that they gave the money to [Peio]$_{F}$.

Two types of proposals

1. Association between focus/interrogatives and nuclear stress.
2. Association between interrogatives and p-phrasing.

Two types of proposals

1. Association between focus/interrogatives and nuclear stress.
2. Association between interrogatives and p-phrasing.

Richards (2010, 2016)

The idea

The interrogative strategies used by languages are (in part) determined by their prosodic properties.

The proposal: an interface constraint on prosodic-phrasing

An interface constraint

- The wh-word and the interrogative complementizer must be in the same prosodic phrase:

  (21) Given a wh-phrase α and a complementizer C where α takes scope, α and C must be separated by as few Minor Phrase boundaries as possible, for some level of Minor Phrasing (Richards 2010: 151).

Minor Phrase Boundary: the lowest level of phonological phrasing.

Varying strategies across languages

- Languages will satisfy this constraint by appealing to different strategies:
  - Changes in the prosodic phrasing ("P-rephrasing").
  - *Wh*-movement to the C domain.
- Parametric choices independent of question-formation will have an effect on the strategy employed:
  - Relative order of heads and their complements (locus of C°).
  - Alignment of phrase boundaries.

Wh-in-situ in Japanese

- Final complementizer.
- Minor phrase boundaries to the left of XPs such as DPs.
- "Prosodic *wh*-domains" beginning with a Minor Phrase Boundary to the left of the *wh*-phrase and ending to the right of C.

Wh-movement in Northern Biscayan Basque

Assumptions:

- Final C (*cf.* Arregi (2003), *pace* Ortiz de Urbina (1989, *et seq.*)).
- NBB is a pitch-accent variety (Elordieta, 1997):
  - → Minor Phrase Boundaries to the right of (at least):
    - The constituent immediately to the left of the verb.
    - *Wh*-phrases.

The way to optimally satisfy the p-phrasing requirement is to 'evacuate' elements intervening between the *wh*-phrase and C

No correlation between prosodic and syntactic properties in dialectal variation

Richards' (2010) analysis is based on NBB, which concerns a reduced group of pitch-accent varieties of Basque.

- All the rest are stress-accent varieties (Hualde 1999, 2003, Elordieta 2003, Elordieta & Hualde 2015).
- Nonetheless, all varieties use the same strategies for interrogatives (*cf.* Hualde & Ortiz de Urbina 2003).

There is no correlation between the prosodic and syntacic properties of interrogatives.

Conclusions

Approaches where interface components derivationally affect the syntactic component are empirically problematic, and lack theoretical details as to how the PF representations are obtained (the moment they do so, they go syntactocentric).

4 potential ways of interaction

1. The "radical externalization" thesis.
2. Derivational interactions between interface components and syntax.
3. Interface components as (nonperfectly) reflecting syntax.
4. Interface components as imposing legibility conditions.

1 and 2 argue for a de-syntactisation of phenomena that were thought to pertain to the syntactic component.

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Syntax reflected at the interfaces

The child uses perceptual input (sounds and situations) to hypothesize grammatical structures during language acquisition, assuming some degree of homomorphy between syntactic structure and the representations at interface components.

- Semantic bootstrapping.
- Prosodic bootstrapping.

The main idea

"the child can access a structural representation of the intended semantics or conceptual content of the utterance, and that such representations are sufficiently homomorphic to the syntax of the adult language for a mapping from sentences to meanings to be determined"

(Abend *et al.* (2017: 117))

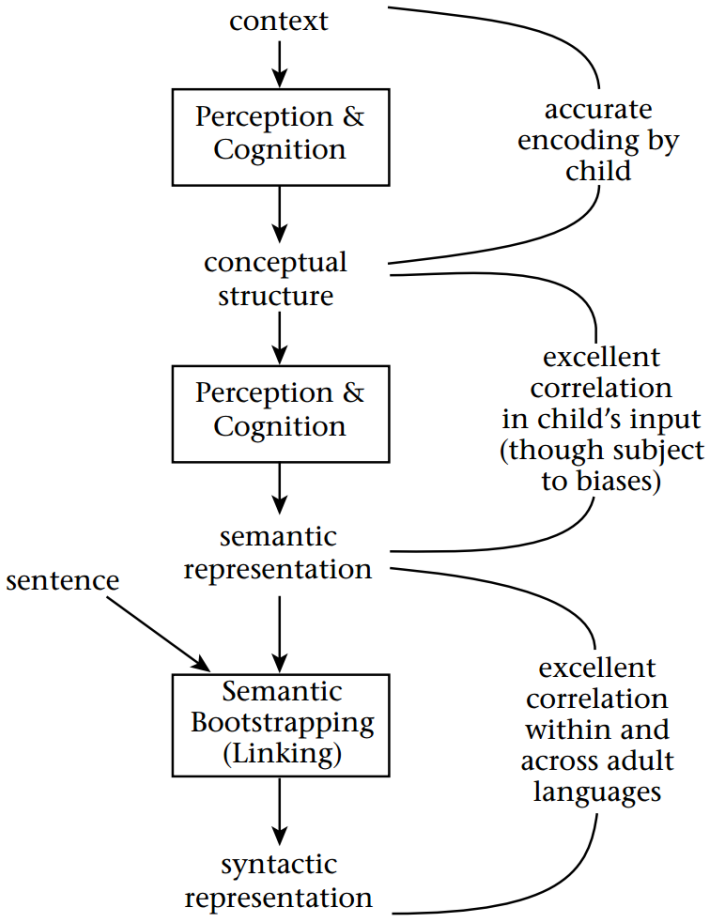
The semantic bootstrapping hypothesis

cf. Pinker (1989)

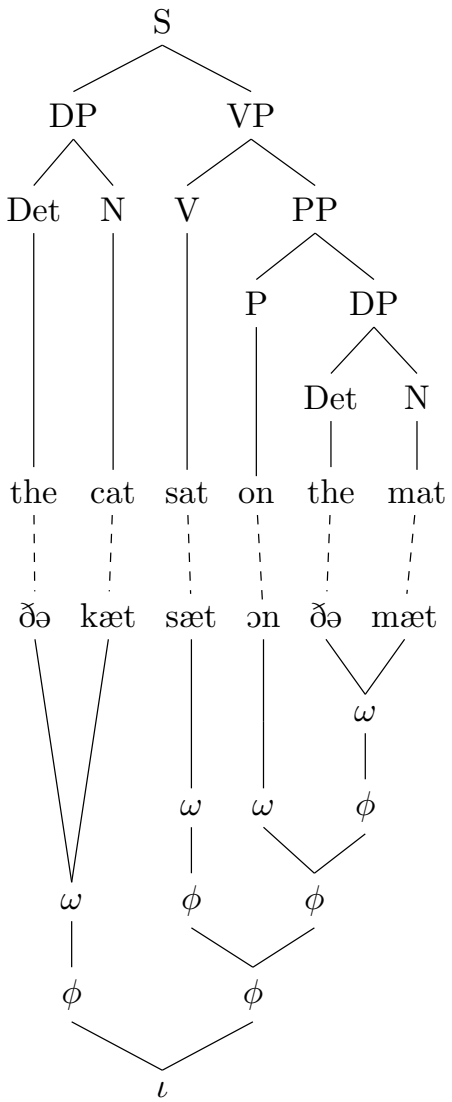
> "if children know that a word refers to a thing, they can infer that it is a noun; if they know that X is a predicate and Y is its argument, they can infer that X is the head of a phrase that includes Y; if they know that a phrase is playing the role of agent, they can infer that it is the subject of the clause"
>
> (Pinker (1989:425))

The semantic bootstrapping hypothesis

cf. Pinker (1989)



The syntax-phonology interface

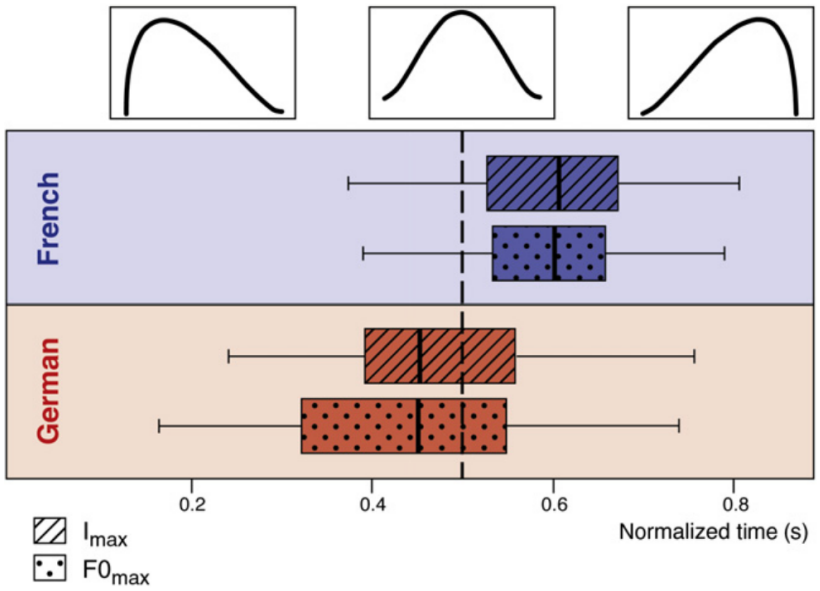


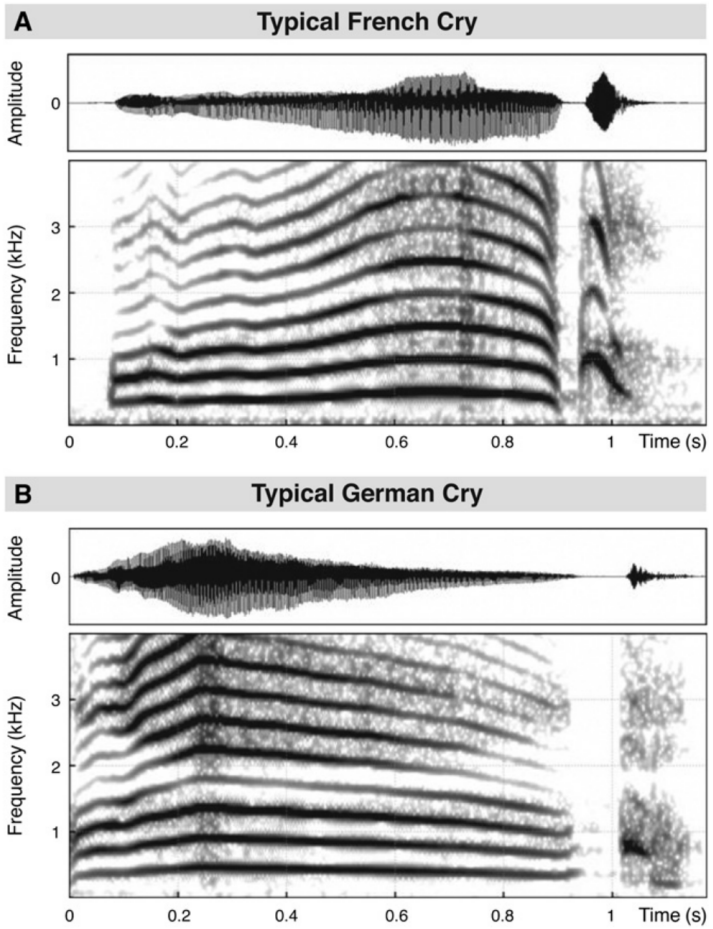
Early prosodic abilities

- Infants already possess an adult-like dedicated neuronal network for phonological processing at 3 months of age (*cf.* Dehaene-Lambertz and Baillet, 1998; Peña et al., 2003; Dehaene-Lambertz et al., 2006; Dubois et al., 2015).
- A natural "tuning up" between speech rhythm and endogenous oscillatory auditory cortical properties (*cf.* Giraud and Poeppel, 2012; Peelle and Davis, 2012)).
- Child-directed speech: exaggerated pitch + emotional prosody (*cf. i.a.* Fernald, 1984; Cooper and Aslin, 1989; Fernald and Mazzie, 1991; Katz *et al.*, 1996).
- Prosodic segmentation abilities have emerged crosslinguistically some time around 8 months (Nazzi *et al.*, 2006).

3 day olds' cry melodies (French *vs.* German)

Mampe *et al.* (2009)





Discrimination of rhythm with *low-pass* filtered speech

Nazzi *et al.* (1998)

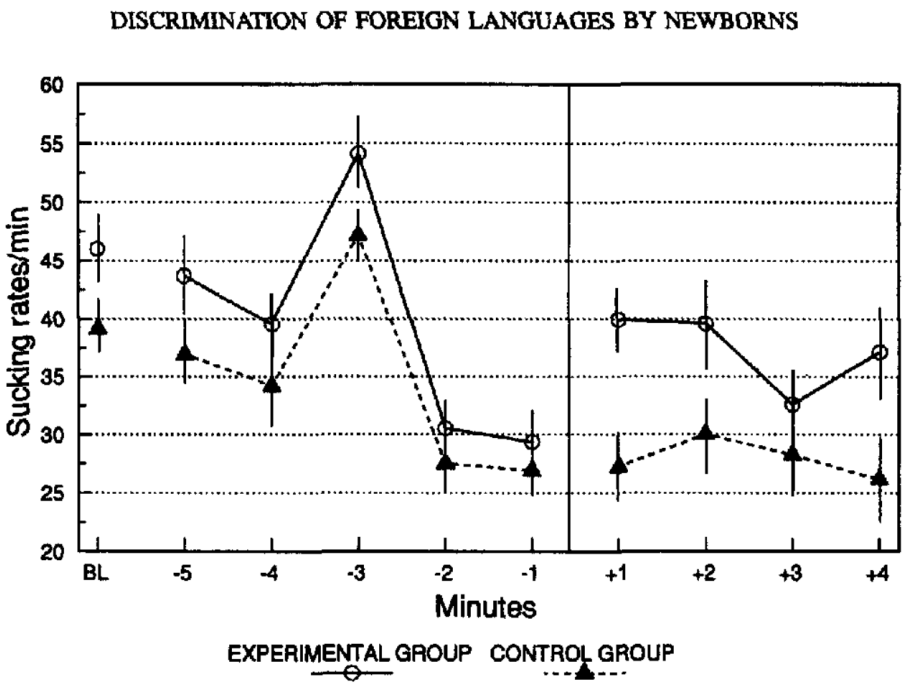


Figure 1. Sucking-rate averages during baseline (BL), last 5 min of familiarization (−5 to −1), and 4 min of test (+1 to +4) for experimental and control groups in Experiment 1. The bars above and below each point indicate the standard error of the mean.

. . . however. . .
this type of ability is not human-specific:

- guinea pigs (Vince, 1979), sheep (Vince et al., 1982) and chinchillas (Kuhl and Miller, 1975) *i.a.* have sound discrimination abilities.
- cotton-top tamarins (*cf.* Ramus et al., 2000), and even rats (*cf.* Toro et al., 2003) can distinguish different rhythmic types.

- But human infants go well beyond mere acoustic pattern-recognition and learning; they develop a full-fledged language.
- They may employ an early acquired rich knowledge of the prosody of their language in order to infer its syntactic pattern when the syntactic ability develops.

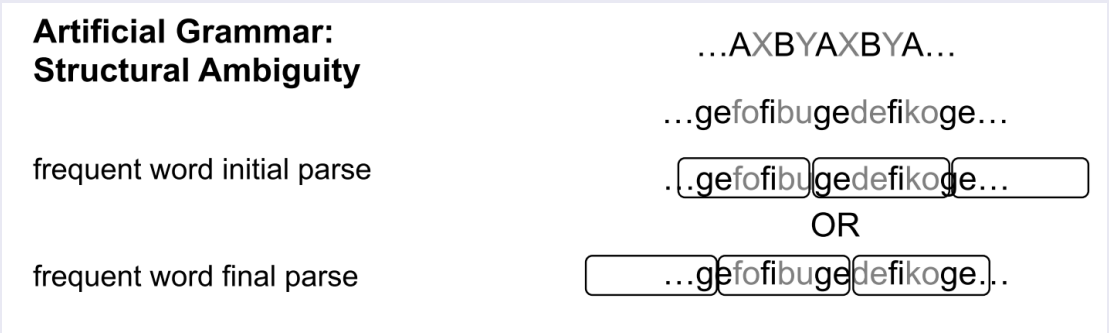
Prosody & the head parameter

cf. Christophe *et al.* (2003), Mehler, Sebastián-Gallés & Nespor (2004)

Prosodic bootstrapping hypothesis

- They are able to use word frequency and prosody (pitch, duration) as early cues to word order (*cf.* Bernard & Gervain (2012); Gervain & Werker (2013)).

Infants exposed to OV prosody show a preference for Frequent Final, while infants in the VO prosody condition prefer Frequent-Initial items.



Conclusion

Semantics and prosody can serve as biases for decisions under uncertainty with respect to language acquisition.

4 potential ways of interaction

1. The "radical externalization" thesis.
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Legibility conditions

Requirements on derivations as *Bare Output Conditions*, which, ideally, have to derive from restrictions imposed by the external systems:

- At the PF interface:
  - Linearity.
  - Size constraints.
- At the LF interface:
  - *Vacuous Quantification.
  - Constraints on the logic of predication.

The issue

The issue

Possible questions:

(22) *Who* stabbed Cæsar?

(23) *Whom* did Brutus stab?

(24) *Where* did Brutus stab Cæsar?

(25) *When* did Brutus stab Cæsar?

(26) *How* did Brutus stab Cæsar?

(27) *Why* did Brutus stab Cæsar?

Impossible question

(28) **Whxyzed* Brutus Cæsar?
'What type of event happened such that it has Brutus as external argument and Cæsar as internal argument?'

Generalization

Crosslinguistically there are no verbal *wh*-words.

(to be modified)

$\rightsquigarrow$ Seldom discussed in linguistics
(see a few exceptions in Hagège (2003, 2008), Idiatov & van der Auwera (2008)).

A conjecture: illegibility at LF

My proposal

The lack of verbal *wh*-words derives from a general axiomatic constraint of first-order logic which, if violated, derives in an LF illegibility with DPs without θ-roles (*cf.* the θ-criterion of Chomsky (1981) or Higginbotham (1985)).

DPs and θ-roles

1. DPs function as participants in the eventuality denoted by the verb in a clause.
2. Different types of participation: agents, themes, undergoers, experiencers, beneficiaries, etc. as the potential thematic- (or θ-) roles.
3. The most 'syntacticising' view: θ-roles as formal features, with a legibility requirement that those features be derivationally checked by LF (see *i.a.* Bošković & Takahashi (1998), Manzini & Roussou (200), Fanselow (2001), Bagchi (2007).
4. θ-roles are particularly central to Neo-Davidsonian event semantics (Parsons (1990, 1995), Hornstein (2002), Pietroski (2002, 2003, 2005), Schein (2002)).

Neo-Davidsonian semantics

cf. Castañeda (1967)

(29) I flew my spaceship to the Morning Star.

a. ∃e[Flying(e, I, my saceship) & To(e, the Morning Star)]

b. ∃e[Flying(e) & Agent(e, I) & Theme(e, my spaceship) & To(e, the Morning Star)]

(30) I flew to the Morning Star.

a. ∃e[Flying(e, I) & To(e, the Morning Star)]

b. ∃e[Flying(e) & Agent(e, I) & To(e, the Morning Star)]

(31) I flew.

a. ∃e[Flying(e, I)]

b. ∃e[Flying(e) & Agent(e, I)]

Neo-Davidsonian semantics

cf. Castañeda (1967)

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b. ∃e[Flying(e) & Agent(e, I) & Theme(e, my spaceship) & To(e, the Morning Star)]

(33) I flew to the Morning Star.

a. ∃e[Flying(e, I) & To(e, the Morning Star)]

b. ∃e[Flying(e) & Agent(e, I) & To(e, the Morning Star)]

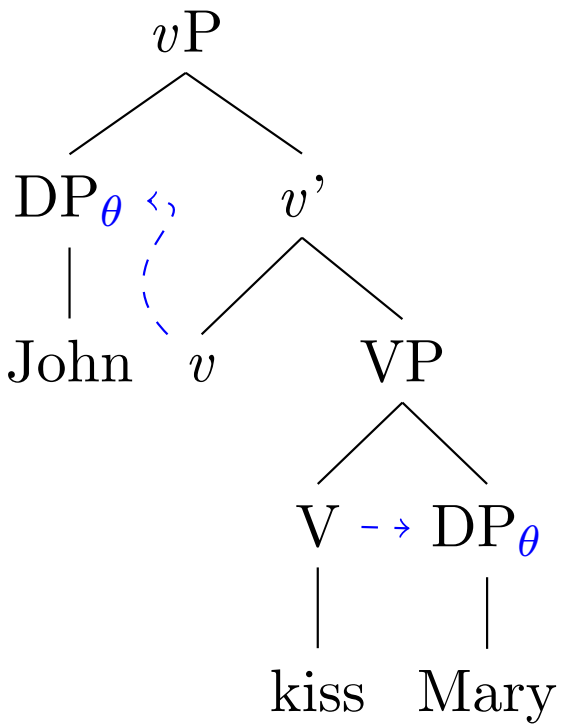
(34) I flew.

a. ∃e[Flying(e, I)]

b. ∃e[Flying(e) & Agent(e, I)]

Neo-Davidsonian semantics & Minimalist Syntax

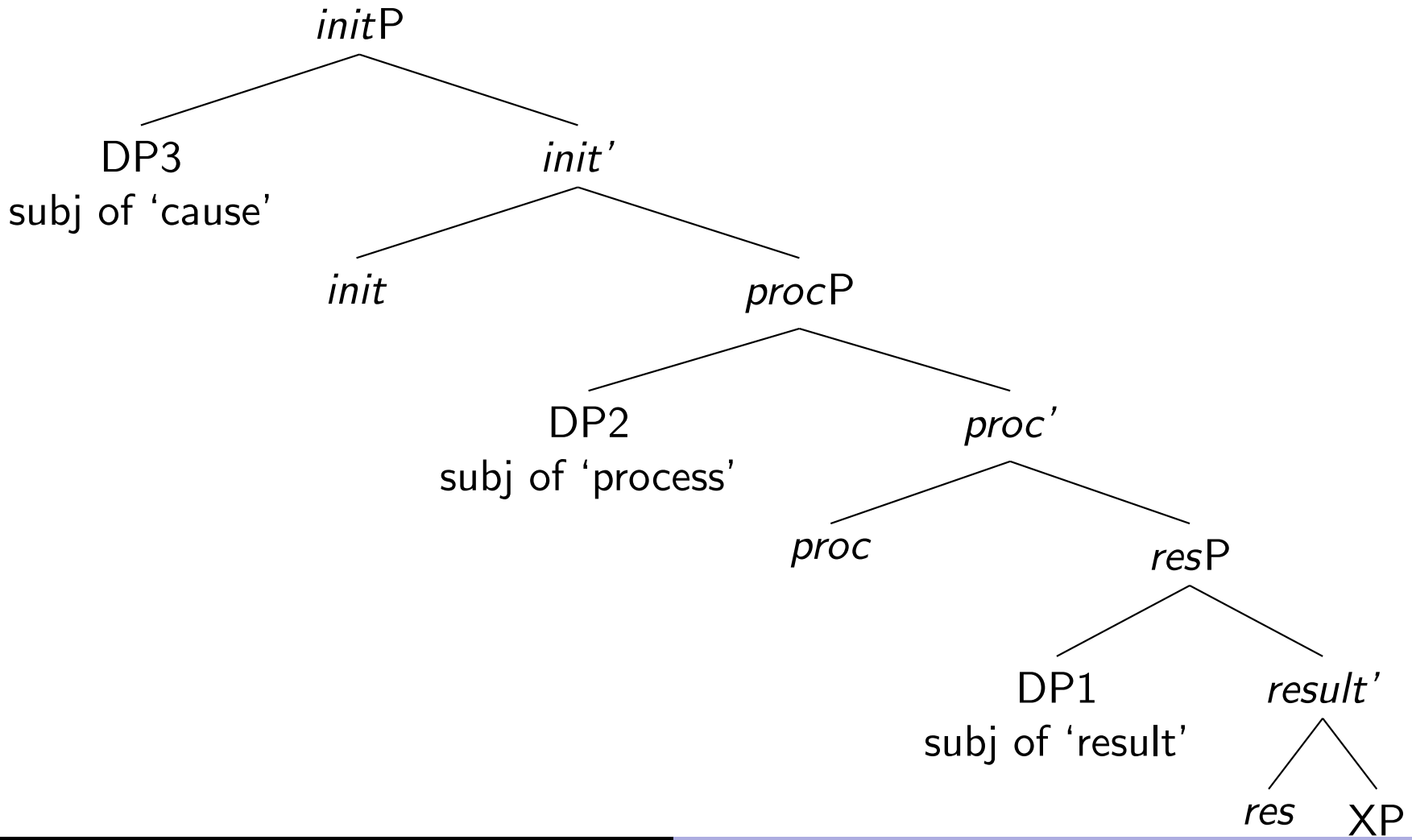
The nature of each θ-role directly derives from the bottom-up syntactic composition of the clause, whereby DPs are merged in specific positions within the projection of event-denoting heads (see *i.a.* Hornstein (2002), Pietroski (2003, 2005), Borer (2005), Ramchand (2008)).



Object ⇒ Sister of V
Subject ⇒ Spec of vP (sister of v')

First-phase syntax

Ramchand (2008:39)



Proposal

- θ-roles are predicates of eventualities.
- *wh*-words introduce variables that may range for individuals (& other), but *not* for predicates of eventualities: predication (≈logicial assertion) of an interrogation is incongruent.

(35) a. ∃e [Agent(e, ?) & Stabbing(e) & Patient(e, Cæsar)]
'*Who* stabbed Cæsar?

b. ∃e [Agent(e, Brutus) & Stabbing(e) & Patient(e, ?)]
'*Whom* did Brutus stab?'

c. *∃e [Agent(e, Brutus) & ?(e) & Patient(e, Cæsar)]
'*Whxyzed* Brutus Cæsar?'

d. *∃e [?(e, Brutus) & ?(e) & ?(e, Cæsar)]

Proposal

In a nutshell:

(36) *Proposal:* The lack of verbal question-words derives from the LF illegibility they would generate, since their semantics involves predicating interrogation variables which furthermore derives in a failure to assign θ-roles to event participants.

Languages with interrogative pro-verbs

- Very few and with a not very clear status.
- Interrogative verbs restricted to intransitive clauses, or
- Different verbs for intransitive and transitive uses.
- No language with real Int/Tr./Ditr. interrogative verbs.

Not agnostic *wrt* argument structure but semantically loaded.

Conclusion

- When verbs question the type of eventuality, they tend to do so within a restricted set of options sharing an essential argument structure.

Languages with interrogative pro-verbs

(37) a. *Whxyzing* you?

b. *∃e [Argument(e, you) & ?(e)]
"What type of event are you participating at such that you are experiencing it or undergoing it or performing it or catalizing it, *etc*?"

c. ∃e [Agent(e, you) & Action(e, ?)]
"What are you doing?"

Conclusion

(38) a. *Whxyzed* Brutus Cæsar?

b. *∃e [ExternalArgument(e, Brutus) & ?(e) & InternalArgument(e, Cæsar]

c. ∃e [Agent(e, Brutus) & Action(e, ?) & Theme(e, Cæsar)]

On non-interrogative pro-verbs

- Non-interrogative pro-verbs like Basque *zertu* are much more common than interrogative pro-verbs.
- Typically employed when encountering difficulties with word retrieval; but have a determinate argument structure.

A prediction

A prediction: interrogative adpositions?

The semantic contribution of adpositions (Davidson (1967)):

(39) a. I flew my spaceship to the morning star.

b. ∃e[flying(I, my spaceship, e) & to(the morning star, e)]

(40) a. Brutus stabbed Cæsar with a knife.

b. ∃e[Agent(e, Brutus) & Stabbing(e) & Patient(e, Cæsar) & with-a-knife(e)]

Adpositions as θ-role introducers (*cf.* Larson & Segal (1995))

(41) ∃e[Agent(e, Brutus) & Stabbing(e) & Patient(e, Cæsar) & Instrument(e, a-knife)]

Proposal

An explanation of why there are no adpositional *wh*-words cross-linguistically: just like an interrogative verb would create a LF illegibility the same will happen with an interrogative adposition (since predicating an interrogative variable is paradoxical).

(42) a. **Whxyz* a knife did Brutus stab Cæsar?

b. *∃e[Agent(e, Brutus) & Stabbing(e) & Patient(e, Cæsar) & ?(e, a-knife)]

Compare with questions on adjuncts

(43) a. What did Brutus stab Cæsar with?

b. ∃e[Agent(e, Brutus) & Stabbing(e) & Patient(e, Cæsar) & Instrument(e, ?)]

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