Using corpus analysis to compare the explanatory power of linguistic theories: A case study of the modal load in *if*-conditionals

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1 Motivation, background and aims

Corpus-based examinations of the extent of modal marking (*modal load*) in *if*-conditionals in the written BNC (Gabrielatos 2007, 2010: 189-229, 266-295) have revealed that they have a significantly higher modal load (ML) than average,[1] as well as a higher ML than indirect interrogatives with *if* and *whether*, concessive conditionals with *even if* and *whether*, and non-conditional bi-partite constructions with *when* and *whenever*. Crucially, *if*-conditionals show a higher ML than conditionals with other subordinators (e.g. *assuming*). Also, the ML of *if*-conditional protases (i.e. their subordinate parts) is comparable to that of the baseline, despite their being already modally marked by *if*.[2]

Explanations for the emerging ML patterns are sought in the tenets of two recent linguistic theories: *Construction Grammar* (CxG) (e.g. Fillmore 1998) and *Lexical Grammar* (LG) (e.g. Sinclair 1996). The juxtaposition was motivated by the significant overlap in their tenets. Both theories take into account meaning (semantic and pragmatic) as well as lexical and grammatical factors. *Constructions* are symbolic units with particular features pertaining to their form and meaning. The former specify morphological, phonological and syntactic properties; the latter specify semantic and pragmatic attributes (e.g. Croft and Cruse 2004: 257-258). In LG, the unit is the *lexical item*, comprising the core (a word/phrase) and its collocates, semantic preference, semantic prosody and colligations (Sinclair 1996). The core difference between the two theories is that LG gives clear prominence to lexis over grammar (the component of colligation is optional), whereas CxG posits no distinction between them.

This study examines whether the ML of *if*-conditionals can be explained by the semantic preference of the word *if* (LG), or by the semantic component of conditional constructions (CxG).

2 Data and methodology

The study uses eleven random samples of 1,000 *s-units*[3] from the written BNC:

- All types of constructions, providing an indication of the average frequency of modal marking in written British English – which was used as the baseline.
- Non-conditional constructions, taken collectively.
- Conditional constructions with *assuming, if, in case, on condition, provided, supposing,* and *unless*.
- Conditional-concessive constructions with *even if* and *whether*.
- Indirect interrogative constructions with *if* and *whether*.
- Constructions with *when* and *whenever*, as they are seen as combining "condition with time" (Quirk et al. 1985: 1089), and are presented as synonymous with unmodalised *if*-conditionals (e.g. Palmer 1990: 174-175).

The methodology combined close analysis of the samples (in order to divide the constructions into clauses), manual annotation (for modal marking), and quantitative analysis. The ML was established through the interaction of two complementary metrics: *modal density* and *modalisation spread* (Gabrielatos 2010: 50-52). Modal density (MD) is the average number of modal markings per clause, and is expressed as the number of modal markings per 100 clauses. Modalisation spread (MS) is the proportion of constructions that carry at least one modal marking, and is expressed as the percentage of modalised constructions. MD helps comparisons between samples by normalising for the complexity of the constructions in each, while MS corrects for heavily modalised constructions in the sample (see Ball 1994: 297-300). The ML of constructions is represented graphically in a scatterplot as the interaction of MD and MS values (see Figure 1). The size of similarities/differences of the MD and MS values of the constructions in focus was also examined using hierarchical cluster analysis (Gabrielatos 2010: 52-54).

The empirical comparison of the explanatory power of the two theories was motivated by the following overarching hypothesis: If different types of constructions sharing the same subordinator (particularly *if*) show similar ML, then this could be seen as the result of the subordinator's semantic preference (SP), and would indicate support for LG. If constructions within the same family (particularly

[1] This was calculated using a random sample from the written BNC, the ML of which was used as the baseline.
[2] *If* was not included in the modal load.
[3] An *s-unit* is a stretch of text delimited on either side by a sentence-boundary marker (e.g. full-stop, question mark) (Sperberg-McQueen and Burnard 2007).

conditionals) show similar ML, irrespective of their subordinators, then this could be seen as the result of the construction's semantic component, and would indicate support for CxG.

More precisely, the baseline and non-conditional constructions provided initial reference points against which the ML of the constructions in focus could be compared. Comparisons between conditional constructions helped investigate a) whether all conditional constructions have comparable ML, and, when this was not the case, b) the extent to which the ML of a conditional construction could be attributed to its subordinator. Comparisons with *even-if* concessive-conditionals and indirect interrogatives with *if* helped investigate the extent to which ML was due to the nature of the conditional construction or the word *if*. Comparisons with conditional-concessives and indirect interrogatives with *whether* provided a reference point for conditional-concessive and indirect interrogative constructions respectively – while also providing further opportunities to examine the influence of subordinators on ML. The comparisons were carried out not only between whole constructions, but also between their subordinate parts. The latter comparison was deemed necessary, because the ML of subordinate parts can better reflect the SP of subordinators within the usual collocation span of 5 words.

The comparisons of MD and MS take into account the statistical significance of differences, using the log-likelihood statistic, with $p \leq 0.05$ as the threshold for statistical significance, and $p \leq 0.01$ indicating high statistical significance. The MD and MS values were also submitted to cluster analysis to reveal their progressive patterning.

3 Main results

The comparison of the ML of whole constructions (Figure 1)[4] and the cluster analysis (Figure 2) revealed patterns which seem to support an explanation of ML in terms of CxG:

- *If*-conditionals (*if*_cnd) have a much higher MD and MS than indirect interrogatives with *if* (*if*_q) ($p \leq 0.01$) – and the two constructions are in completely different clusters.
- The conditional-concessives with *even if* (*even-if*_cc) are in the same pre-final cluster with *if*_cnd, whereas *if*_q is found in the other pre-final cluster.
- The two indirect interrogative constructions (*if*_q and *whether*_q) cluster together, despite having different subordinators.

However,

- although most conditionals cluster together, two of them (*in case, on condition*) are in a different pre-final cluster;
- the two conditional-concessives (*even if* and *whether*) are in different pre-final clusters.

The examination of the ML of subordinate parts (Figure 3) and the clustering of their ML values (Figure 4), however, seem to indicate that the ML may be due to the SP of *if* – particularly if we consider that *even if* can be expected to have a different SP from *if* (e.g. Quirk et al. 1985: 1002).

- *if*_cnd and *if*_q have comparable ML, and cluster together .
- *even-if*_cc have much lower ML than *if*_cnd and *if*_q, and are in a different major cluster.

Still, another pattern seems to provide support for CxG:

- *whether*_q have comparable ML with both *if*_q, and share the same major cluster.

4 Brief discussion

At first glance, neither the SP of the subordinator, nor the type of construction, on their own, seem able to fully explain the results. What seems to best explain the ML patterns is their combined effect. In this light, CxG clearly demonstrates a stronger explanatory power, as a construction specifies morphosyntactic, lexical and semantic attributes (among others), which it also treats as having equal importance. This is also supported by a closer examination of issues pertaining to the ML patterns within the immediate co-text of the subordinator and the nature of LG.

The immediate co-text (subordinate parts) had to be defined grammatically, not lexically. This was because *if* is not a 'free agent'. On its own, *if* is found in two constructions (conditionals, indirect interrogatives), and in further two as part of a multi-word subordinator: conditional-concessives (*even if*) and comparison clauses (*as if*) (Quirk et al. 1985: 1110). Therefore, a collocational analysis of *if* would not reveal useful patterns, as it would provide a homogenised picture of its SP in the four constructions taken together − with prominence on its collocates in *if*-conditionals, as they account for an estimated 85% of its occurrences (Gabrielatos 2010: 194). Finally, a collocational analysis of *if* aiming at establishing its semantic preference would not be posited within LG, as it does not treat function words as cores of lexical items.

The combined influence of subordinator and construction type is fully consistent with the tenets of CxG. More so, CxG accounts for the interaction between all components of a construction through the "principle of no synonymy" (Goldberg, 1995: 67): morphosyntactic (including lexical) differences between constructions lead to semantic/pragmatic differences, and vice versa.

[4] In Figures 1 and 3, dotted lines indicate the MD and MS of the baseline.

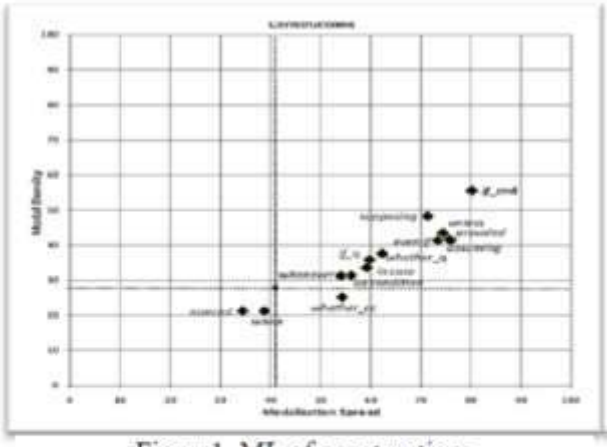

Figure1. ML of constructions

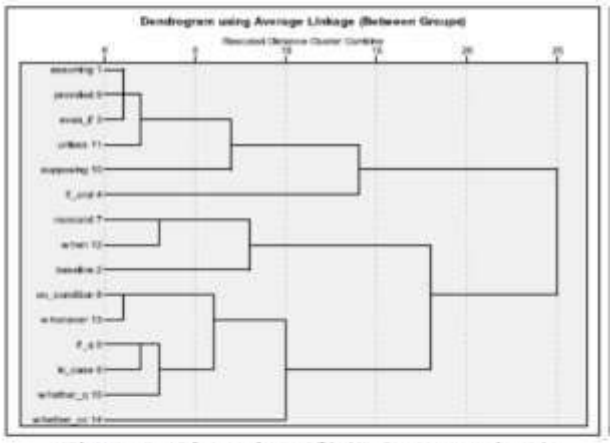

Figure 2. Clustering of ML (constructions)

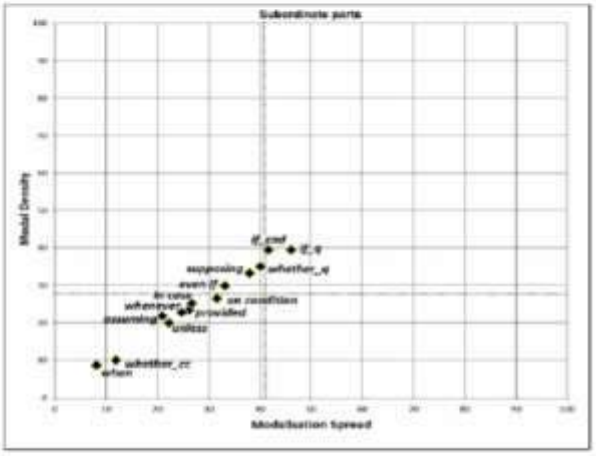

Figure 3. ML of subordinate parts

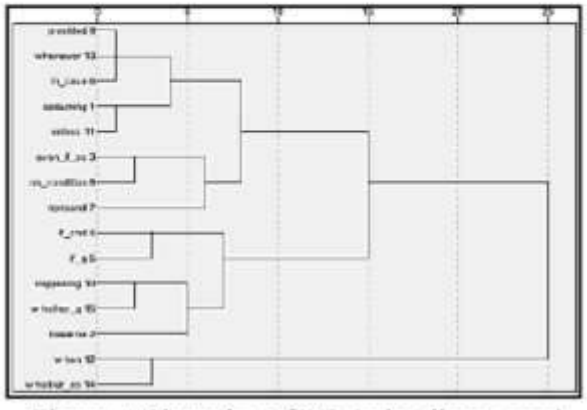

Figure 4. Clustering of ML (subordinate parts)

5 Conclusions

The analysis has provided strong indications that CxG rather than LG can account for the ML patterns examined here. It was also shown that ML patterns are sensitive to different combinations of constructional attributes, as it would be predicted by the principle of no synonymy. This suggests that subordinators, rather than being the core of a lexical item, are better seen as one of many components defining a construction. Consequently, if a semantic attraction of the subordinator can be posited, this has to be understood as being influenced by the type of construction that the subordinator is used in. In this light, semantic preference could be more usefully treated as part of a construction's semantic component.

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Corpus Linguistics 2013, 25 July 2013

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A case study of the modal load in *if*-conditionals

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Motivation

Corpus based studies of the *modal load* (i.e. extent of modal marking) in *if*-conditionals in the written BNC (Gabrielatos 2007, 2010) have revealed that they have a significantly higher modal load than …

- average
- concessive conditionals with *even if* and *whether*,
- indirect interrogatives with *if* and *whether*,
- comparative constructions with *as if* and *as though*
- conditionals with other subordinators (*assuming, in case, on condition, provided, supposing, unless*).
- constructions with *when* and *whenever* (used as conjunctions)
- non-conditional constructions taken collectively

Research Question

Are the different modal load (ML) patterns due to …

- the semantic preference of the lexical item *if?*
  ⇨ Lexical Grammar (LG)

- the semantic make-up of *if*-conditionals?
  ⇨ Construction Grammar (CxG)

Why the particular theories?

- Both take into account ...
  … meaning (semantic **and** pragmatic)
  … lexical **and** grammatical elements

- Main difference ...
  … LG gives clear prominence to lexis over grammar
  … CxG accounts for both in a balanced way
  -- in fact, it posits no distinction.

Modal Load

The interaction of two complementary metrics

Modal Density

Modalisation Spread

Modal Density

Definition	Average number of modal markings per clause.
Expression	Number of modal markings per 100 clauses. (%)
Utility	Helps comparisons between samples by normalising for the complexity of the constructions in each.

(Gabrielatos, 2008, 2010)

Lexical Density:

- The average number of content words per clause (Halliday, 2004: 654-655).
- The percentage of the tokens in a text that are content words (Ure, 1971).

Modalisation Spread

Definition	Proportion of constructions that carry at least one modal marking.
Expression	Proportion (%) of modalised constructions.
Utility	Corrects for heavily modalised constructions in the sample.

(Gabrielatos, 2010)

Spread:

- The proportion of corpus speakers who use a particular language item (Gabrielatos & Torgersen, 2009; Gabrielatos et al., 2010).

Relevant quantitative findings

(written BNC - estimations)

- On average (written BrE), we can expect…

…about three modal markings per ten clauses (MD=27.7).

…about 40% of s-units to be modalised (MS=40.9).

Written BrE is fairly heavily modalised to start with

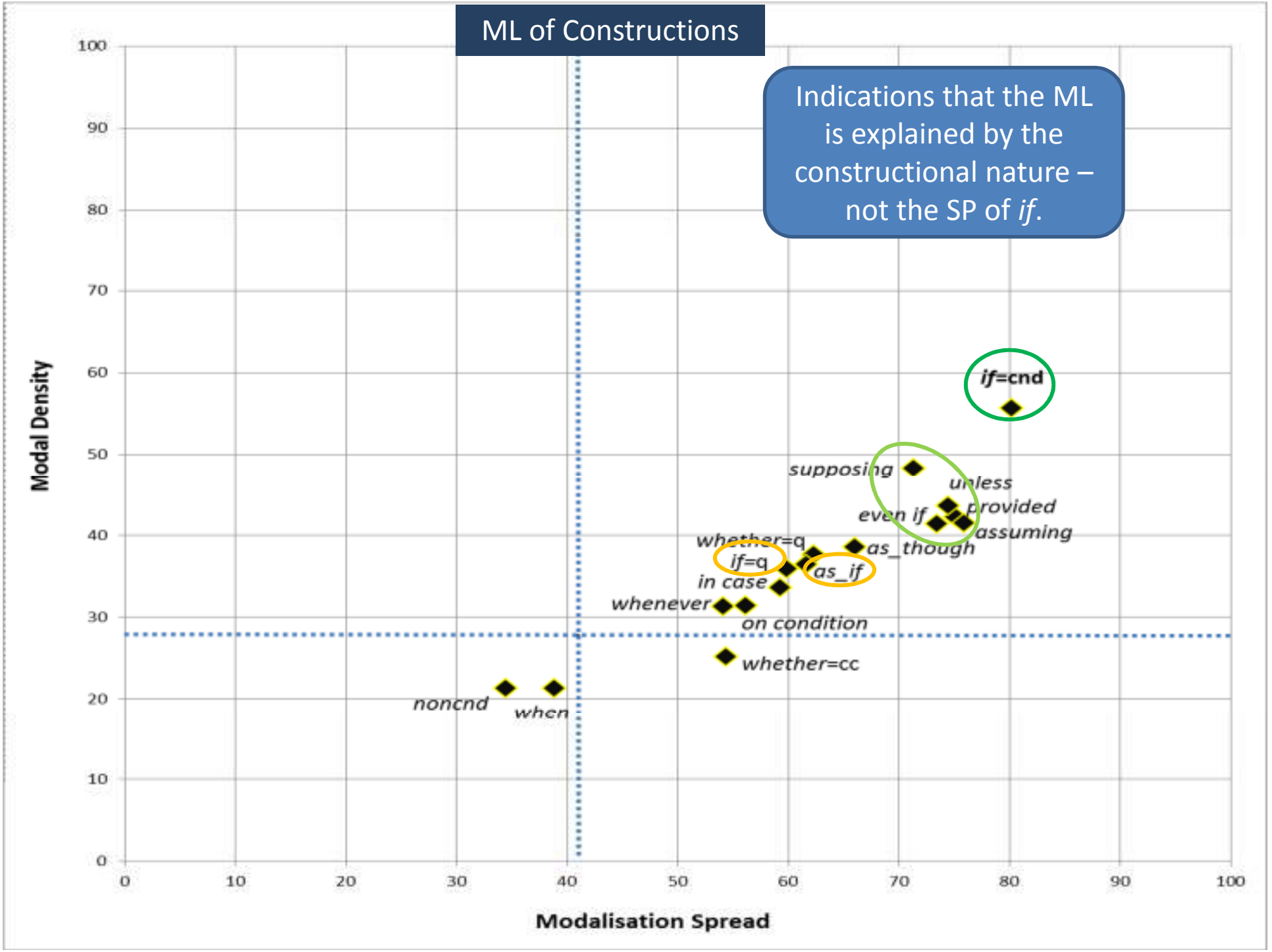
- *If*-conditionals account for about 80% of all conditional construction tokens.

They are excellent candidates for a case study

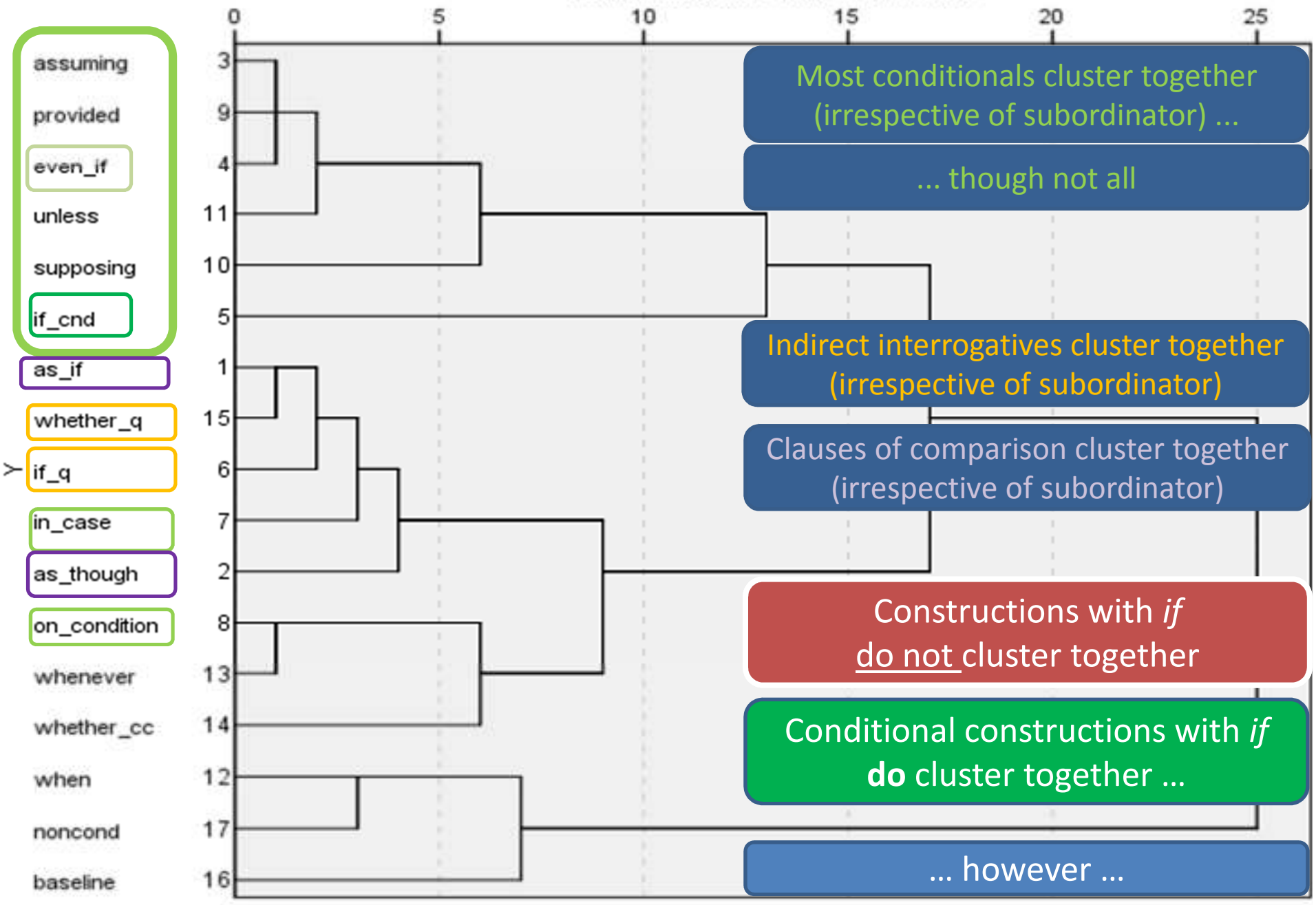
- About 85% of *if tokens* are subordinators of conditional constructions.
- The rest are subordinators of concessive-conditionals, indirect interrogatives and comparison clauses.

The word *if* is not a 'free agent'

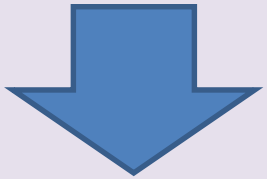
Modal Load
comparisons


ML of Constructions
Indications that the ML is explained by the constructional nature – not the SP of *if*.
Modal Density
Modalisation Spread
0
10
20
30
40
50
60
70
80
90
100
if=cnd
supposing
unless
provided
even if
assuming
as_though
whether=q
if=q
as_if
in case
whenever
on condition
whether=cc
noncnd
when

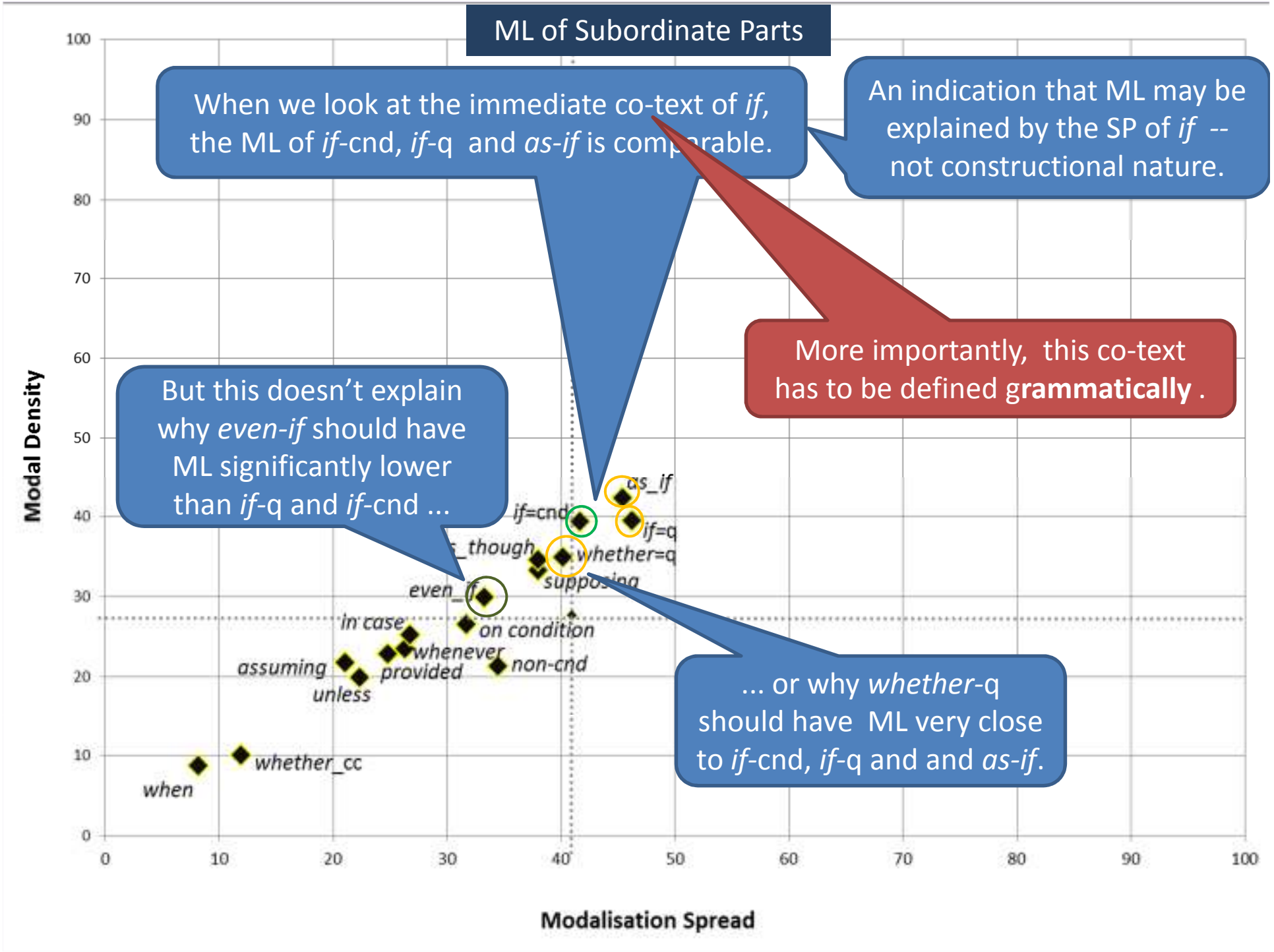
ML Clustering: Constructions



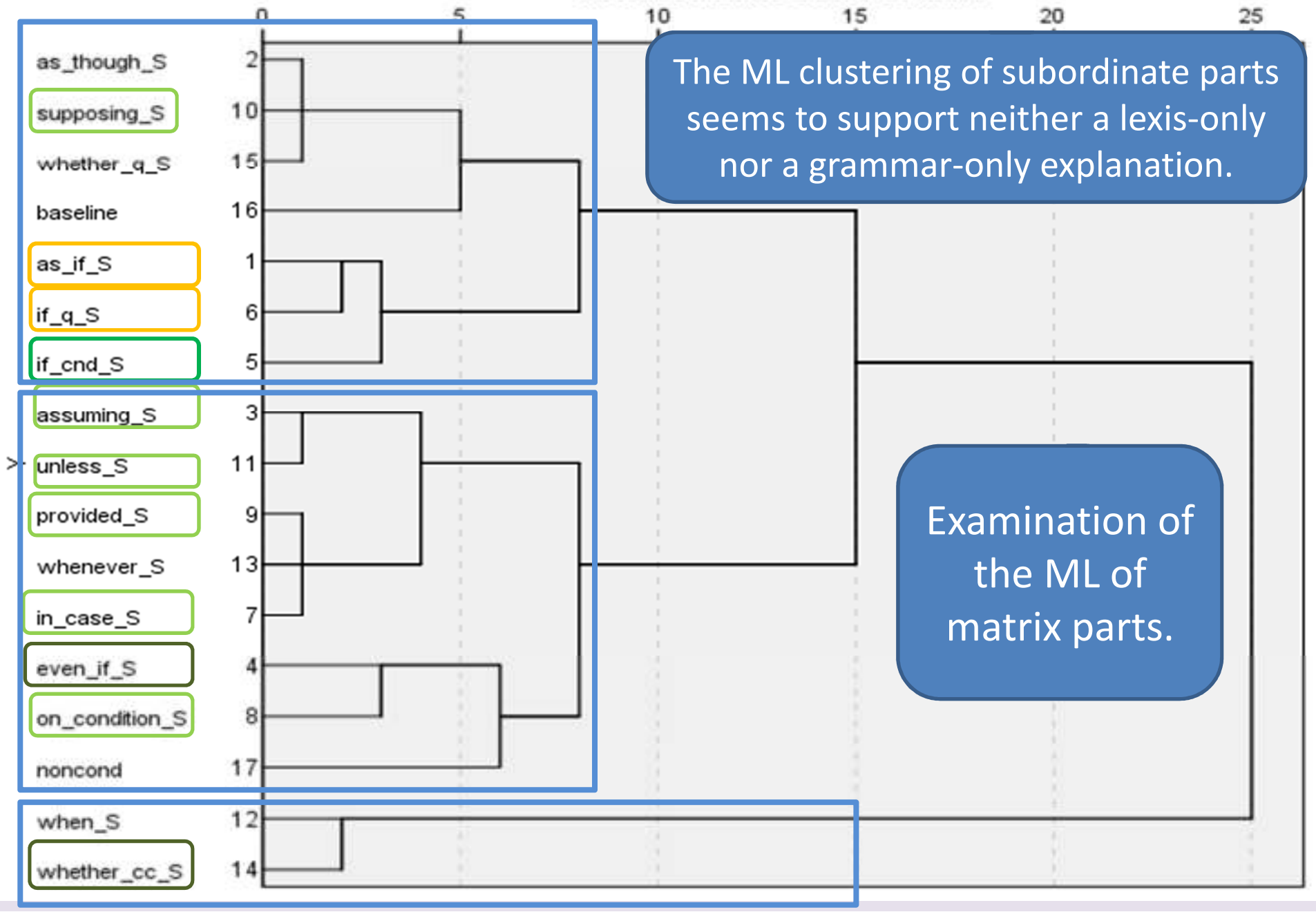
The ML of bi-partite constructions may not reflect the semantic preference of *if* within the usual short collocation span of 4-5 words



Examination of ML in the subordinate part only

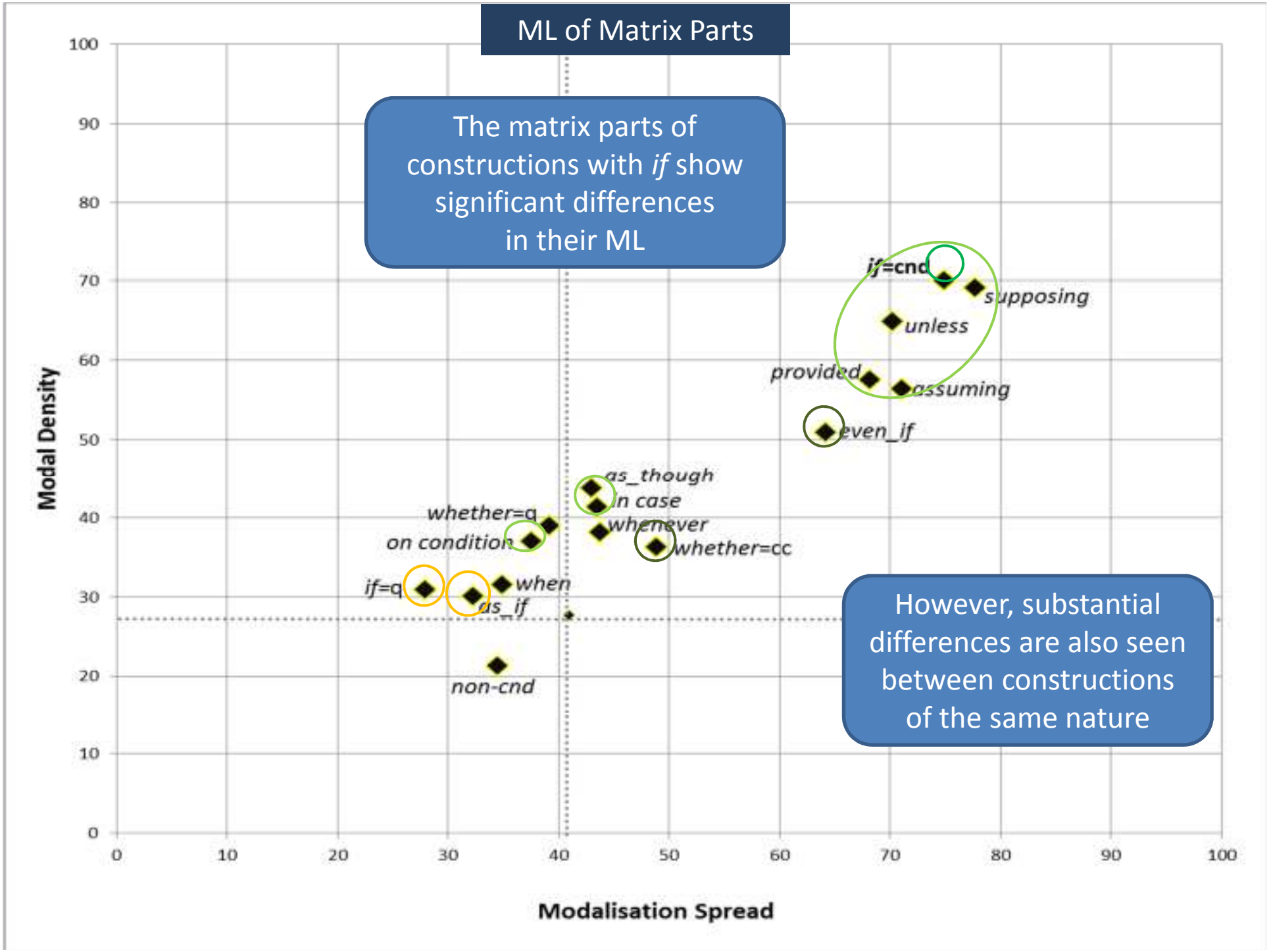

ML of Subordinate Parts
When we look at the immediate co-text of *if*, the ML of *if*-cnd, *if*-q and *as-if* is comparable.
An indication that ML may be explained by the SP of *if* -- not constructional nature.
More importantly, this co-text has to be defined **grammatically** .
But this doesn't explain why *even-if* should have ML significantly lower than *if*-q and *if*-cnd ...
... or why *whether*-q should have ML very close to *if*-cnd, *if*-q and and *as-if*.
Modal Density
Modalisation Spread
0
10
20
30
40
50
60
70
80
90
100
as_if
if=cnd
if=q
whether=q
even_if
in case
on condition
whenever
assuming
provided
non-cnd
unless
whether_cc
when

ML clustering: Subordinate Parts



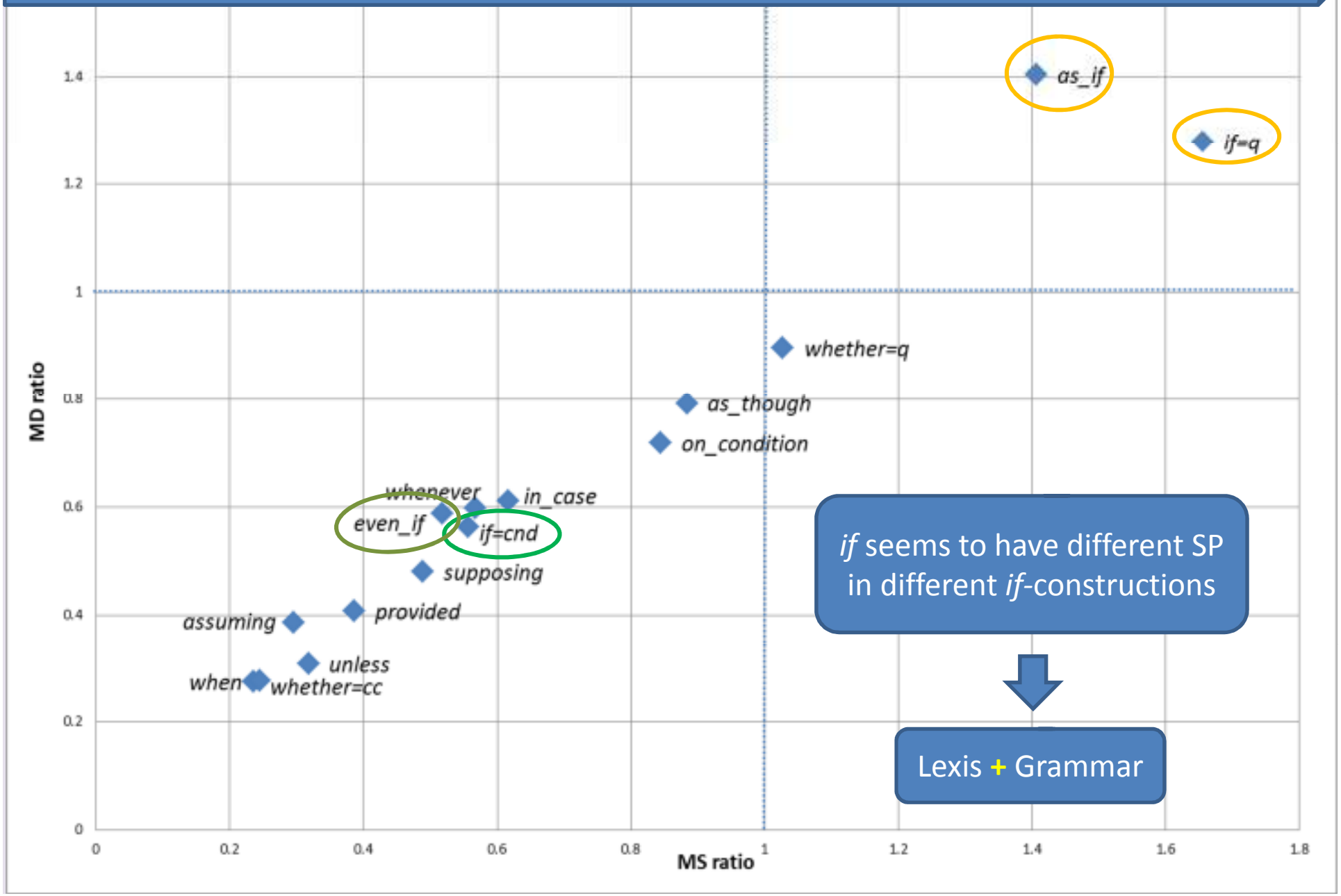
The ML clustering of subordinate parts seems to support neither a lexis-only nor a grammar-only explanation.

Examination of the ML of matrix parts.


ML of Matrix Parts
The matrix parts of constructions with *if* show significant differences in their ML
However, substantial differences are also seen between constructions of the same nature
Modal Density
Modalisation Spread
100
90
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
80
90
100
if=cnd
supposing
unless
provided
assuming
even_if
as_though
in case
whether=q
whenever
on condition
whether=cc
if=q
when
as_if
non-cnd

Subordinate/Matrix ML Ratio:

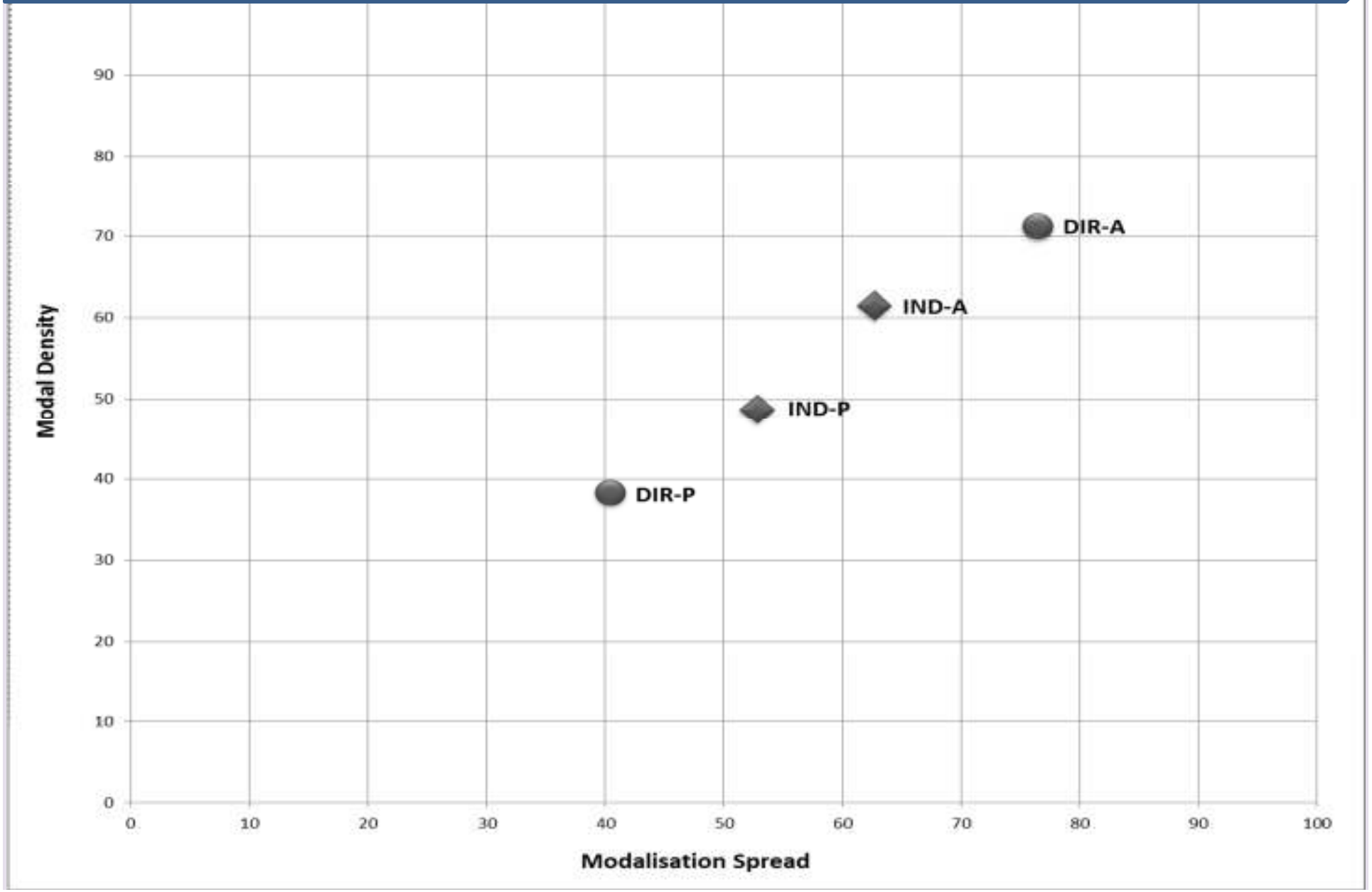
Shows how balanced the ML is between the subordinate and matrix parts of each construction.



if seems to have different SP in different *if*-constructions

Lexis + Grammar

Direct vs. Indirect *if*-conditionals (Quirk et al., 1985): ML of Protases and Apodoses



The ML of *if*-conditionals cannot be regarded as reflecting on the semantics of *if* alone, but the interaction of its semantics with the semantics of the constructions of which it is a component part.

ML seems to be explained by taking into account both ...
… lexical patterns (the SP of the subordinator)
… grammatical patterns

Which, if any, of the two theories can better accommodate this?

Lexical Grammar

Lexical Item / Extended Unit of Meaning

(Sinclair, 1996: 75, 90; Stubbs, 2009: 123-126)

The core (a word or phrase)

Its collocates
Its semantic prosody

Its semantic preference
Its colligations

Obligatory

Optional

Lexis independent of grammar

Grammar emerges from lexical patterning

In its current form, LG cannot explain the ML patterns

- The focus of *extended units of meaning* / *lexical items* is content words (Sinclair, 1996; Stubbs, 2002).

  ⇨ No indication that …

  … *if* (a function word) would be deemed a suitable core element for an extended unit of meaning / lexical item.

  … the notion of a conditional unit would be posited. (Gabrielatos, 2010: 38)

- Collocational analysis of *if* would effectively reveal its SP within *if*-conditionals (about 80% of its uses).

- Collocational analyses of *if* within subordinate parts of particular constructions would contradict central tenets of LG.

Restoring Firthian Definitions

Colligation

"[F]requent co-selections of a content word and an associated grammatical frame" (Stubbs, 2002: 238).

"[T]he grammatical company a word keeps" (Hoey, 1997: 8; also Sinclair, 2004: 174).

"The statement of meaning at the grammatical level is in terms of word and sentence classes or of similar categories and of the interrelation of those categories in colligations. Grammatical relations should not be regarded as relations between words as such – between *watched* and *him* in 'I watched him' – but between a personal pronoun, first person singular nominative, the past tense" (Firth, 1968: 181)

Semantic Colligation

A hybrid of semantic preference and colligation:

"The mutual attraction holding between a sentence class … and a semantic category" (Gabrielatos, 2007: 2).

If-conditionals can be seen as *modal colligations*

However ...

Not all conditionals have high ML.

The construct doesn't fully account for the bi-partite structure of conditionals.

Semantic colligation is a reduced version of a construction.

Constructions

"Conventionalised pairings of form and function" (Goldberg, 2006: 1)

"Symbolic units" with particular features pertaining to their form and meaning (Croft & Cruse, 2004: 257).

Formal properties:
morphological, phonological, lexical, syntactic

Meaning properties:
semantics, (potential) pragmatic uses

(Croft & Cruse, 2004: 258; Fillmore et al., 1988: 501; Fried & Östman, 2004: 18-21)

Accounting for the ML patterns

ML patterns result from the interaction
of constructional elements / attributes …

subordinator
function of the subordinate part
function of the matrix part
nature of link between subordinate and matrix part

… and the function of the construction itself

The SP of a subordinator is influenced by
the type of construction it is a component of.

Further Steps

Finalise examination of ML patterns arising from interaction of modality types and types of conditional constructions (and their subordinate and matrix parts).

In light of Herman Moisl's presentation yesterday, establish whether non-linear cluster analysis is more suitable.

Thank you

Details: bit.ly/CG-Thesis