

Copula-less Nominal Sentences and Matrix-C⁰ Clauses: A *Planar* View of Clause Structure *

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Abstract

This paper is an attempt to unify the apparently unrelated sentence types in Bangla, namely, copula-less nominal sentences and matrix-C clauses. In particular, the paper claims that a “Planar” view of clause structure affords us, besides the above unification, a better account of the *Kaynean Algorithm* (KA, as in Kayne (1998a, b; 1999)) in terms of an interface driven motivation to break symmetry. In order to understand this unification, the invocation of the KA, that proclaims most significantly the ‘non-constituency’ of the C and its complement, is relevant if we agree with the basic assumption of this paper that views both Cs and Classifiers as disjoint from the main body (plane) of the clause. Such a disjunction is exploited further to introduce a new perspective of the structure of clauses, namely, the ‘planar’ view. The unmistakable non-linearity of the KA is seen here as a multi-planar structure creation; the introduction of the C/ CLA thus implies a new plane introduction. KA very strongly implies a planar view of clause structure. The identification of a plane is considered to be as either required by the C-I or the SM interface and it is shown that this view matches up with the duality of semantics, as in Chomsky (2005). In particular, EM (External Merge) is required to introduce or identify a new plane, whereas IM (Internal Merge) is inter-planar. Thus it is shown that inter-planar movements are discourse related, whereas intra-planar movements are not discourse related.

Keywords: copular sentences, classifiers, epistemicity, Kayne, internal/ external merge

1 Introduction

Instead of deriving the differences between languages by the parametric research technology, this paper looks at the possibility of deriving these differences from within each concerned language; the task according to this strategy is therefore to discover the *pressure points* created in a language, which erupt into the so-called inter-language differences, and to locate these pressure points at the Interfaces; Minimalism as a framework provides this opportunity.

If we look at the logic of the Kaynean Algorithm, or KA (discussed in details in section 2.1), then it is clear that the sequence of steps seems to be directed towards the goal of evacuating the VP, or to create a remnant VP. The reading presented in this paper views the breaking up of the VP as an attempt to create a multi-clausal structure from a monoclausal structure. Crucially though, a translation of this algorithm (inspired by the reading above) in terms of a planar view of clause structure, can capture the essence of the KA in its fullest, affording a unification of the two clause types that we will take up for study in this paper, namely, matrix-C clauses and copular constructions. The unmistakable non-linearity of the KA is seen here as a multi-planar structure creation. Introduction of the C/ CLA (classifier) in the derivations of these two constructions will be seen to imply a new plane introduction. KA very strongly implies a planar view of clause structure.

The paper is organised as follows: section 2 introduces C-internal clauses in Bangla and proposes the Revised Standard Non-Linear Kaynean Algorithm (KA) with respect to Bangla

* Two earlier versions of the paper were presented in V Asian Glow in 2005 in New Delhi and in NTNU, Norway in 2011; I am thankful to audiences at these talks, especially Hilda Koopman, Norvin Richards and Tim Stowell.

- (6) *ami jani na [ke je eTa koreche] Bangla
I know not who that this done

The interesting question that can be raised with respect to the Bangla data is the following (following Bhattacharya (2002)):

- (7) Why must an initial element move inside a clause XP to enable that clause to move inside another clause YP?

One answer to this question might lie in the meaning of the C-internal sentences. On the surface, and at the first approximation, the internal-C sentence seems to have the same underlying meaning as the one with the initial C, i.e., the meaning for (1) is also the meaning for (2a). However, this is not so; the latter in fact has the following meaning:

- (8) ‘(as for) the fact that mother will come, John knows it’

We cannot miss the fact that it is actually a topicalised version of the earlier sentence. The English translation makes the topicalised meaning clear. Does the so-called COMP have a role to play in giving the clause a topicalised meaning? Since topicalisation is a root phenomenon, this can partly explain why the complement must move up. A part of the derivation can therefore be rescued by appealing to the fact that it is ‘mother’ (in (2a)) which really carries the topic feature and that pied piping of the CP results in a topicalised meaning of the whole complement when it is moved to a pre-verbal position. However, this is theoretically unimplementable.

2.1 Non-Linear Kaynean Algorithm

A more interesting solution may be advanced if we consider Kayne’s (1998a, b; 1999) radical idea that the C and its complement do not form a constituent. Kayne demonstrates this via the P-Comp *di* in (9). The P-Comp in this model does not form a constituent with the infinitival complement IP *cantare*.

- (9) Gianni ha tentato di cantare
John has tried to sing-inf

Rather, the derivation proceeds as follows:

- (10) a. Merge matrix V with TP: *tentato + cantare*
b. Merge Comp with (a): *di + {tentato, cantare}*
c. Comp attracts TP to its Spec: *cantare, di {tentato, t_{IP}}*
d. A new head W is merged and C adjoins to it:
di+W {cantare, t_{di} {tentato, t_{IP}}}
e. Comp(+W) attracts remnant VP to [Spec,W]:
{tentato, t_{IP}}, di+W {cantare, t_{di} t_{VP}}

The step in (10b) crucially implies that *di* and *cantare* do not form a constituent. Kayne addresses a good many unresolved problems in Romance syntax by letting the derivation proceed in this manner. For more immediate concerns, let us see if this algorithm works for matrix COMPs in an SOV language.

The algorithm derives the unmarked (postverbal) order (11); shading indicates items to be moved:

- (11) John janto [je Sudha phOl kheyechē]
 John knew that Sudha fruit eat.ppl.3
John knew that Sudha has eaten fruit.
- (12) a. [v janto] + [TP Sudha phOl kheyechē]
 b. [COMP je] + [v janto] + [TP Sudha phOl kheyechē]
 c. [IP Sudha phOl kheyechē] [COMP je] + [v janto] + t_{IP}
 d. [COMP je] [TP Sudha phOl kheyechē] t_{COMP} + [v janto] + t_{TP}
 e. [v janto] + t_{TP} [COMP je] [TP Sudha phOl kheyechē] t_{COMP} + t_{VP}

However, it cannot derive the crucial order of (2a) and some other orders that I do not discuss here.

2.1.1 Some problems of KA. However, this algorithm has a number of problems. Apparently, since the constituency of the CP is destroyed (only in step (12d) does C...TP come together in the right order), CP formation seems to be delayed. However, viewed in terms of traditional tree structures, step (12c) should complete the CP (by moving the TP to its specifier), and turn it into a phase resisting further movement out of it. However, this is not the case since we notice subsequent movement out of this CP, even from its complement domain (as in step (12e)). In this step, the remnant VP is too deep to be attracted to the specifier of the C+W complex. Furthermore, in step (12d) the introducing of the phantom head W (as in the original Kaynean algorithm, though not shown here), to which the COMP moves up to, is unmotivated.

2.1.2 Solutions to the problems of KA. Some possible solutions can be offered to the problems raised in the previous subsection. The first problem of a CP-phase resisting further movement out of it in step (12c) above can be addressed with regards to the true nature of the PIC (Phase Impenetrability Condition), which does not prevent movement of the C head since the head of the phase drives further movement (Chomsky (2006) states that IM (Internal Merge) should be driven only by phase heads, satisfying the edge feature (EF) of the phase head).

The other problems noted, namely, with respect to movement of the complement domain and merging of the unmotivated W head, are plausibly dealt with if the PIC is followed; accessibility of H and its edge is only up to the next strong phase. Thus, in (13), the relevant elements of HP are accessible to operations within the smallest strong ZP phase, but not beyond it:

- (13) [ZP Z ... [HP α [H YP]]]

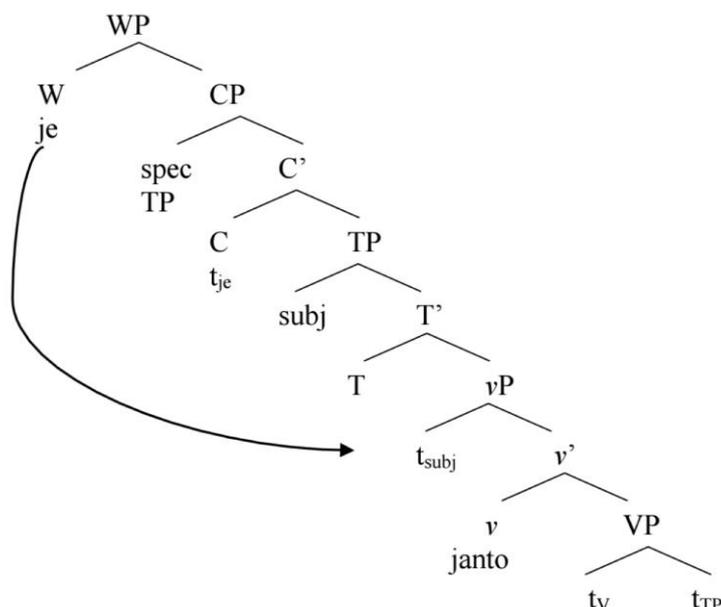
Note that the complement domain YP is not accessible at ZP, as per the PIC. If we go back to (12), step (e) is clearly in violation of this condition since the remnant VP movement is movement of the complement domain like YP. If the COMP moves to a pre-merged W head, then we can assume that the VP movement takes place within the WP, specifically to the specifier of WP. This problem may be resolved by invoking the intervention effect as below:

- (14) A probe can agree with goals in its domain as long as a goal with no unvalued features is found, after which further search is blocked (Chomsky, 2006).

Thus, the EF (a feature of a lexical item (LI) that permits it to merged) at W scans down the tree and can seek a goal only until it encounters another phase. However, note that whether VP-movement occurs prior to any intervention effect, we need to sort out expected problems that are faced while trying to marry a Kaynean system of derivation with that of

mainstream Minimalism. The KA starts off by merging the main verb with the TP complement; it is rather silent about the status of the subject (*Gianni* in (9)). If we try to take the subject into account then it is obvious that we will need to merge also a small *v*, projecting a *vP*. This in turn implies that any probe from the W position in the diagram will not find a goal until the *vP*:

(15)



In the true spirit of (14), the *vP* itself can be a goal, but nothing inside it or beyond it can. I will address the third problem in the next subsection.

2.1.3 The Revised Kaynean Algorithm (RKA). As we noted above, the KA fails to account for the topic cases as in (16), which are instead derived as in (17). Here, I depart from the KA by moving not the TP but the VP in step 2, and by moving not the remnant VP but the remnant IP in step 4.

- (16) John [Sudha je phOl kheyechē] janto
 Sudha C fruit eat.ppl.3 knew
As for the fact that Shudha has eaten fruits, John knew it.

- (17) a. [v janto] + [IP Sudha [VP phOl kheyechē]]
 b. [COMP je] + [v janto] + [IP Sudha [VP phOl kheyechē]]
 c. [VP phOl kheyechē] [COMP je] + [v janto] + [TP Sudha tVP]
 d. [COMP je] [VP phOl kheyechē] tCOMP + [v janto] + [TP Sudha tVP]
 e. [TP Sudha tVP] [COMP je] [VP phOl kheyechē] tCOMP + [v janto] + tTP

Given the reasoning in the previous section about accessing the *vP*/ VP at WP, if W also projects a phase, then the final step in either the KA or RKA is illegal in any case (due to PIC/EF effects). However, I would suggest that this is foreseen in KA. Thus there is good reason for keeping the phantom head introduction (W) as a part of the KA; since only the target projects (Chomsky, 1995a), the resulting structure after the introduction of W cannot be another CP, thus preventing the formation of another phase which in turn bars further movement. We thus address the problem associated with motivating the introduction of the head W.

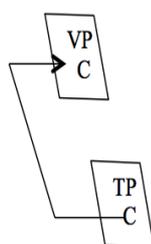
However, the movement of the COMP *je* to the phantom head *W* still needs to be justified. I discuss $C \rightarrow W$ movement in the next section.

2.2 Trigger for Head Movement

In KA, *C* and its complement *TP* are separated until the step (c) above in (12); this is when the *TP* and its *C* come together, but not necessarily in the required order. This is followed by the movement of the *C* which then gives what we would traditionally start with: *C+TP*.

The reading of this particular sequence of movement that I offer is as follows: breaking up the *VP* (consisting of *V+TP*) in the KA, by moving the *TP* away, is an attempt to create a multi-clausal structure from a monoclausal structure. The structure created in (12) after following the KA can be seen as creating a biclausal structure. Thus the logic of creating a remnant *VP*, and moving it subsequently, is to obtain a biclausal structure. Notice that in the process of the two crucial movements, i.e., of *TP* and of (remnant) *VP*, the parts of the *VP* get distributed; more specifically, both the *TP* and the *VP* sans the *TP* get separately associated with *C*. This can be considered as giving the effect of two *C*s separately associated with different chunks of the event. This is shown in (18), which clearly justifies the phantom head *W* of Kayne's algorithm:

(18)



The RKA proposed in (17) tries to create a different remnant (rather than a *VP* remnant as in the original KA), namely, a *TP* remnant. Technically, this is justified by noting that this is less costly since it takes advantage of the fragility between the EA (external argument) and the *VP* that is a characteristic of every *TP*. Empirically too, *TP* remnant movement produces sound results; this is shown below:

(19) *Remnant VP movement*

- a. hOyto [TP John [kal rate phOl kheyechē]] vacate VP →
probably last night.loc fruit eaten
- b. phOl hOyto [TP John [kal rate kheyechē]] remnant VP →
- c. * kal rate kheyechē phOl hOyto [IP John t_{VP}]

(20) *Remnant IP movement*

- a. hOyto [TP John [kal rate phOl kheyechē]] vacate TP →
- b. kal rate phOl kheyechē [hOyto [TP John t_{VP}]] remnant TP →
- c. John kal rate phOl kheyechē hOyto
Probably, John ate fruit last night.

With a pre-sentential adverb like *hOyto* 'probably', it is seen that creating a remnant *TP* and then moving it to a higher specifier produces a grammatical sentence.

3 Non-Linearity: A Plane View of Interfaces

In this section I make the theoretical move of introducing a new framework of dealing with the complex sentence types that we have been discussing, which is driven by the fact, now established, that the KA is unmistakably non-linear. The sequence of merge and move that is part of the KA can be considered to be deliberately put in place to capture non-linearity. As noted in the previous section, the KA ‘distributes’ parts of the events to create a biclausal structure. This idea seems to reflect what is proposed in Chomsky (2006), namely, that T inherits its features and *Agree* from C, as it is desirable to spread to two domains. I will take this to mean that it is desirable to consider derivations to consist of planes.

However, the real question is, why is non-linearity needed? A simple answer would be that non-linearity is needed only if sentence structure is assumed to be non-linear to start with. To make this proposal more concrete, let us assume that C is that crucial fulcrum which introduces a new plane. Along with this assumption, we make the further minimalist assumptions discussed below.

For example, we will assume that planes must be identified since they are required by the interfaces. In particular, the notion of ‘duality of semantics’ that captures two different types of semantic interplay within a clause, namely, θ -semantics and discourse/ peripheral semantics, is captured through a biplanar/ multiplanar structure. The details of the movements across and within planes are as follows:

- (i) IM (Internal Merge) is mostly required to identify a new plane, whereas EM (External Merge) either introduces a new plane or is intraplanar; IM movements are required for discourse semantics (topicality by C, specificity by CLA, etc.) to be displayed and they can be either inter- or intra-planar; in other words, planes represent information structure divide that we see between, for example, topic and comment.
- (ii) The C/D domain in Bangla constitute a strong phase, such that a clausal complement must be parsed as a separate Intonational Phrase (Kidwai, 2011)

In the next two sections, I present a planar view of both the KA and RKA.

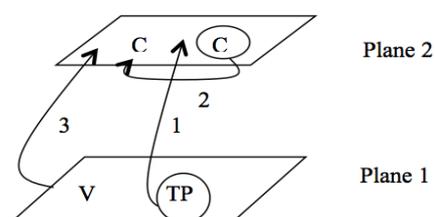
3.1 KA in a planar view

The conjecture above that the pre-VP positioning of the embedded clause is ‘monoclausal’ which can nonetheless be derived by KA or RKA by remnant movement (of VP/TP) leads to the possibility of treating KA as better represented by a planar view of clause structure. Note that the sequence of movements in the KA is as follows:

- (21) TP-movement > C-movement > (remnant) VP-movement

Given the assumption that C introduces a new plane, V+TP will create the first plane, but once the C is merged, the second plane is introduced. The two planes and the inter- and intra- planar movements are shown in (22) below:

- (22)



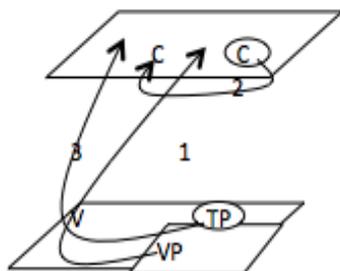
Note that movements 1 and 3 are interplanar; this is required for introducing or identifying a new plane (plane 2 here). Note that the new plane itself is available only after a higher functional head like C is introduced. If we consider the duality of semantics as an interface requirement, a biplanar structure is justified since it is the upper plane introduced by a typical discourse related head like C, that obtains discourse semantics.

Note also that IM and EM do not always correspond with inter- and intra- planar movements, respectively. The system is set up such that both interplanar and intraplanar movements obtain discourse related information structure (as in old information, topic-related information, or specificity). The inherent claim, which becomes clearer as we go through a set of derivations, relates information structure to how the planes behave. Note that the last movement, movement 3, achieves plane-incorporation; any precedence relation falls out as a result of the EF requirement of the embedding strong phase-head C. I would suggest that the set of movements here display an economy condition such as *VACATE MAXIMALLY*, which applies whenever possible. Plane-incorporation thus makes the structure in fact mono-planar; thus, a biclausal structure (1a) here is mono-planar. Furthermore, whenever plane-incorporation takes place, respecting *VACATE MAXIMALLY*, no special information structure obtains.

3.2 RKA: A Planar View

Recall that the revised KA suggested in section 2.1.3 makes an embedded VP move, followed by remnant movement of the TP. This is shown below in terms of the planar framework introduced above:

(23)



Note that in this derivation no plane-incorporation takes place, making this monoclausal structure (the pre-verbal complement positioning is being considered structurally monoclausal as in (2a)) bi-planar. The first movement is to weaken the TP to facilitate movement 3 later on; that is, the extraction of the VP out of the TP is to weaken the TP along its ‘crack’ so as to facilitate later separation of the V and the TP in the third movement step. The movement of the VP is reminiscent of Moro’s (1997) predicate raising analysis of copula sentences. Note here that the economy principle *VACATE MAXIMALLY* fails to apply, leading to non-incorporation of planes. This in turn implies that information structure becomes salient in such a configuration. Thus, we re-affirm that plane behaviour is responsible for information structure of a sentence rather than whether the movements are inter- or intra-planar, or whether they are IM or EM.

4 Matrix-COMP Clauses

Out of the two independent structures that are supposed to end themselves uniformly to a planar analysis, matrix-C clauses are another instance of C-internal clauses, albeit within a

simplex clause. Thus, apart from its usual function of being a clause-initial COMP in examples like (1a) (repeated here as (24)), *je* can also appear in matrix clauses (as in (24b)):

- (24) a. John jane [je ma aSbe]
 John knows C mother come.fut.3
John knows that mother will come.
- b. John hEmleT je poReche!
 John Hamlet C read.ppl.3

The obligatory exclamation mark in (24b) indicates that *je* sentences are easily acceptable when they are embedded clauses, but becomes much harder (and one needs special intonation) when they are in the matrix clause. I will suggest that this has to do with change being under way, from embedded clause C to matrix clause C. That is, *je* did indeed originate as a C in an embedded clause but it is now slowly undergoing reanalysis to be also available in the matrix clause. For the reanalysis to occur there must be a period where an embedded clause is interpreted as a matrix clause even though syntactically it is still an embedded clause. The suggestion here is that this is possible by deletion of the matrix clause.

Independently, we have seen that when the embedded clause *je* appears inside the complement clause while the clause itself raises to a pre-verbal position, a topic interpretation for the complement is obtained:

- (25) [mother je come-will] John knew
As for the fact that mother will come, John knew it.

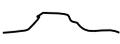
The meaning of (24b) is thus:

- (26) *As for reading Hamlet, John has already done it.*

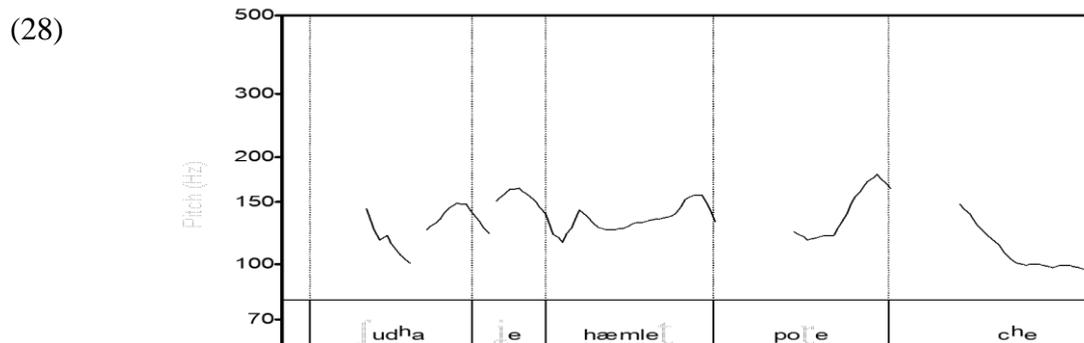
This supports the conjecture above that (24b) is an embedded clause in the guise of a matrix clause.

4.1 Prosody of Matrix-C clauses

In this section, I will present particular characteristics of these matrix-C clauses, which have not been seen as grammatically relevant constructions to date. Pitch studies of these strange root C clauses reveal an unusual contour, shown below:

- (27) 
 Sudha je hEmleT poReche
 Sudha C Hamlet read.ppl.3
'As for reading Hamlet, Shudha has already done it'
 ⇒ Hat contour over the verb

This can be seen even more clearly in the following pitch data:



In the pitch graph above, we notice very clearly the hat contour over the verb. The reason for this contour is conjectured above by stating that change being under way may result in deletion of the matrix clause from the biclausal structure. However, it remains to be seen how this deletion may be brought about. I will propose a rationale for this analysis in the following section.

4.2 Epistemicity

In this section, I will give an account of the possible reason for the matrix clause deletion phenomenon conjectured above. First consider the following data:

- (29) a. ami biSSaS kori (je) ora ebar jitbe
 I believe do C they this time win.fut.3
I believe that they will win this time.
- b. ?[ora ebar jitbe] ami biSSaS kori
 c. [ora je ebar jitbe] ami biSSaS kori
- (30) John je ghumocche!
 John C sleep.prog.3
(But) John is sleeping!

The data in (29a) and (29b, c) show that epistemic main clauses prefer a clause-internal C when the complement clause is in a pre-verbal position. The improvement of (29c) with a clause-internal C highlights the topicality of the EC. When conditions such as these are met, eventually the main clause simply drops out of the frame due to extreme epistemicity. As a consequence of pressure from the C-I interface, the main clause becomes entirely bleached of meaning, to the extent that it drops off the sentence frame. The erstwhile EC thus becomes the main clause. The C matrix clauses in Bangla are therefore like epistemic uses of parentheticals in English, where the subject of the EC, rather than that of the main clause, becomes the topic of the discourse:

- (31) a. It'll rain, I believe.
 b. John is asleep, I think. Underhill (1988)

Thompson and Mulac (1991) show that epistemic use correlates with the greater possibility of dropping *that*; correlation is most prominent if the following conditions are met:

- (i) 1st and 2nd person subject are more likely to be used with epistemic
- (ii) parentheticals, as they express the degree of speaker commitments more truthfully

- (iii) *think* and *guess* are the most frequent verbs that occur with epistemic expressions
- (iv) if the main verb occurs with auxiliaries it is more likely to retain the comp
- (v) main clause verb phrases with indirect object are more likely to retain *that*
- (vi) main verb with adverbs retain *that* more than ones without adverbs
- (vii) when the complement subject is a pronoun, *that* is more likely to be used than when it is not, since pronouns indicate high discourse topicality

The following table summarises their findings:

	- <i>that</i> (%)	+ <i>that</i> (%)	Bangla
person			*NSD
1 st	90	10	
2 nd	90	10	
3 rd	64	36	
main verb			NSD
<i>think</i>	91	9	
<i>guess</i>	99	1	
Other	76	24	
aux			✓
with aux	71	29	
without aux	88	12	
indirect object			✓
with indirect object	47	53	
without indirect object	87	13	
adverb			✓
with adverb	65	35	
without adverb	88	12	
subject of EC			NSD
Full NP	79	21	
Pronoun	89	11	

Figure 1

*NSD = No Significant Difference

The following example, which meets all the conditions for *that* retention, shows that C-deletion is not preferred:

- (32) John Sudhu mOdh-ke bolchilo *(je) du-To meye piknik-e
 John only Madhu-dat say.be.past.prog.3 C 2-cla girls picnic-loc
 jabe na
 go.fut neg
John was telling only Madhu that two girls won't go to the picnic.

Note that in (32), we see a 3rd person in the matrix clause; a main verb other than *think*, *guess*, etc.; an auxiliary; an indirect object; an adverb with the main verb; and finally, a full NP as a the EC subject.

An examination of the conditions for *that* deletion (which aid in epistemic meaning of the main clause) reveals that for Bangla, the potentiality of a legal pre-verbal fronting is also dependent on a combination of these factors. This is shown by the following where such fronting improves the grammaticality progressively:

- (33) a. Robin John-ke taRataRi bojhačchilo *(je) Mohon aj aSbe
 Robin John-dat quickly make understand C Mohon today come.fut.3
Robin was quickly making John understand that Mohan will come today.
- b. *Robin John-ke [Mohon aj aSbe] taRataRi bojhačchilo
 c. ?Robin John-ke [Mohon je aj aSbe] taRataRi bojhačchilo
 d. [Mohon je aj aSbe] Robin John-ke (Se-Ta) taRataRi bojhačchilo

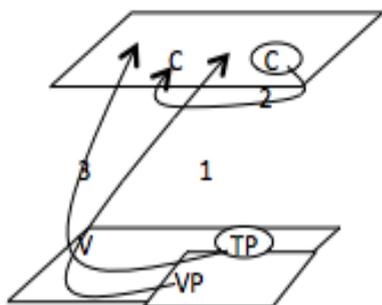
(33b) clearly shows that fronting of the EC without the C is impossible, but (c) and (d) show that the EC can sit in the pre-verbal position if it moves along with the C, with the latter being a non-initial position of the EC. The progressive nature of judgement across (c) and (d) show that as long as the C is re-analysed as occurring inside the EC, moving to the front of the clause is a natural phenomenon. I take this to be evidence in favour of an EC progressively showing main clause behaviour, albeit with the main clause being a part of the EC.

4.3 A Planar Account of C Matrix Clauses

In this section, I will show that a planar account of matrix-C clauses is superior in explaining how the C never gets deleted and is instead reanalysed as a part of the new matrix clause. This demonstration, in keeping with the demonstration of the planar account of the KA and RKA reaffirms the reinterpretation of what the sentential frame must be composed of, i.e., planes. Matrix-C clauses provide yet another strong support for this view of syntactic the frame.

Consider the structure (23), repeated here as (34):

(34)



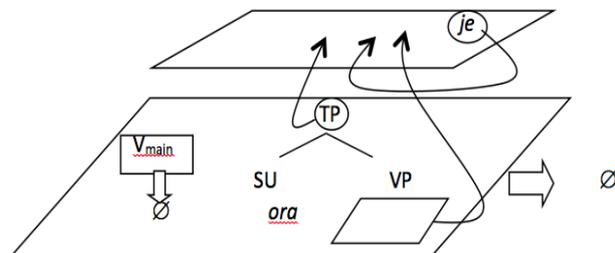
This structure, as noted above, does not involve plane-incorporation. However, we can now derive the matrix-C clauses from this structure without adding any extra mechanism. This is done by simply deleting the place hosting the matrix verb (and the matrix clause subject). This deletion, as discussed above, is facilitated by epistemic bleaching of the contents of the matrix clause. So although there is no plane-incorporation, there is now plane deletion, as VACATE MAXIMALLY applies.

This account has the additional advantage that we now have a ready explanation of why the C of the matrix clause is not deleted along with other material of that clause; C is simply introduced in a different plane (as independently required for other cases). Plane deletion also accounts for the peculiar intonation on the final verb.

Going back to (29), a planar view can now account for the preference for the complementizer *je* to appear clause internally when the complement is fronted. From the point of view of progressive movement to the front, and disappearance of the main clause under epistemic bleaching, we can consider the main predicate (being an epistemic one), *biSSaS kOra* 'to believe', to be deleted after VP-movement followed by TP-remnant

movement takes place. The consequence of interplanar movements of the VP and the remnant-TP, and the intraplanar raising of the C *je*, is felt at the lower plane respecting VACATE MAXIMALLY by deleting the epistemic predicate; the whole lower plane is, in effect, deleted. As in (34), plane deletion is planar representation of bleaching here too:

(35)



Considered from all perspectives, a planar view of matrix-C clauses makes immense sense in terms of capturing the embedded clause metamorphosing into a matrix clause – the presence of C is in fact the strongest evidence in favour of the reanalysis. However, the planar account makes the additional prediction that C survives in the upper plane, a plane introduced by that C itself. The discourse semantics obtained in the meaning of a matrix-C clause, as in (24b), is now captured adequately by realising the discourse plane (introduced by the C) to be the one into which the EC material from the lower plane incorporates.

5 Why a classifier in a copular sentence?

Having looked at one peculiar construction in Bangla and treated it through a planar account, let us consider the other construction that receives a unified treatment under the planar approach. It is sometimes easy to relegate the KA as purely a matter of the SM interface. However, I think there is more to it than routine PF matters. I hope to have demonstrated through the last few sections that the planar account of the KA gives us a superior account of C-internal and C-matrix clauses. In this section I hope to show that the answer posed by the question in the section title lies in a requirement of the C-I interface (that of breaking symmetry and maintaining the duality of semantics) that can be implemented better in a planar view of the KA. Thus, two disparate phenomena like C-internal clauses and copula-less nominal clauses are given a unified treatment by this model. This in turn raises the interesting possibility of whether the two are in fact disparate phenomena at all.

Consider first the fact that the following is ungrammatical in Bangla:

(36) *e boi
 this book
 This is a book.

This is so because we need an abstract representation, and the substantive part (an ‘equal to’ sign); that is, there should be some way to express the thought that *it* represents or stands for *book* but is not *book* itself. The copula in English does the job, but how does Bangla express the thought *This is a book*? Consider the following:

(37) e-Ta boi
 this-cla book
 This is a book.

We can ask, how (or why) is (37) possible? A general classifier *-Ta* (a nominal device) is used with the representation of the thing (*book*) to convey the same thought expressed by a copula in English or Hindi-Urdu. The situation is somewhat like the following:

- (38) a. $X = book$ Intended message
 b. *is* ($X, book$) English, Hindi-Urdu; $X = it/ yah$ ‘this’
 c. *X-def/spec book* Bangla

That is, English and Hindi-Urdu convey the intended message by inserting something between the two nouns (equivalent to an ‘equal to’ sign); Bangla instead achieves this by making one of them more definite or specific.

The interface question that I want to raise here is the following: Why is it the case that a language chooses to use a nominal element (a classifier) to complete a thought? The answer is not so simple. First, syntactically, the copula in Bangla equational sentences is dropped in the present tense. This is merely a syntactic observation, and does not approach the interface question at all. However, the observation, with regard to the requirement of a classifier to aid manifesting a thought, can be approached in a more minimalist manner. In particular, we could ask: (i) is it the case that the classifier is needed to express the distinction between the thing and its representation precisely because the *be* verb can be dropped in certain cases; or (ii) is it the case that the presence of the classifier triggers the deletion of the copula because they are both performing the same function? Given minimalist assumptions, both hypotheses seem quite likely. From the interface point of view, the narrow syntax (the computation to LF) readjusts to break to break the symmetry between the representing and the represented in response to the demand of the C-I interface by insertion of a copula (as in English and Hindi-Urdu) or a classifier (as in Bangla).

The two hypotheses stated in the previous paragraph make the situation complex. It is quite possible that since Bangla already has a well-developed system of classifiers, the system makes itself available for the purpose of ‘distinguishing’ X and Y in so-called equative constructions. On this view, the purpose of the equative is not to equate at all, but rather to rather show the dissimilarity between X and Y. Just because some well-studied language makes a deficient use of the construction by employing an equative copula, we have been primed to think that the purpose of the equative constructions is to show the equality between X and Y.

Given the planar of view of clauses, we are now in a position to hypothesise as follows: if Bangla is a more prominent ‘planar’ language, that is, it seizes the smallest opportunity to view clauses as planar, then it is likely that the moment there arises a possibility of introducing a new plane (for example, when our mind is dealing with two concepts X and Y), it does so. This is carried out by the classifier in so-called equative constructions. That is, the parametric difference between the languages boils down to the availability or lack of enough functional elements to carry out plane-realisation.

On this view, using the copula for an equative is the weaker strategy, and is employed only when the language does not have enough functional heads to carry out plane-realisation. On this view, (ii) (or the more accurate reformulated version below) is more likely to be case: (ii)’ Since classifiers are available to define or to make the noun more specific, the weaker strategy of ‘standing for’ constructions by using the copula is avoided. Thus, ‘break the symmetry’ as a C-I requirement is the most appropriate way of describing a so-called equative construction.

The following is inappropriate as the expression *this is a book*, precisely because it is merely an NP, and thus not a complete thought; it is not a thought chunk (TC) because no plane-introduction can take place as per the planar translation of the KA, since it is not an Event or State:

- (39) e boi-Ta
 this book-cla
 This book.

5.1 Copular Sentences

The minimalist observations raised in relation to the equative constructions above demand that we look at copular sentences in Bangla. Adopting the most popular view of copular sentences as a small clause complement of the predicate *be* (Stowell, 1978), shown in (41) is the structure for the copular sentence in (40). I suggest that if the *be* is unrealised, or is zero, then there is no way to break the symmetry between the elements of the SC (as demanded by the C-I interface). Something else must be introduced to break the symmetry, since if it too symmetrical it will lead to a derivation clash at C-I.

- (40) John ?(Ek-jon) lekhok
 John one-cla writer
 John is a writer.

- (41)
-
- ```

graph TD
 Root[] --- BE[BE]
 Root --- SC[SC]
 SC --- John[John]
 SC --- lekhok[lekhok]

```

If the copula head is filled (as in English and Hindi-Urdu), it breaks the symmetry by inducing raising; if it is empty, then we need to introduce another head (such as the phantom head *W*, as in the KA) in the form of CLA, FOC, or TOP (see Bhattacharya, (1999) for evidence of a Focus head inside the DP) to break the symmetry. One important consequence of this demonstration is that the phantom head introduction of Kayne is now seen as required by the C-I Interface. Thus, breaking of the symmetry is a structural manifestation of the C-I requirement that an NP by itself cannot be a TC; it would then be an illegitimate language-object at that interface. For it to be a minimal TC, it needs to merge a predicate, since *John lekhok* ‘John (is a) writer’ is a headless SC. A legal predicate head that can be merged with an SC is the copula *be* with an equative function. So we have a situation like the following:

- (42) {V [sc X Y]}  
       ∅

An empty predicate head cannot induce raising (either of the subject or the predicate of the SC) to break the SC-internal symmetry to become a TC. The C-I interface now dictates that for this derivation to proceed as a language object, the narrow syntax must employ a different strategy for breaking the symmetry:

- (43) [sc Y Y] → [sc Y+x Y] → (in effect) [sc X Y]

Thus the addition of something else can make the members of the SC dissimilar. I suggest that this ‘something else’ is specificity marking, which can be shown to follow the abstract head introduction in the KA. The triggers that drive movement from inside the SC can be found a minimalist explanation. I will suggest that the CLA is introduced at the Edge and an EF drives the raising of the SC-internal element.

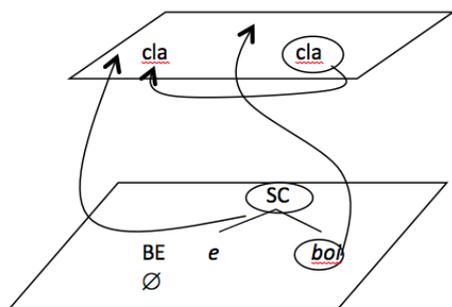
## 5.2 Breaking Symmetry in the Planar View

In this section, I will show that breaking symmetry can be shown to be plane-introduction. That is, the C-I requirement that the members of the SC should not be symmetrical is carried out by the CLA in Bangla, which nevertheless, on par with C in the earlier cases considered, introduces a new plane.

Consider the the copular sentence in (44) and its planar derivation in (45):

- (44) e-Ta    boi  
       this-cla book  
       *This is a book.*

(45)



As in the case of COMP, the functional element CLA introduces a new plane. The sequence of movements is as in the (R)KA: first the SC is weakened by vacating it, followed by F head raising which enables the remnant movement. Note that the set of movements is remarkably similar to earlier derivations, capturing in a way the strength of the planar framework. The lower plane is not deleted, although it follows the VACATE MAXIMALLY principle (unlike in the epistemic contexts as in Matrix-C clauses), due to the presence of null BE, which shows up in past and negative contexts:

- (46) a. e-Ta    boi    chilo  
       this-cla book be.past  
       *This was a book.*
- b. e-Ta    boi    nOY  
       this-cla book neg.be.prs  
       *This is not a book.*

This view will support the existence of expressions such as the following:

- (47) ei    je boi/ boi-Ta!  
       this    C book/ book-cla  
       *Here, (is) a/the book!*

Since the noun *boi* ‘book’ here has a special status (almost like a proper name), it is not a ‘stands-for’ construction, and therefore no SC is generated; rather, a null *be* takes a DP as its complement. The CLA does not introduce a new plane as it comes pre-packed with the N (CLA here does not create a subject-predicate-like information structure divide, and therefore does not introduce a plane); *boi-Ta* comes as it is and no SC is assumed.



The intra-planar movement and the mono-planar structure for these SVO structures are supported by the following:

- (53) a. \*ei je holo boi  
           this c becomes book  
       b. \*ei holo boi-Ta  
           this becomes book-cla

In other words, in Bangla, a potential plane-introducing functional material like a C (*je*) or a CLA (*Ta*) is not legal with these expressions, showing that these are purely mono-planar structures.

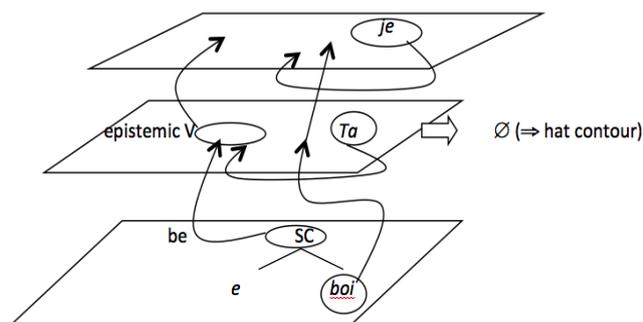
The expression in (54), however, is exactly like the matrix-C clauses with a multi-planar structure and an intonation reminiscent of the matrix-C clauses:

- (54) e-Ta je boi!  
       this-cla c book  
       *As for this, this is a book.*

A plane is deleted but the *be* plane is retained. The derivation is shown in (56):

- (55) a. e-Ta je boi chilo  
       this-cla c book was  
       *As for this, this was a book.*  
       b. e-Ta je boi nOY  
       this-cla c book neg.prs  
       *As for this, this is not a book.*

(56)



As in the case of matrix-C clauses, the epistemicity of the main clause is responsible for its ultimate demise (and the intonational contour), and for and re-emergence of the embedded clause as the only clause:

- (57) a. ami bhablam je e-Ta boi  
           I thought c this-cla book  
       b. \*ami bhablam je ei boi  $\emptyset_{be}$   
       c. \*ami bhablam je ei boi-Ta  $\emptyset_{be}$

Thus, given the similarity of intonation between matrix-C clauses and (54), if we were to reconstruct an earlier stage of the latter, it will still be grammatical (as in (57a)) but not for (47)). That is, the latter two (57b, c) could not have arisen as a result of matrix clause deletion

due to extreme epistemicity. Note also that the derivation in (56) accounts for the topic meaning that (54) obtains, namely, ‘As for X, ...’, through the introduction of the C-plane.

## 6 Conclusions

The plane-representation of the KA, C-internal clauses (the RKA), matrix-C clauses and nominal clauses above show that the embedded C in Bangla indeed is a strong phase head, requiring that clausal complements must be parsed as separate Intonational Phrases (Kidwai, 2011). The observation based on Guha (2011) that *je* in Bangla is a relativiser-turned-complementiser can be also transported into a plane-based account. However, Kidwai’s claim that the Bangla C<sup>0</sup> therefore requires a nominal in its specifier, in order to retain its strong phase character, is not so obvious in this model, since remnants have no particular property of being just nominal.

The plane-based model has certain obvious advantages over this. First, it accounts for the information structural differences that a C-internal clause obtains. Secondly, remnant movement accounts for non-constituency of all that finally appears to the left of the C. In addition, it has a natural way of providing a uniform account of C-internal, matrix-C and nominal clauses. Finally, the plane-based model can easily be extended to the following case (where the clause-internal C is embedded deeper, appearing after the object inside the EC), by opting for local, intra-planar object movement to satisfy C’s discourse properties (obtaining cleft focus semantics for the shifted object) followed by remnant movement of the TP as in the derivation (23) (for RKA) above:

- (58) [kal-rat-e ma phOl je kheyechen] Sudha jane  
 Last-night-loc mother fruit C eaten.hon Sudha knows.3  
*As for the fact that it was fruit that mother ate last night, Sudha knows.*

The fact that this requires no additional mechanism to be derived supports the planar view of clauses in general. Furthermore, no special head needs to be posited to account for the focus driven object shift in this example; the focus-semantics is determined simply as a property of the type of inter-planar movement in the upper, discourse related plane of the clause.

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# Pied Piping in Cognition \*

*Richard Hudson*

## **Abstract**

The paper offers an analysis of pied piping within the theoretical framework of Word Grammar. This framework combines cognitive linguistics with dependency grammar, so it assumes that the full power of domain-general cognition is available for syntax and that phrasal categories are not needed. Instead, syntactic structure is a network of relations between individual words which combines dependencies with the ‘landmark’ relations that determine word order. To handle the special characteristics of pied piping, the analysis includes a single special relation, ‘pipee’, which links the piper (the *wh*-type word) to the word which replaces it in the landmark structure. The analysis is applied in detail to English, and then compared with previous analyses and extended to accommodate both the pied piping with inversion found in Meso-American languages, and the boundary markers found in other languages. The main things missing from the analysis are explanations for the restrictions on pied piping in free relatives, and the social restrictions on ‘quiz interrogatives’.

*Keywords:* pied piping, Word Grammar, cognitive linguistics, dependency grammar, networks

## **1 Introduction**

As a serious challenge for any theory of syntactic structure, ‘pied piping’ has enjoyed a great deal of attention from theory-builders since it was first identified and named (Ross, 1967), so we know how it works both in English and in a number of other languages. A typical example is (1), where *which* is said to ‘pied pipe’ the preposition phrase *in which* into a position which is normal for *which* but not for a preposition phrase.

- (1) This is the book in which I found it.

Even the ‘pied piping’ terminology is widely agreed, though not universal. On the other hand, in spite of widespread agreement on the facts, our theories of syntax are as divided on pied piping as on other matters, and the dominant HPSG theory based on feature percolation (Pollard and Sag, 1994) has been challenged by both Optimality and Minimalist alternatives (Broadwell, 1999; Cable, 2012). The main differences between the alternatives lies in their theoretical assumptions about the apparatus needed for syntax, and in the special apparatus that they introduce for pied piping, rather than in their ability to handle the data. But what unites them is the phrase-structure apparatus that they all assume for linguistic structure.

This paper assumes a very different theoretical foundation, Word Grammar, and shows how it can be applied to pied piping.<sup>1</sup> Word Grammar (Duran-Eppler, 2011; Gisborne, 2010; Hudson, 1984; Hudson, 1990; Hudson, 1998; Hudson, 2007; Hudson, 2010) is a version of cognitive linguistics, so its most controversial theoretical assumption is that we use the same mental apparatus for learning and processing language structure as for ordinary everyday cognition. Pied piping is a particularly good testing ground for this theory because it is such a

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\* This paper has benefited from discussion with And Rosta and Nik Gisborne. An earlier theory of pied piping, which the present one supersedes, is presented in Hudson 2013b.

<sup>1</sup> An earlier theory of pied piping, which the present one supersedes, is presented in Hudson (2013b).

peculiarly ‘linguistic’ pattern, apparently as far removed from everyday cognition as syntax can be.

Apart from the cognitive orientation, however, Word Grammar also assumes dependency structure, which is just as controversial within cognitive linguistics as it is in mainstream American and European linguistics. For instance, in (1) this theory does not recognise *in which* as a preposition phrase; instead, it just recognises a dependency from *in* to *which*, and another from *found* to *in*. Once again, the challenge of pied piping is special because the apparatus of phrase structure plays such an important part in other analyses.

The paper starts by building on the insights of earlier work (section 2), and then introduces the theoretical apparatus needed for pied piping (section 3). The main body of the paper is a fairly full discussion of English pied piping (sections 4 to 6), but the survey of how pied piping relates to general cognition also considers data from other languages (section 7).

## 2 Insights from other approaches

Most discussions of pied piping in English limit themselves to the pattern found with *wh*-words – i.e. relative and interrogative words – and this paper has the same focus. What these examples have in common is that a phrase containing a *wh*-word as a dependent, rather than as a head, occurs in a position where the normal rules allow a *wh*-word.

### 2.1 Challenges

For instance, take the following examples of interrogative clauses (Huddleston and Pullum 2002: 910):

- (2) In which drawer do you keep the bank statements?
- (3) What size shoes do you take?
- (4) How big a hole did it make?

In (2), the interrogative determiner *which* stands, as expected, at the start of the clause, but so does the whole of the underlined phrase *in which drawer*. This is not expected; the only reason for this phrase being in this position is that it contains the word *which*. Crucially, *which* is not the head of the phrase, so the whole phrase exceptionally takes its position from a non-head word inside it. The same is true of the other two examples.

It could be objected that preposition phrases can be freely topicalized, with or without a *wh*-pronoun:

- (5) In this drawer I keep the bank statements.

But this explanation clearly fails for questions, and fails even more spectacularly for relative clauses such as (6):

- (6) This is the drawer in which I keep the bank statements.

Here pied piping is the only possible explanation for the position of *in which*, there being no grammatical alternative without a *wh*-pronoun:

- (7) \*This is the drawer in it I keep the bank statements.

The main theoretical challenge of pied piping, therefore, is the mismatch between linear position and dominance: in terms of dominance, the head of *in which drawer* is the preposition

*in*, but it is the *wh*-word *which*, not *in*, that determines the linear position of the whole phrase. This conflicts with the very general principle that a phrase's position is determined by its head word. For instance, the phrases *very big* and *about linguistics* can both modify the noun *book*, but their position before or after *book* is determined by their head's word class, giving *very big book about linguistics*, but not *\*about linguistics book very big*.

Another theoretical challenge is to explain why pied piping applies to words such as our *wh*-words, and only to these. The obvious peculiarity of these words is their dual linkage. For example, in *the book which I bought*, the relative pronoun *which* has 'internal' links within the relative clause (as the object of *bought*), but also has 'external' links to its antecedent noun *book*. The same is clearly true of interrogative *wh*-words in subordinate clauses, as in *I wonder what happened*, where *what* is internally linked to *happened* but also externally linked to *wonder*. Arguably, even main-clause interrogatives have a similar combination of internal and external links, although the external link is purely semantic. The second challenge, therefore, is to explain how the dual internal/external linkage of *wh*-type words relates to pied piping.

## 2.2 Theory

Until recently, the most popular explanation for the mismatch between linear position and dominance has been 'feature percolation', in which the 'WH' feature (actually, either REL or QUE) of the *wh*-word passes up to the node representing the entire phrase. This is an attractively simple explanation for the word-order mismatch, especially given the important role played by feature-passing in the HPSG treatment of other phenomena. On the other hand, this analysis also has major costs, not least of which is the fact that feature percolation from a non-head to its containing phrase exists solely for the sake of pied piping.

Another cost is in the semantics of the percolated feature. REL and QUE are defined not only by their position, but also by their meaning; REL provides an index for the relative pronoun binding it to an antecedent noun (Pollard and Sag, 1994, pp. 208-214). However, if this index percolates up to the pied-piped phrase, the semantics fails. For example, in (6) *the drawer* is the antecedent of *which*, not *in which*. This is even clearer in an example like (8):

(8) This is the drawer whose key I lost.

Here *the drawer* is the antecedent of *whose*, but the pied-piped phrase is *whose key*, referring to the key, not the drawer. Such examples show that the semantics is out of step with the word order: even though *whose* shares its position with *key*, it does not share its semantics. Consequently, pied piping must find some way to separate the semantic consequences of *wh*-words from their consequences for word order.

Similar objections apply to a more recent Minimalist analysis which includes extra syntactic structure containing an invisible operator (Cable, 2010) which affects word order but has no effect on meaning. The best evidence for this operator comes from a minority of languages in which it is visible, so the analysis depends heavily on controversial assumptions about universal grammar. On the other hand, the analysis also points to the possibility of an abstract structural peculiarity of pied-piped structures which triggers the special word order (as in the analysis to be developed below).

Another recent analysis in the Chomskyan tradition presents pied piping strictly as a matter of word order, without any other implications for meaning or syntactic structure (Heck, 2009). For this analysis, the challenge is to find a way to tweak the structure and the usual movement rules so that they move the entire phrase along with the *wh*-phrase that it contains. The important insight here is that pied piping is merely a matter of word order. The strict distinction between word order and the rest of phrase structure is of course reminiscent of the

ID/LP split in the GPSG literature, in which ‘immediate dominance’ was separated from ‘linear precedence’ (Gazdar and Pullum, 1981).

Alongside the formal analyses in the PSG or Minimalist traditions, there is an important contribution that employs Optimality Theory (Broadwell, 1999; Broadwell, 2006). We consider the relevant data in section 7, but the important insight to be noted here is the idea that syntactic patterns, including pied piping, are due to independent but interacting constraints, such as the requirement that *wh*-words should stand at the start of the clause. It is a short step from this kind of analysis to one which links these constraints to functional benefits for speakers and hearers, and raises questions about why pied piping exists in so many languages.

### 2.3 Description

Meanwhile, more descriptive studies have produced statistical evidence to support the idea that pied piping is more academic or formal than its stranded counterpart (Hoffman, 2008). As we might expect, private conversations and correspondence strongly favour stranding over pied piping, in contrast with more formal varieties where the balance is reversed. This comparison is possible in English because, at least with preposition stranding, we have a free choice between the two patterns, as in (9) and (10):

- (9) This is the drawer in which I keep the bank statements.  
 (10) This is the drawer which I keep the bank statements in.

In languages which forbid stranding, of course, there is no choice; this makes it much harder to assess formality. But why should pied piping be more formal? Is it simply a matter of a historical link between the Romance pied piping and formal learning, or is stranding inherently easier and more appropriate for casual conversation? If the latter is indeed the case, is there any counteracting benefit of pied piping? These questions bring us back to the functional motivation for pied piping.

One last descriptive fact to emerge from earlier work is the difference, mentioned earlier, between different kinds of *wh*-construction: preposition pied piping is much freer in relative clauses than in interrogative clauses. The following examples (from Huddleston and Pullum (2002), p. 1040) illustrate the freedom found in relative clauses, and especially in non-restrictive relative clauses:

- (11) the curtain behind which Kim was hiding  
 (12) She’s just sat her final exam, the result of which we expect next week.  
 (13) They will be involved in several projects, one of the most important of which will be to find ways to use the new superconductor in chips that can provide the brains of a new generation of supercomputers.  
 (14) The many varieties of mammalian skin secretions perform a wide range of functions, prominent among which is sexual attraction.  
 (15) I became disturbed by a ‘higher criticism’ of the Bible, to refute which I felt the need of a better knowledge of Hebrew and archaeology.  
 (16) They take a rigorous examination, passing which confers on the student a virtual guarantee of a place at the university.

In free relatives, however, preposition pied piping is hardly possible at all:

- (17) I enjoyed what I filled my time with.  
 (18) \*I enjoyed with what I filled my time.  
 (19) \*I amused myself with what I filled my time.

These distinctions are normally described in terms of different clause types (interrogative clause, etc). However, since each clause type allows a different range of *wh*-pronouns, the distinctions could be made equally well in terms of word classes: interrogative pronoun, relative pronoun, and so on through finer subdivisions.

To summarise this brief survey, earlier analyses have contributed several important insights to our understanding of pied piping:

- i. Pied piping is primarily a matter of word order, completely separated from other structural issues such as classification and meaning.
- ii. But there must be some structural connection between the *wh*-word (the ‘piper’) and the node representing the entire pied-piped phrase (the ‘pipee’), whether this is described in terms of a percolated feature or an invisible operator or by some other means.
- iii. The structural analysis may enable a functional explanation for the existence of pied piping, and also for the choice, in preposition phrases, between pied piping and stranding.
- iv. The analysis must differentiate different types of *wh*-constructions (or different kinds of *wh*-word), as well as providing a single unifying explanation for their similarities.

### 3 Towards a cognitive analysis

Suppose our aim is to produce a cognitively plausible account of pied piping, with the minimum of special cognitive apparatus. Clearly the theoretical minimum is none at all, so our aim should be to explain pied piping without any special apparatus, and only to import extra assumptions or apparatus when we’re sure that ordinary cognition does not offer what we need. One of the claims of a cognitive theory such as Word Grammar is that, in fact, no extra apparatus is ever needed; but this claim clearly requires an audit of relevant apparatus which is readily available in ordinary cognition. Three items seem particularly relevant to pied piping, so this section will introduce them, and later sections will explain how they apply to pied piping. They are listed below:

- i. Networks
- ii. Default inheritance
- iii. Landmarks

#### 3.1 Networks

The idea that knowledge forms a network is uncontroversial. The clearest experimental evidence comes from priming experiments, which show that activation (manifested in mental accessibility) spills over to ‘neighbouring’ concepts in a way that can only be explained if the concepts concerned are directly linked in a network. Everyday experience of associations supports the idea that concepts are organised in a network. Consequently, cognitive theories of language often present language as a network of objects such as constructions or attribute-value matrices.

However, the ‘network notion’ takes this idea even further, by explaining all the properties of one concept as nothing but its links to other concepts (Reisberg 2007). In this view, concepts are atoms without any inherent structure or content, rather than complex ‘boxes’ of information (such as constructions or lexical entries). Without this notion we might think of a concept such as ‘dog’ as a complex collection of information, consisting of special features such as size, function, and so on; the network idea would be relevant to the relations between

these complex boxes. In contrast, the network notion merges the concept's 'internal' features with its external relations to other concepts, so that the atom labelled 'dog' is defined by its relation to other atoms such as 'bark', 'mammal', 'pet', 'kennel', 'size' and so on, and is also part of the definition of each of these other atoms. This merger has the great advantage of removing the need for a distinct set of 'features' (which threaten an infinite regress because they too need some kind of definition).

Word Grammar (following Stratificational and Neurocognitive Linguistics – see Lamb (1966); Lamb (1998)) accepts the network notion, so that each unit (e.g. word) is shown simply as a node whose content is provided by its relations to other units in the network. Figure 1 illustrates this idea with a simplified view of the language network around *likes*, the third-person singular of the verb LIKE<sub>v</sub>, which also shows the homonymy of this verb with the preposition LIKE<sub>p</sub>. This diagram also introduces two notational conventions of Word Grammar: the small triangle means 'isa' (so LIKE<sub>3sg</sub> isa both LIKE<sub>v</sub> and 3sg), and ellipses indicate relational concepts, in contrast with the non-relational entities in rectangles. In words, {like} is the realization of both LIKE<sub>v</sub> and LIKE<sub>p</sub>, {likes} is the realization of LIKE<sub>3sg</sub>, and x is the object of LIKE<sub>v</sub>.

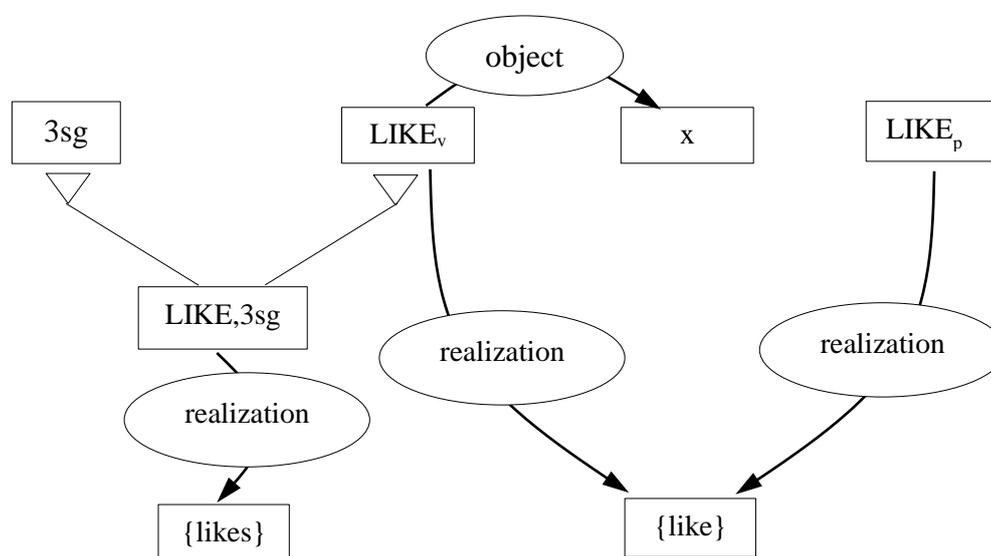


Figure 1: A network for likes

The theoretical claim behind this network notation is that, because language is a kind of knowledge and knowledge forms a network, language too is just a network, and nothing else. There are no rules, no processes, no principles, so it's a single integrated network all the way down. In short, Word Grammar is a constraint-based theory of language structure like HPSG, LFG and others, but with a single subnetwork (within the super-network of cognition) which shows both the interrelations among 'linguistic items' and their internal structures. And, of course, one aim of this article is to demonstrate that such an impoverished formal apparatus can accommodate the complexities of pied piping.

### 3.2 Default inheritance

Like many other cognitive theories, Word Grammar assumes that the underlying logic of thought is default inheritance – a process whereby stored patterns are inherited by tokens of experience, and which allows defaults to be overridden by exceptions. For instance, if we hear the form {likes}, we inherit the fact that it is the realization of LIKE<sub>3sg</sub>, which in turn isa 3sg and LIKE<sub>v</sub>, so it has an object, and so on. Word Grammar avoids the familiar problems of non-

monotonicity by a simple assumption: inheritance happens only when new nodes are first created during processing, and it works strictly bottom-up, meaning that the first value inherited is always the most specific, and can never be overridden by a more specific value (Hudson, 2015). Thus, inheritance is part of the process of enriching newly created nodes for utterance tokens, rather than a freely available process for enriching the established network.

One immediate consequence of this assumption, when applied to language, is that because the structure of an utterance is inherited from a network, it too must be a network (albeit, of course, a mere fragment of the total stored network), with the full formal freedom of a network. In particular, individual nodes can freely relate to one another (as they do outside language, for instance, in a social network); there is therefore no formal reason for assuming the very limited geometry of phrase structure which recognises only part-whole relations. Consider the two consequences of applying this principle to a sentence such as (20):

(20) Small children were playing outside.

First, there is no need for an NP node for *small children* to show that they belong together semantically, because general cognition allows individual items (such as people) to be related directly to one another. Applied to this sentence, this means that *small* can be related directly to *children* by a **dependency** which shows that *small* modifies the meaning of *children*. Moreover, since general cognition allows us to create concepts as needed, this modification creates a distinct node for the modified *children*, as opposed to the *children* node inherited directly from the grammar. So although we seem to have just one node for *children*, we actually have two: the token *children* as first inherited, meaning ‘children’, and the ‘**sub-token**’ *children'*, resulting from the modification by *small* and meaning ‘small children’. This sub-token is very similar to an NP node, in that it carries the meaning of the two words combined and reflects a direct dependency relation between them, but crucially *children'* has exactly the same syntactic classification as *children*, rather than a distinct ‘phrasal’ classification. In short, dependency structure provides all the structure needed, without invoking phrase nodes as well. In concrete terms, the subject of the verb is not the phrase *small children*, but the sub-token *children'*.

Second, *children'* is not only the subject of *were*, but (thanks to raising) also of *playing*. This double dependency is like the HPSG notion of re-entrance, where a single item is the value for two attributes. But once again, there are reasons for thinking that it is not a single item that is involved in two dependencies, but a different one in each. This is because each dependency provides a different set of inheritable properties, including word order: as subject of *were*, *children'* should stand just before *were*, but as subject of *playing*, it should be next to *playing*. To explain why this conflict has to be resolved in favour of *were* (and more generally, in favour of the higher verb), we can once again invoke two distinct nodes, the sub-token *children'* and the sub-sub-token *children''*, with an ‘isa’ link between them:

- i. *children''* is subject of *were*, and isa *children'*
- ii. *children'* is subject of *playing*.

The properties of *children''* override those of *children'*, just as the latter’s override those of *children*. Similar arguments apply to the other words, so the full analysis for this sentence is as shown at the top of Figure 2, where the lower diagram is a simplified version which ignores extra word tokens.

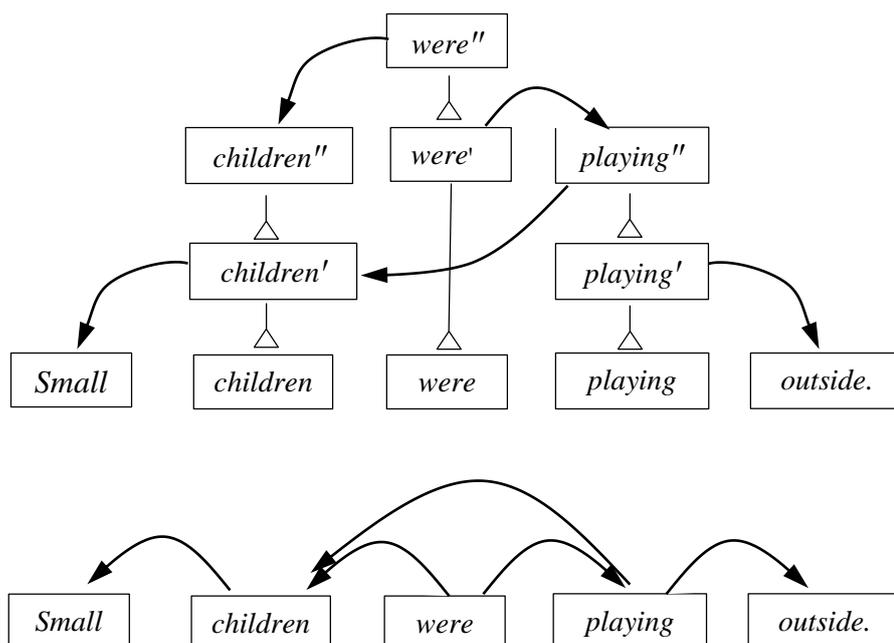


Figure 2: The syntax of modification and raising

In prose, Figure 2 says that *small* modifies *children*, turning it into a distinct token concept *children'* with the meaning 'small children' and acting as the subject of *playing''*. Similarly, *outside* turns *playing* into *playing'*, which *children'* turns into *playing''*, so that it means 'children playing outside'. As for *were*, it combines with *playing''* to produce *were'*, which in turn is modified into *were''* by *children''* to carry the meaning of the entire sentence, 'Small children were playing outside'. The similarities to Categorical Grammar are obvious, but instead of composing words to produce phrases, we compose them to produce extra word tokens. The difference is subtle, but important because it involves default inheritance rather than composition, and therefore allows overriding.

### 3.3 Landmarks

Like networks and default inheritance, landmarks are an obvious part of ordinary cognition. They play an important part in the semantics of Cognitive Grammar (Langacker, 2007), where location is described in terms of a landmark and a trajector (the thing located); for instance, *the book on the table* locates the book (the trajector) in relation to the table (the landmark). However, Word Grammar extends their use into syntax, where they are the main mechanism for handling word order. After all, the mechanism for expressing the meaning of *Monday is before Tuesday* could well be relevant too for describing the order of words in *Monday, Tuesday, Wednesday*.

Landmarks are an important part of any network model for the simple reason that a network has no left-right dimension. Linguistics has always rested heavily on our writing system, which uses this dimension for linear order, but the fact is that linear order is a relation, just like the other relations of syntax. A diagram such as Figure 2 implies this relation, but does not show it explicitly. We know from experimental psychology that the linear order of a string of words (or other objects) is separate from their individual identities, so we can treat a word's position as one of its properties, along with its class membership, its realization, its dependents, its meaning, and so on.

Linear order in a network seems to require two different kinds of relation. At the most basic level, we need a ‘next’ relation between adjacent words in a string: in the string *Monday, Tuesday, Wednesday*, the word *Tuesday* is the ‘next’ of *Monday*, and in *Small children were playing outside*, each word is the ‘next’ of the word before it. This relation is certainly needed in morphology and phonology in order to explain, for example, that the word AN is realized as {a} or {an} according to whether its ‘next’ begins in a consonant or a vowel, as in *a pear* and *an apple*.

Alongside this low-level relation, we also need the more abstract ‘landmark’ relation, in order to allow general ordering constraints, since these rarely apply only to adjacent items. Instead, we need generalizations such as “A verb’s subject stands before it” or even the very general “A word’s dependent stands near to it”. In each of these generalizations, one word is treated as the landmark, the fixed point, and the other as the trajector, the item that takes its position from the landmark; this results in an asymmetrical relation, as in the case of a syntactic dependency. Indeed, many dependencies are defined in part by a landmark relation in which the ‘parent’ word (the word on which it depends) is the landmark and the dependent is the trajector.

The decision to treat word order in terms of ‘next’ and ‘landmark’ has important theoretical consequences. For one thing, it means that the syntactic structure of a sentence can be a true network which does not rely on the left-right dimension – although for purely practical reasons of presentation, the networks are easier to read if we can read them from left to right. More importantly, if a word’s linear position is a property of that word, the position can be inherited by the usual mechanism of default inheritance. By default, a word’s parent is also its landmark, so landmark relations can be inherited from dependency relations; however, like any other default, this can be overridden – exactly what we need in order to explain pied piping.

A further consequence of recognising ‘landmark’ as a relation is that relations are a type of concept, so they can be subclassified; this means that the general ‘landmark’ relation can be subdivided into ‘before’ and ‘after’. For example, although a verb is the landmark for all its dependents, it is the ‘before’ for its subject and the ‘after’ for its object; e.g. in *John loves Mary*, *loves* is both the landmark and the ‘before’ of *John*.

It will be helpful to have a notation for syntax which allows us to combine landmark relations with dependency relations. There is no established convention for this in Word Grammar so we now introduce the convention of writing all dependencies above the words and all landmark relations below them. The convention is illustrated (with simplified dependencies) in Figure 3:

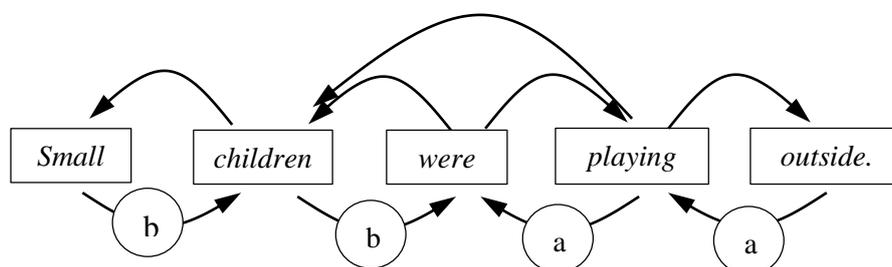


Figure 3: Landmarks combined with dependencies

Notice that, in general, each arrow above the words in Figure 3 is paired with an arrow below the words that points in the opposite direction; this is because the former point towards the dependent, but landmark arrows point towards the dependent’s parent. Exceptionally, the dependency arrow pointing from *playing* to *children* (or more accurately, from *playing* to *children*) has no paired landmark relation; this is because, by default inheritance, the landmark

link from *children* to *were* overrides it. This possibility of overriding default landmarks will provide the mechanism needed for pied piping.

The distinction between landmarks and dependencies is important because it is the landmarks, not the dependencies, which define the phrases that are continuous (or, in dependency terminology, ‘projective’). In Figure 3, *small children playing outside* is a dependency-based phrase because both *children* and *outside* depend on *playing*; it is not a landmark-based phrase as it is interrupted by *were*. In formal terms, landmark arrows never intersect each other, in contrast with dependencies, which often do (we shall see examples of this in later diagrams). This ban on intersecting landmarks has an easy non-linguistic explanation: the same is true of landmarks in general cognition. According to the Best Landmark Principle (Hudson, 2010, p. 53), the best landmark for an object is the nearest object which is more prominent. Given a row of objects A B C, if the best landmark for A is B, then A cannot be the best landmark for C; after all, B is both more prominent than A, and closer to C. For example, if my socks are by the chair and my shirt is on the chair, we would not use the shirt as the landmark for saying where the socks were. Given a longer row of objects A B C D, there is no situation in which landmark links could intersect; that would necessarily mean that some object was preferring a more distant landmark over a nearer one.

#### 4 English preposition pied piping

We are now ready to explain the pied piping found in examples like (1), *This is the book in which I found it*.

##### 4.1 Mutual dependency

On the way to this explanation we must review the Word Grammar analysis of *wh*-constructions such as *wh*-interrogatives and relative clauses, so we start with a very simple example:

(21)        What happened?

The dependency structure is unexpectedly complicated. One thing is clear: *what* is the subject of *happened*, so *what* depends on *happened*. However the converse is almost equally clear: that we expect *what* to introduce a clause, or (in dependency terminology) its valency includes a finite verb. This means that *happened* must be the complement of *what* – in short, this is a clear case of mutual dependency, which modern grammatical theories, whether based on phrase structure or on dependency structure, assume is impossible; it is, however, accepted in Word Grammar, as it clearly exists outside language (Hudson, 1990, p. 119).

However, there may be an intermediate position between the rejection of mutual dependency and its acceptance. This is because of the extra flexibility provided by sub-tokens. Given this assumption, *what* is the subject of *happened'*, but when the latter depends on *what* it creates a sub-token *what'*, so it is *what'* rather than *what* itself that *happened'* depends on. If this is right, we seem to need a structure like that in Figure 4. Notice that the landmark links (below the words) are also mutual, and both require the same order, with *what* before *happened*. Strictly speaking, these links apply to the sub-tokens, but our notation prevents us from showing this.

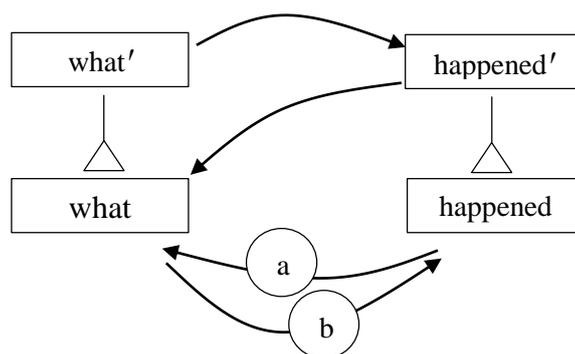


Figure 4: Mutual dependency

## 4.2 Extraction

Next we consider extraction, where the *wh*-word is moved out of its default position by being attached as a preceding ‘extractee’ to the finite verb, as in (22):

(22) What did you find?

In the Word Grammar analysis, *what* depends (as object) on *find*, but it is also the ‘extractee’ of *did*. Each of these relations defines a different token of *what*: the object *what* and the extractee *what'*. The conflict between their properties, including their expected positional properties, is resolved by the fact that *what'* isa *what* in the inheritance hierarchy. The structure, ignoring all other sub-tokens, is shown in Figure 5. The main point of this example is that the default position of *what* after *find* is overridden by that of *what'* before *did*, giving *What did ...* rather than *... find what*. In all other respects, however, the dependency of *what* on *find* is exactly the same as it would have been in a non-extracted example, such as *I found it* (we might also note that *you* takes its position from *did* rather than *find*, although thanks to raising it depends on both; the explanation would involve the same overriding mechanism, but is not directly relevant here).

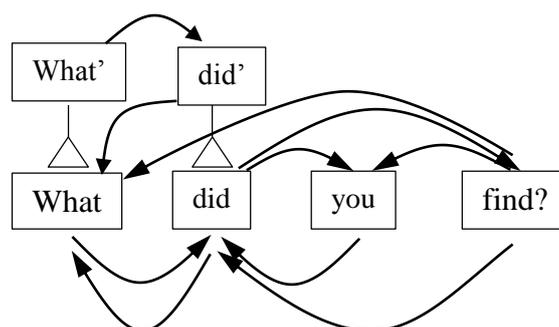


Figure 5: A simple *wh* extraction

## 4.3 Pied piping

4.3.1 *Pied piping in interrogatives.* Returning to pied piping, we start with a pied-piped interrogative:

(23) With whom do you live?

This is just like the previous example, except that it is *with* rather than *whom* that takes its position from *did*, thereby overriding its default position after *live* (as in *I live with Jane*). Yet it is clearly *whom*, rather than *with whom*, that is extracted; after all, a *wh*-question needs to start with an interrogative pronoun, not a preposition phrase, and semantically the question is about the referent of *whom* (rather than of *with whom*), so a good answer would be simply *Jane*. In short, the dependency structure is, in fact, exactly the same as in the stranded equivalent:

(24) Who do you live with?

As noted in section 2, pied piping is strictly a matter of word order, and nothing else. When reading the two dependency structures shown in Figure 6 it is important to bear in mind that, in a network, these two structures are topologically identical and indistinguishable.

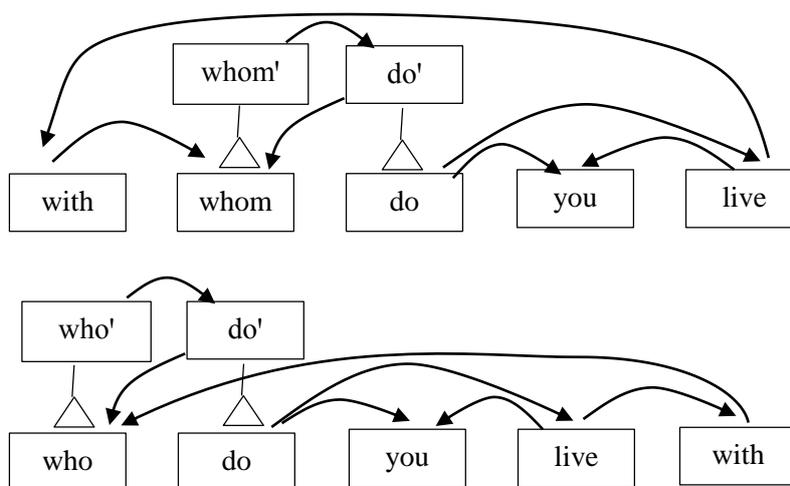


Figure 6: Two identical dependency structures with different word orders

The question, therefore, is how to explain the different positions of *with*. What seems to be happening in the pied-piped example is that *with* replaces *whom* in the landmark structure; *with*, instead of *whom*, takes *do* as its landmark, and *with*, instead of *whom*, also acts as landmark for *do*. More generally, this is possible because *with* is the parent of *whom*; however, this is equally true whether or not pied piping applies, so we need an additional trigger for pied piping which is not part of the regular dependency structure. Since it is *whom* that permits pied piping and controls it, the trigger must be a special relation between *whom* and *with*. The obvious name for this relation is the term introduced earlier, ‘pipee’ (meaning ‘what is pied-piped’); *with* is the pipee of *whom*. Although this is neither a dependency nor a landmark, we can freely add it to the analysis because the latter is just a small part of the total cognitive network which already includes many different kinds of relations. The ‘pipee’ relation is not the only such additional relation; as Rosta (2005) argues, a more general ‘surrogate’ relation may be involved, not only in pied piping, but also in a range of constructions such as the optional *that* which introduces subordinate clauses, and degree modifiers such as *so* in *so big a house*.

With this addition, then, the complete analyses for our two interrogative examples are shown in Figure 7, where the crucial relations in the pied-piped structure are shown as dotted lines.

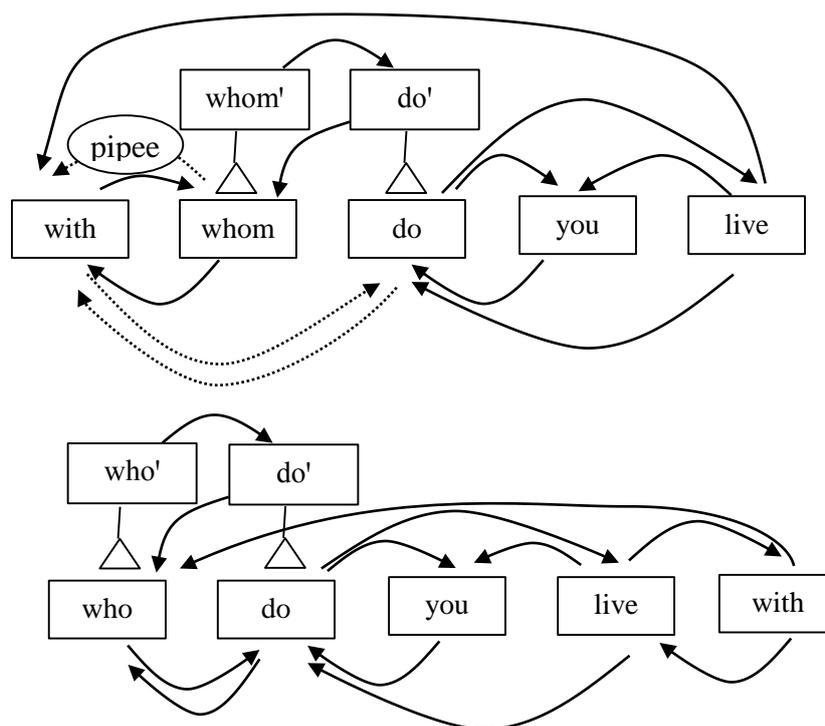


Figure 7: Pied piping versus stranding

We now have the full apparatus needed for pied piping:

- i. the ordinary dependency structure, in which dependency relations are properties of word tokens.
- ii. the landmark structure which treats linear order as a property of word tokens.
- iii. the isa relations between tokens and sub-tokens which resolve conflicts, including conflicts of linear order.
- iv. the special ‘pipee’ relation from a *wh*-word to the word which replaces it in the landmark structure.

This analysis extends easily to other kinds of interrogative such as our original example, (2): *In which drawer do you keep the bank statements?* The only relevant difference is that the *wh*-word is the determiner *which*, rather than the pronoun. As it happens, Word Grammar treats determiners as heads (Hudson, 2004), so *which* is directly linked to the preposition, just as in the *with whom* example; we shall also consider examples below in which this is not the case.

4.3.2 *Pied piping in subordinate interrogatives.* Subordinate interrogatives such as (25) are slightly more complicated, because the interrogative pronoun has an additional dependency:

(25) I wonder what she wants.

In this case, *what*, or rather its sub-token *what'*, must depend on *wonder* as well as on *wants*, because the latter requires an interrogative word such as *what*. Moreover, *wonder* must be the landmark of *what'* because the latter, and the clause it introduces, takes its place among the higher verb’s dependents; this can be seen in (26) where *what she wants* separates *wonder* from its adjunct *because she looks hungry* (the cause of the wondering, not of the wanting).

(26) I wonder what she wants because she looks hungry.

This landmark link from *what* to *wonder* explains the order *wonder ... what*. However, it also removes the existing explanation for *what ... wants*. If *wonder* is the landmark of *what*, and a word may only have one landmark, this relation must override the other potential landmark of *what*, the lower verb *wants*. In that case, why must *wants* follow *what*? Fortunately, the mutual dependency mentioned earlier offers an explanation: as shown in Figure 8, *wh*-words are mutually dependent with their complement verb, so (in a main-clause interrogative) *what* must be the landmark of *wants* as well as the other way round. Both landmark relations guarantee the same order (*what ... wants*), so the order persists even without one of the landmarks.

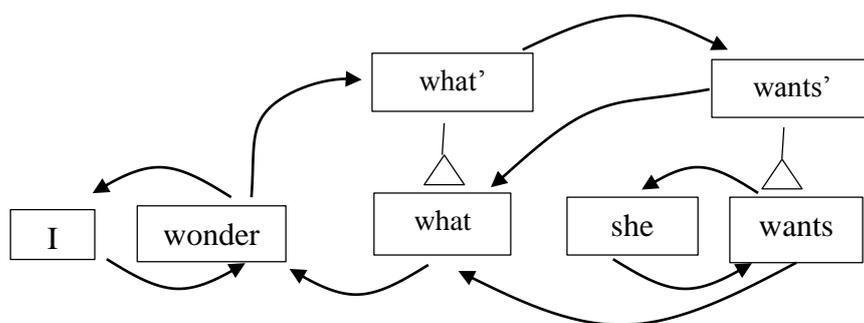


Figure 8: A subordinate interrogative without pied piping

This analysis is confirmed by a curious difference of word order between main-clause and subordinate interrogatives: an adjunct may be fronted before the *wh*-word in a main clause, but not in a subordinate clause (Hudson, 2003). For example, compare the following:

- (27) Tomorrow where shall we meet?  
 (28) \*I wonder tomorrow where we shall meet.

In (27), *tomorrow* is a semantically coherent adjunct of *shall*, but this interpretation is not possible in (28). The difference can be explained in terms of the Best Landmark Principle explained above. In the main clause, *tomorrow* takes *shall* as its landmark, and so does *when*. In the subordinate clause, however, *when* has *wonder* as its landmark; *tomorrow* therefore cannot take *shall* because the two landmark links would intersect.

The same kind of analysis applies to a pied-piped example such as (29) giving the structure in Figure 9, where once again the heavy dotted lines show the pied piping of *with* and its effect on word order.

- (29) I wonder with whom she lives.

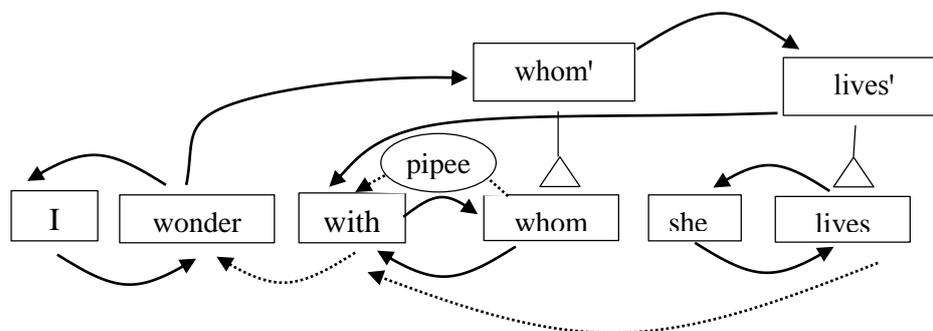


Figure 9: Pied piping in a subordinate interrogative

4.3.3 *Pied piping in relative clauses.* Subordinate interrogatives lead comfortably into relative clauses, which have very similar syntactic structures except for the much greater freedom in pied piping discussed in more detail below. Here too the *wh*-word has an extra dependency external to the subordinate clause; and here too, the *wh*-word has the external parent as its landmark. Take, for example, the stranded equivalent of our first example:

(30) This is the book which I found it in.

Here *which* is an adjunct of the antecedent, *book*, but it is also the complement of *in* and the extractee of *found*. As far as landmarks are concerned, *book* is the landmark of *which*, overriding both *in* and *found*; but the order *which* ... *found* is still guaranteed because *which* is the landmark of *found* (see Figure 10).

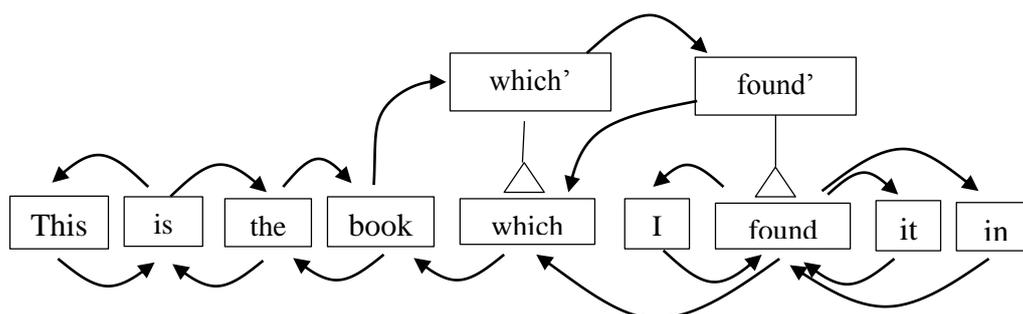


Figure 10: A relative clause without pied piping

As with interrogatives, pied piping is permitted by the ‘pipee’ relation, so we start with a simple example where a single preposition is pied-piped, our (1): *This is the book in which I found it*. Here the pipee is *in*, so it is *in*, rather than *which*, that has *book* as its landmark and provides the landmark for *found*. The structure is shown in Figure 11:

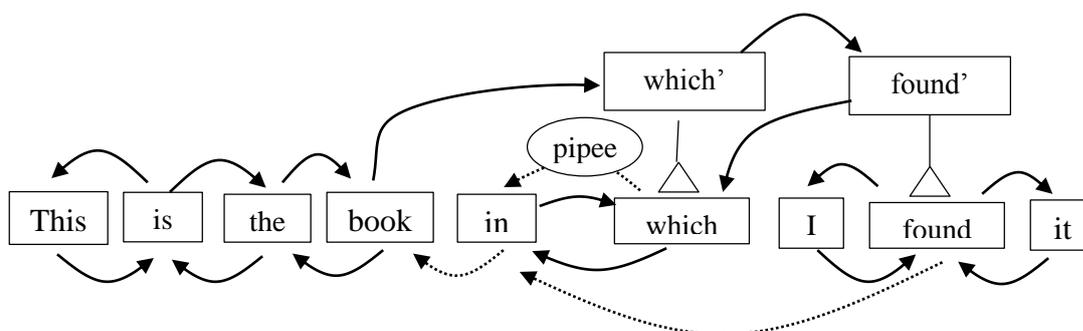


Figure 11: A relative clause with simple preposition pied piping

The main point of this section has been to introduce the relation ‘pipee’ and to show how it extends the basic analyses of interrogative and relative clauses to include elementary prepositional pied piping. The next section considers other and more complicated constructions.

## 5 The limits of pied piping

### 5.1 Recursive pied piping in relative clauses

The flexibility of prepositional pipees in relative clauses was illustrated earlier in (12) to (16), where we find the following pied-piped phrases:

- (31) ... her final exam, the result of which we expect next week.
- (32) ... several projects, one of the most important of which will be to ....
- (33) ... a wide range of functions, prominent among which is sexual attraction.
- (34) ... a ‘higher criticism’ of the Bible, to refute which I felt the need of ...
- (35) ... a rigorous examination, passing which confers on the student ...

Alongside these real examples we can include the noun phrases in Ross’s famous made-up examples (Ross, 1967):

- (36) reports the covers of which the government prescribes the height of the lettering on
- (37) reports on the covers of which the government prescribes the height of the lettering
- (38) reports the lettering on the covers of which the government prescribes the height of
- (39) reports of the lettering on the covers of which the government prescribes the height
- (40) reports the height of the lettering on the covers of which the government prescribes

Admittedly Ross himself claims that (37) and (39) are ungrammatical, but the differences seem too subtle to rely on.

The easiest generalisation for relative clauses is that, as far as the grammar is concerned, the pipee may be almost any ‘ancestor’ of the piper, where ‘ancestor’ is a recursive generalisation across ‘parent’ (just as in ordinary kinship terminology). The exception is finite verbs, which seem to be absolutely impossible as pipees. A plausible example would be (41):

- (41) \*She’s just taken her exams, that she’s passed which I very much doubt.

It is true that even some of the earlier examples are hard to process, and might be considered impossible because of that; however, (41) feels different, and its badness cannot be explained simply in terms of processing difficulty as it is probably easier to parse than some of the earlier examples. It seems, therefore, that the grammar allows pied piping to apply recursively across nouns and prepositions until it is blocked by a finite verb.

### 5.2 Restrictions on pied piping in relative clauses.

Alongside this great potential freedom for recursive pied piping, there are severe lexical limitations (Johansson and Geisler, 1998). In principle, pied piping is an alternative to stranding, but this choice is actually only available in half the cases studied by Johansson and Geisler. In some of the other cases, the only permitted option was stranding, while in others it was pied piping. They report that pied piping is obligatory with some antecedent nouns (e.g. *way*, *extent*, *point*, *sense*, *degree*, *time*, *moment*) and some prepositions (e.g. *beyond*, *during*, *underneath*):

- (42) I love the way in which you casually mentioned her death.
- (43) \*I love the way which you casually mentioned her death in.
- (44) The trees stretched half-way up the mountain, beyond which there was no cover at all.

- (45) \*The trees stretched half-way up the mountain, which there was no cover at all beyond.

In contrast, stranding is obligatory with phrasal verbs (e.g. *look after*) and other idioms (e.g. *get rid of*) where the preposition does not have its normal meaning:

- (46) This is the book which I'm looking after for her.  
 (47) \*This is the book after which I'm looking for her.  
 (48) Where's the body which we have to get rid of?  
 (49) \*Where's the body of which we have to get rid?  
 (50) \*Where's the body rid of which we have to get?

These two sets of constraints are rather different. The stranding-only cases are easy to explain in terms of processing, because they inevitably mislead the hearer/reader by inviting a default interpretation of the preposition which later has to be abandoned, producing a 'garden-path' effect; for instance, an incremental reading of *this is the book after which* invites the reader to construe *after which* as a time adverbial. In contrast, the piping-only cases look like constructional patterns which are learned item by item, and hardly generalise beyond these items: we learn *way in which* and *beyond which* as fixed phrases. Moreover, the possibility of stranding must be controlled lexically by the preposition rather than the *wh*-word because *beyond* or *during* cannot be stranded with any relativizer, including *that* or zero:

- (51) That was the concert during which I went to sleep.  
 (52) \*That was the concert which I went to sleep during.  
 (53) \*That was the concert that I went to sleep during.  
 (54) \*That was the concert \_ I went to sleep during.

It may be significant that these prepositions are also unstrandable in passives:

- (55) \*This line has never been walked beyond.  
 (56) \*His lectures are never slept during.

These facts suggest that the grammatical entry for each preposition may show whether it can be pied piped and whether it can be stranded – two grammatical configurations that can easily be accommodated in the local network for the preposition concerned.

Another kind of limitation on pied piping in relative clauses is social: it is far more common in formal and academic writing than in conversation (Biber, Johansson, Leech, Conrad, and Finegan, 1999, p. 625). However, this may follow from the social limitations on the *wh*-words which pied piping requires, and which also have the same distribution (Biber et al., 1999, p. 610). Other research confirms that, when the relativizer is a *wh*-word rather than *that* or zero, pied piping is actually more common than stranding (Johansson and Geisler, 1998). Consequently, it may be better to assume that pied piping in relative clauses actually has no social limits either, so that it is limited only by the lexical restrictions mentioned above.

However, prepositional piping in relative clauses is not the only kind of pied piping, and different kinds have different limits. A full account of pied piping needs to accommodate the following:

- prepositional pied piping in interrogatives
- *how* as degree modifier (e.g. *how big a car*, *how fast*)
- *wh*-determiners: *what*, *which*, *whose*
- complex pied piping combining a mix of types
- free relatives



found in relative clauses (Huddleston and Pullum, 2002, p. 913). An obvious example is the combination *what ... for*, meaning ‘why’ (or more accurately, ‘with what purpose in mind’):

(70)        What did you do that for?

Here pied piping is absolutely impossible, even in quiz shows:

(71)        \*For what did you do that?

The same ban on pied piping applies to a few other idiomatic combinations such as *what ... like*; and as with relative clauses, some preposition + *wh* + noun combinations (e.g. *in what way*) have to be pied piped:

(72)        In what way can I help you?

(73)        \*What way can I help you in?

Once again, these lexical restrictions suggest an analysis which includes a large number of lexically specific constructions, alongside some rather weak generalizations. The next section will suggest how this analysis can be modelled in a network grammar.

This completes the discussion of prepositional pied piping, so it will be helpful to stand back from the detail to review this construction. The most obvious point to make is that this kind of pied piping has the effect of separating the *wh*-word from its preferred position at the start of the clause; so instead of starting with, say, *what*, the clause starts with *in what*. Another effect is to shift material from the end of the clause to the beginning. We shall consider possible functional explanations for the pied piping in section 7.

5.3.2 *How as degree modifier*. We now consider examples in which the *wh*-word comes first in its phrase, starting with the *wh*-word *how*:

(74)        How fast did she run?

(75)        How big a house do you want?

These examples count as pied piping because the *wh*-word determines the position of its phrase without being the head of this phrase. Unlike prepositional pied piping, however, the pied piping is part of a more general pattern, which has nothing to do with relative or interrogative clauses. As a degree modifier, *how* behaves like *so*, *too*, *as*, *this*, and *that*, since when modifying an adjective, the latter must modify a following *a* (which, in turn, needs its usual singular noun):

(76)        They bought so big a house that we always get lost there.

(77)        They bought too big a house to heat properly.

(78)        They bought as big a house as they needed.

As these examples show, most of these modifiers have the additional property of projecting their valency upwards; in (76), for example, it is *so* that lexically sanctions the *that* clause, but this depends on *house*, rather than on *so* (in Rosta’s terms, either *a* or *house* is the ‘surrogate’ of the degree modifier). This is not simply a matter of word order, but of meaning. For example, in *as big as X*, the parameter of comparison is simply size, whereas *as big a girl as X* builds ‘girl’ into the parameter, so that any standard of comparison must also be a girl. This is why (79) is sensible but (80) is anomalous:

(79)        She is as big as her brother.

(80)        #She is as big a girl as her brother.

In short, degree modifiers sanction a dependency for a noun higher up the dependency chain.

This analysis provides an explanation for the pied piping found with the degree modifier *how*: *how* sanctions a finite verb complement, but this depends on the higher noun, so it takes the higher noun as its landmark. This explains why *how big* or *how big a house* are clause-initial in (74) and (75), but it does not explain why these phrases can take their position in a higher clause, as in (81) and (82):

- (81) I wonder how big a house they want.  
 (82) How big a house they want is a mystery.

This external positioning of the subordinate clause is handled in our analysis by the ‘pipee’ relation, so this relation must also be available for *how*. We shall see below that this will help to explain why *how* can be combined with prepositional pied piping, as in *In how big a house do they live?*

5.3.3 *Wh-determiners*. Like *how*, the *wh*-determiners *what*, *which* and *whose* occur on the left of their phrase, but unlike *how*, they qualify as head of this phrase; at least, they do if we accept the DP-like analysis favoured by Word Grammar (Hudson, 2004). Given this analysis, there is no more need for pied piping in (83) than in (84):

- (83) What clothes shall we take?  
 (84) What shall we take?

However, *whose* is rather different from the other *wh*-determiners; a very persuasive analysis (Rosta, 1997) takes *whose* as two syntactic words, *who* + *Z*, realized by a single word-form in the morphology. In that analysis, *Z* is the determiner and the head, just as it is in at least one analysis of *John’s* or *everyone else’s* (Hudson, 2013a). Therefore, even a simple example, such as that in (85), involves pied piping, with *who* as a dependent and *Z* as the pipee:

- (85) Whose car shall we use?  
 (86) Who Z car shall we use?

Consequently, we must recognise the *who* of *who Z* as a pied piper.

Both *how* and the *wh*-determiners stand firmly at the start of their phrase, so we can call them ‘phrase-initial pied piping’. In contrast with prepositional pied piping, the result of phrase-initial pied piping is that the *wh*-word stands at the start of the clause, rather than being separated from it by the pied-piped material; we should therefore not expect the same functional explanations to apply to both.

5.3.4 *Complex pied piping*. The two kinds of pied piping, prepositional and phrase-initial, can combine freely, as in the following examples:

- (87) In how big a house do they live?  
 (88) In whose car did you come?  
 (89) I’ve found the book about whose cover’s colour we were arguing.

Moreover, phrase-initial pied piping is indefinitely recursive when combined with the possessive *Z* discussed earlier:

- (90) How many people’s neighbours’ dogs dig up their gardens, I wonder.  
 (91) The man whose mother’s father’s brother’s house is up for sale has just died.

In all these cases, the pied-piped phrase follows ordinary syntactic patterns except for its position, which is determined exceptionally by the *wh*-word.

Once again, the simplest conclusion is that the pipee relation can be passed recursively up the dependency chain without limitation. On the other hand, we still find the limitations on prepositional pied piping noted previously: an absolute prohibition of finite verbs as the pipee, and a ban on recursive prepositional pied piping in normal interrogative clauses.

*5.3.5 Free relatives.* In contrast with all other kinds of *wh*-word, those that introduce free relative clauses do not allow any pied piping (Heck, 2008, p. 342). For example, whereas *with which* is an alternative to *which ... with* in (92) and (93), *what ... with* in (94) cannot be changed into the *with what* of (95):

(92) This is the thing which I blocked the hole with.

(93) This is the thing with which I blocked the hole.

(94) This is what I blocked the hole with.

(95) \*This is with what I blocked the hole.

This restriction cannot be explained in terms of dependency structure, because pied piping does not affect dependency structure: (94) and (95) simply have the same dependency structure. A functional explanation may, however, be possible in terms of the processing difficulties of *this is with what*, where the normal procedures try to treat *with* as a dependent of *is*. On the other hand, some languages do allow free relatives with pied piping. For example, German examples like (96) have been found in published writing (Müller, 1999, p. 61, quoted in Hoffman, 2011, p. 58):

(96) Aus wem noch etwas herausgequetscht werden kann, ist  
Out-of whom still something squeezed be can is

ist sozial dazu verpflichtet es abzuliefern  
is socially thereto obliged it deliver

*Those who have not yet been bled dry are socially obliged to hand it over.*

This example is remarkable for the fact that *wem*, ‘who’, is in the dative, as required by the preposition *aus*, but is also functioning as the subject of the higher clause, which would normally require an accusative *wer*. If German speakers can process (96), why can’t English speakers process (95)? In short, the proposed analysis fails to explain the restrictions on pied piping in free relatives.

The next section explains how these English patterns can be formalized in Word Grammar, and then section 7 will explore the cognitive background for pied piping.

## 6 Formalizing the pipee

Section 4 presented a Word Grammar analysis of single-step prepositional pied piping, so we now need to consider how this grammar needs to be expanded in order to accommodate the more complicated examples reviewed in section 5. The earlier analyses all relied on the special relation ‘pipee’, which connected the *wh*-word to the word which replaced it in the landmark structure (responsible for word order). We shall now see that this relation is all we need to accommodate the more complex examples as well.

The main complexities are as follows:

- different provisions for relative, interrogative and free relative clauses
- recursive pied piping in relative clauses and some interrogatives, with an absolute ban on finite verbs as pipees
- lexical restrictions on pipers (the *wh*-words), pipees and antecedents
- social restrictions on some kinds of pied piping.

Arguably, all these possibilities and limitations are part of our ‘competence’, i.e., our knowledge of English, so the challenge is to incorporate them all into a formal model of that knowledge.

## 6.1 Pipers

We start with the *wh*-words themselves. Word Grammar provides a hierarchical classification of words, so we can recognise a hierarchy containing ‘pronoun’ and ‘relative pronoun’ as well as the individual lexemes such as WHO. This inheritance hierarchy, based on the ‘isa’ relation introduced earlier, replaces the syntactic features favoured by most other theories, and there is certainly no suggestion that the hierarchy might be part of ‘universal grammar’; it is learned rather than innate, and can vary freely between languages. One of the advantages of a hierarchical classification is the prevalence of this kind of classification outside language, in contrast with feature-structures, which are much more limited outside language. Another is the unified treatment that it allows for general categories and lexical items, contrasting with the fundamental distinction forced by feature structures.

One example of this unified treatment is the possibility of distinguishing ‘sub-lexemes’ – distinct uses of what is clearly a single item, comparable to the ‘sub-tokens’ discussed earlier. For example, it allows us to recognise a single lexeme WHO which requires a human referent, while also distinguishing the relative pronoun WHO<sub>rel</sub> from the interrogative WHO<sub>int</sub>. These sub-lexemes can inherit their distinct properties from the more general categories ‘relative pronoun’ and ‘interrogative pronoun’ because the hierarchy allows multiple inheritance; WHO<sub>rel</sub> isa both WHO and ‘relative pronoun’. Similarly, ‘interrogative pronoun’ inherits from ‘interrogative word’ and ‘pronoun’, so HOW can inherit from ‘adverb’ as well as from ‘interrogative word’; assuming that there are no other such words, the resulting intersection could equally well be called either ‘HOW’ or ‘interrogative adverb’ (arguably, both WHEN and WHERE are pronouns, since they can both be used as relative pronouns). The network in Figure 12 shows some of the relevant nodes:

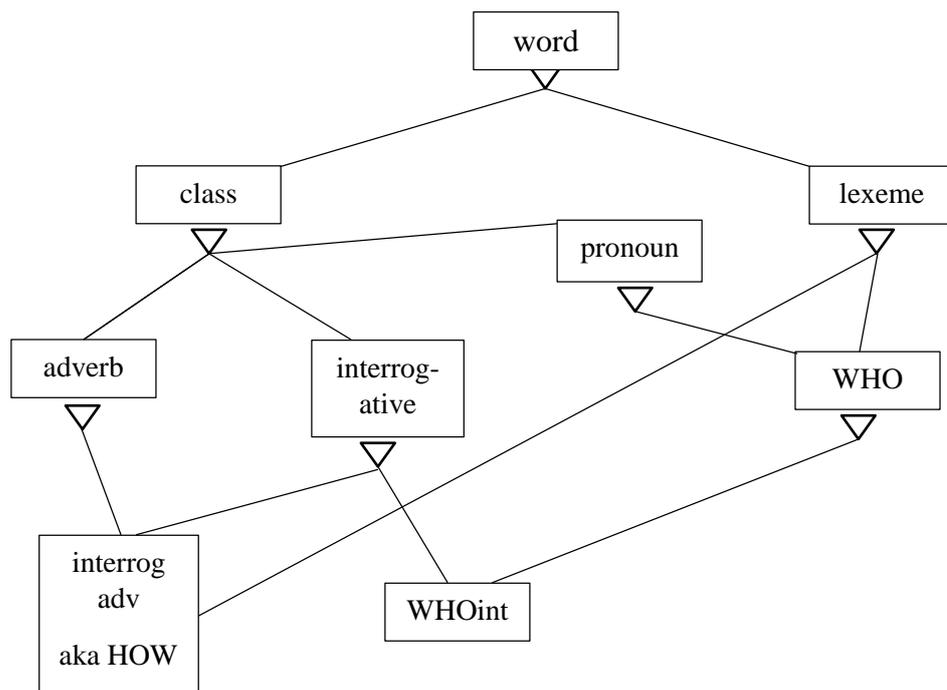


Figure 12: Classification of words in a network

This classification of words will allow us to identify words as ‘pipers’ in pied piping. For instance, we can say that any interrogative word is a potential piper; or we can say more specifically that  $WHO_{int}$  is a potential piper. Since pipers are lexically restricted, it seems likely that we shall need to include both general and specific information. How this can be done will be explained below.

## 6.2 Constructions

The sub-classification system of Word Grammar accommodates constructions in terms of sub-lexemes. For example, an idiom such as KICK THE BUCKET is analysed as containing a special sub-lexeme of each of the words concerned:  $KICK_{bucket}$ ,  $THE_{bucket}$  and  $BUCKET_{kick}$  (the choice of labels is, of course, trivial; indeed, one of the basic assumptions of network analysis is that labels are merely an analytical convenience, without any material content). Each of these words has some unique properties; for example,  $KICK_{bucket}$  is the only example of KICK that means ‘die’ and requires  $THE_{bucket}$ , and the latter is the only example of THE that occurs with  $KICK_{bucket}$  and  $BUCKET_{kick}$ . But at the same time, these words are also linked to the default lexemes KICK, THE and BUCKET, as has been shown through priming experiments (Sprenger, Levelt, and Kempen, 2006). The proposed analysis captures the similarities to the default entries as well as the differences.

Returning to pied piping, the same principles apply. For example,  $WHAT_{for}$  is the sub-lexeme of WHAT which occurs in the *what ... for* construction, along with  $FOR_{what}$ , the special sub-lexeme of FOR. This system allows both pipers (e.g., *what*) and potential pipees (e.g., *for*) to be specified either crudely, in terms of general word classes, or more specifically, in terms of sub-classes or even specific lexical items. Moreover, in this system we can tie lexical constraints to the pied-piping or stranding constructions: it is just  $WHAT_{for}$ , rather than every WHAT, that cannot have a pipee, and it is  $WHICH_{way}$  (the *which* found in *the way in which ...*)

that must have a pipee. The first restriction rules out *\*for what* (in *\*For what did you do that?*) while the second rules out *\*the way which ... in* (in *\*I liked the way which he did it in*). In view of the very construction-specific constraints on pied piping reviewed in section 4, this degree of specificity is essential.

### 6.3 The optionality of prepositional pied piping

Assuming, then, that we can distinguish the constructions which require pied piping from those which forbid it or merely allow it, we now need a mechanism for expressing these differences in a network. Optionality is handled in Word Grammar by means of an elementary ‘quantity’ relation, whose values range over numbers. By default, the quantity of any entity is 1; this means that when it is possible structurally, we expect to find one exemplar in our experience. The default can, however, be overridden by values such as ‘0-1’ (either 0 or 1) or ‘0’. In network diagrams, the quantity relation is labelled ‘#’, so the total network would include the sub-network shown in Figure 13 for *WHAT<sub>for</sub>* and *WHICH<sub>way</sub>*. The diagram shows that, by default, a pipee is optional, but it is impossible with *WHAT<sub>for</sub>* and obligatory with *WHICH<sub>way</sub>*.

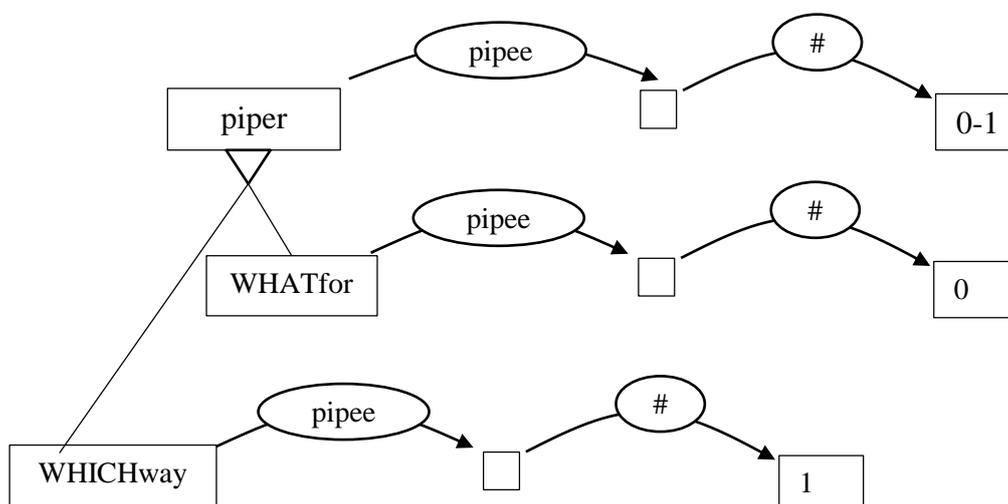


Figure 13: *WHAT<sub>for</sub>* cannot have a pipee but *WHICH<sub>way</sub>* must have one

### 6.4 Pipees and landmarks

Now that we have a mechanism for adding the pipee relation as required, we can show how this relation produces the word order of pied piping. As explained earlier, a word's parent is normally also its landmark; this is shown in the top section of Figure 14. This is the default arrangement, but pied piping is exceptional because the piper, defined as a particular kind of word (e.g. a relative pronoun) has a pipee which takes over the piper's role in landmark structure: any parent of the piper acts as the landmark ('lm') of the pipee, and any dependent of the piper takes the pipee as its landmark.

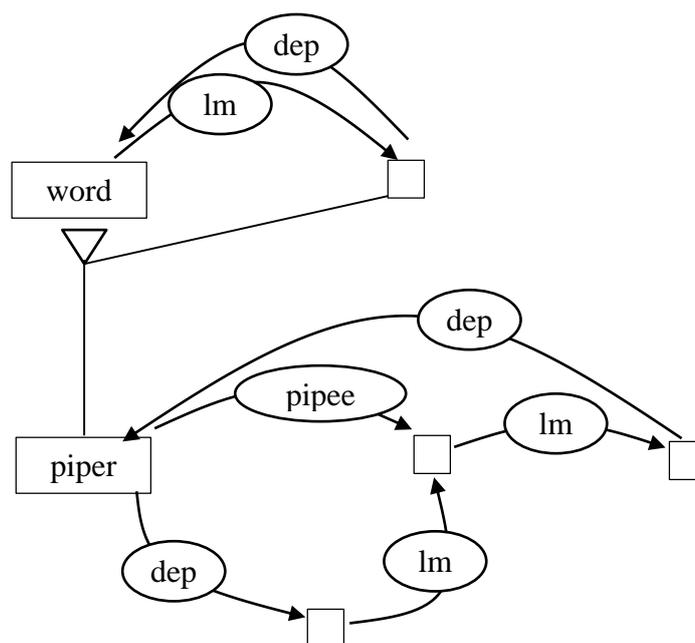


Figure 14: Pipes as exceptional landmark bearers

The sub-networks presented above combine as a formal grammar which generates the structures shown in the earlier syntactic diagrams. For example, Figure 7 shows that exactly the same dependency structure is mapped onto two different word orders, according to whether or not the pipee relation is included. In the default case, with stranding and no pied piping, the order is: *Who do you live with?* In this sentence, *do* is the landmark of *who* and *who* is also the landmark of *do*. But when *with* is the pipee of *who*, these landmark relations transfer from *who* to *with*.

## 6.5 Recursive pied piping

Finally, the grammar needs to allow recursive pied piping in some cases but not in others. Recursion is found in both prepositional and phrase-initial pied piping, but it involves different mechanisms so we consider the two types separately.

By default, prepositional pied piping is freely recursive and allows complicated structures like those in (31)-(40). The only general constraint is that a finite verb cannot act as a pipee (as in the ungrammatical (41)). The sub-network in Figure 15 shows how this recursion can be expressed in a network. In prose, if word B is the pipee of word A, and B depends on C, then C may also be the pipee of a new token of A, A' (the extra token A' is needed in order to allow A to have more than one pipee). However, in the even more specific case Y, where C is finite, this extra pipee relation is impossible. The optionality of the pipee in one case and its impossibility in the other are shown by the 'quantity' relations (#).

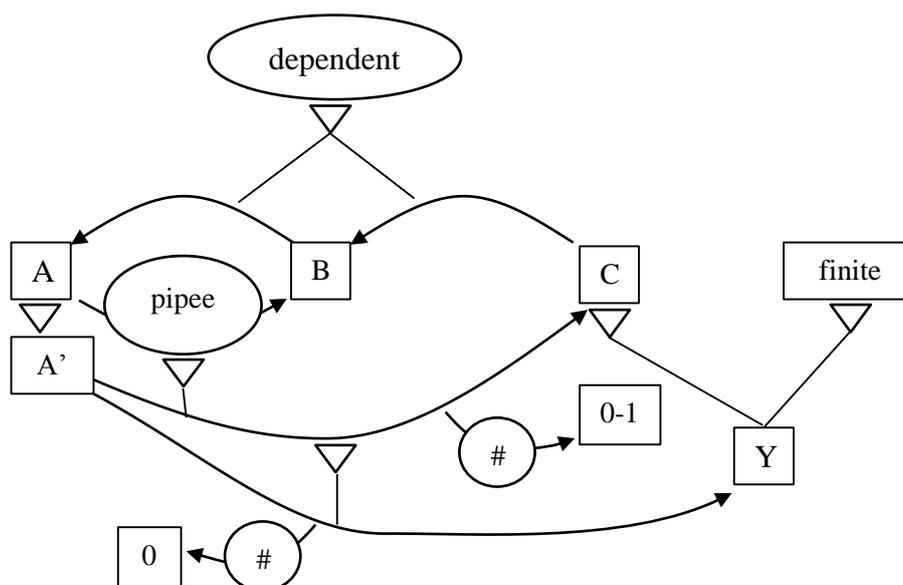


Figure 15: Defining 'pipee' recursively

One possible objection to this analysis is that it identifies too many pipees, each of which could have the piper's parent as its landmark. For example, in *the book on the cover of which I wrote*, the piper *which* creates four different pipees: *on*, *the*, *cover* and *of*; but only *on* takes over the piper's landmark role. Why isn't this possible for the other three pipees? The answer is that the pipee relations form an isa hierarchy: *which:on* (the pipee relation from *which* to *on*) isa *which:the*, which isa *which:cover*, which isa *which:of*. By default inheritance, the winning value is the one furthest from the default, at the bottom of the hierarchy; *which:on* automatically beats all the other values for 'pipee' when applying the rule for landmarks.

The discussion so far has focussed on prepositional pied piping, and has almost finished the formal analysis of this kind of pied piping in English. The only fact not yet covered is the fact that ordinary interrogatives are different from quiz interrogatives; since this involves a complex sociolinguistic category, we must leave this for future research.

We now turn to the phrase-initial pied piping found with interrogative *how*, *what* and *which*, and either interrogative or relative *whose*, as in *how big a hole*, *what size* or *what size shoes*, *which book* and *whose book*. These need not delay us, because they are already covered by the analysis. As we saw in relation to examples (87)-(91), the *wh*-word can pied pipe recursively, so the pipee may be either the head of the local phrase (e.g., *shoes* in *what size shoes*) or a more remote ancestor, whether a preposition, as in a sentence such as *In how big a house do they live?*, or a possessive *Z*, as in *How many people's neighbours' dogs dig up their gardens, I wonder*.

## 7 Cognitive ends and means

The previous sections have all concentrated on showing how pied piping can be accommodated in a theory such as Word Grammar, which makes all of the machinery of ordinary cognition, and only this machinery, available to grammatical analysis. Because of this focus, the discussion concentrated on how pied piping works in Modern English. However, one of the basic assumptions of Word Grammar is that the challenge for linguistics is not to explain the similarities among languages, but rather to explain their differences (Evans and Levinson,

2009). Given the problems of communication, each language evolves its own ‘engineering solutions’ which strike some kind of balance between competing pressures.

What, then, are the communication problems for which pied piping is a solution? What relevant cognitive apparatus is available? And what solutions are found in other languages?

## 7.1 Communicative ends

The communication problem addressed by pied piping is information-packaging: how to achieve a user-friendly distribution of the information in a sentence. The same could be said, of course, about any part of language, because every word has evolved as a way to package information in a user-friendly way; however, in contrast to most words and constructions, pied piping does not increase the expressive power of a language in the technical sense of allowing more meanings to be expressed. Instead, it is just a matter of word order (section 2); it applies to dependency structures that are licensed independently by the grammar, and allows a word order which would not otherwise be possible but which brings some identifiable functional benefits.

The functional benefits of pied piping have to be explored in the context of a number of potentially competing functional pressures:

- i. *Endocentricity*: a phrase’s head determines all its properties relevant to the rest of the sentence, including its position in word order. This principle disfavors all pied piping.
- ii. *Boundary linkers*: a word which indicates how a whole phrase is linked to other words in the sentence is located on the phrase’s boundary between that phrase and those words. This principle disfavors prepositional pied piping, because the linking word (the *wh*-word) is not at the clause’s edge, but it allows phrase-initial pied piping.
- iii. *Anti-stranding*: a word should not be separated from its complement. This principle favors pied piping as an alternative to stranding.
- iv. *Memory protection*: structures should be selected so as to minimize the burden on the working memory of both speaker and hearer. This principle favors any structure which allows information to be distributed evenly, including pied piping.
- v. *Grammar simplification*: grammars should be as simple as possible. This principle disfavors the extra complexity of pied piping.

The first four pressures apply to pied piped and stranded pairs such as (97) and (98).

(97) This is the book which I found it in.

(98) This is the book in which I found it.

The stranded (97) wins on two of the pressures and the pied-piped (98) on just one, with almost equal scores on the remaining one. Endocentricity is satisfied by *which ... in*, because the phrase’s head (*in*) is in its expected position (even if its complement is not), whereas *in which* defies endocentricity by taking its position from a non-head (*which*). Boundary linkers are as expected in *which ... in* because *which* (the word which links its clause to the antecedent *book*) is the first word in its clause, in contrast with *in which*. (This constraint is similar to Broadwell’s ‘align’ which places the interrogative phrase at the left edge of the clause -- Broadwell 1999). Anti-stranding disfavors structures such as *which ... in*, including those which we call ‘stranding’, in which a word’s complement precedes it and is separated from it. It may be that this constraint could be constrained so as to apply only to function words (such as prepositions) and their complements; this would explain why prepositions cannot be stranded in languages where verbs can, and might explain why languages that forbid preposition stranding also tend to allow fusion of a preposition with a definite article (e.g. French *au* for *à le* and German *zum*

for *zu dem*, both meaning ‘to the’), showing a specially tight connection between prepositions and their complements. For memory protection, the two versions make equal memory demands when measured in terms of dependency distance, the number of words separating each word from its parent (Liu, Hudson, and Feng, 2009): *which ... in* scores one more on *in*, while *in which ...* scores one more on *which*. However the pied-piped version also includes the pipee relation from *which* to *in*, so its structure is slightly richer and therefore makes more memory demands.

Grammar simplification is a different kind of pressure because it applies to the diachronic development of a grammar by the language community concerned rather than to the way in which that grammar is applied; so given that English already allows both pied piping and stranding, this criterion does not distinguish *which ... in* from *in which*. The fact is that pied piping requires special apparatus, as outlined above, and however simple that apparatus is, it still needs to be learned. Similarly, a grammatical ban on stranding needs to be learned (as a special constraint on recursive extraction), so the simplest grammar is one which allows stranding but not pied piping. For any language community, therefore, the challenge is to evolve a grammar which strikes an acceptable balance among these five competing pressures.

For linguists, the challenge is to explain why any community chooses pied piping as a solution, given the balance of advantage that appears to favour stranding. One benefit of pied piping has already been noted: anti-stranding forbids the obvious alternative, which is stranding. But this doesn’t in itself explain why pied piping develops; after all, French-speaking children apparently manage without it (Guasti and Shlonsky 1995), just as English-speaking children do (McDaniel, McKee, and Bernstein 1998), even though they have no stranding alternative. If children can tolerate the lack of pied piping, why not adults too?

Another benefit involves phrase-initial pied piping, in which a non-head such as *whose* or *how* pipes its phrase to the front of the clause. Any language that has such words needs the equivalent of our ‘pipee’ relation, even if it does not allow prepositional pied piping; so at least that much of the extra grammatical apparatus is already available. However, not every language has such words: for instance, examples such as (99), a word-for-word translation of English *How big is it?*, are possible in German but not in French, which demands (101) instead of (100).

(99)        Wie gross ist es?  
              *How big is it?*

(100)      \*Combien grand est-il?

(101)      Combien est-il grand?  
              how is-it big?

And although determiners such as *quel*, ‘which’, exist in French as well as in German, these are heads according to the DP analysis favoured in Word Grammar, so they don’t require pied piping.

The most convincing functional explanation for the existence of pied piping is that it helps when the clause introduced is complex, by distributing information more evenly than the stranded alternative (Johansson and Geisler 1998). Johansson and Geisler quote the following examples from their corpus of spoken language:

(102)      I mean there are some subjects # in which I get the impress # you know # that there is a pump going # and the stuff is pumped # from one mind # into another mind #

(103)      The system architecture which is the focus of today's seminar is really an er a complete environment within which we can deal with the challenges of this new generation of enterprise client server applications.

In both of these examples, the stranded alternative would place a heavy strain on working memory because of the many words separating *which* from the stranded preposition:

- (104) I mean there are some subjects # which I get the impress # you know # that there is a pump going in# and the stuff is pumped # from one mind # into another mind
- (105) The system architecture which is the focus of today's seminar is really an er a complete environment which we can deal with the challenges of this new generation of enterprise client server applications within.

This benefit is similar to one of the benefits of topicalization, which allows information to be redistributed within a complex clause. For instance, we might compare (103) and (105) with the following pair:

- (106) Within this environment, we can deal with the challenges of this new generation of enterprise client server applications.
- (107) We can deal with the challenges of this new generation of enterprise client server applications within this environment.

Topicalizing the adjunct allows it to be processed separately from the rest of the clause, and allows it to be linked directly to *can*, whereas the end position in (107) leaves it separated by a lot of other words from *can*.

If this explanation is correct, and pied piping arises in order to facilitate the formation of complex clauses, it could explain a number of other things. Maybe this is why pied piping is so strongly associated in English with formal (and therefore complex) writing. And maybe it explains some of the strong lexical restrictions noted earlier, if we can also assume that the constructions concerned, such as *way in which* or *beyond which*, are typically used in complex structures.

## 7.2 Cognitive means

Suppose, then, that the extra machinery of pied piping would help communication if it was introduced. And suppose the ordinary machinery of grammar is supported mentally, as claimed in section 3, by ordinary cognitive abilities such as networks, default inheritance and landmarks. Would the extra machinery for pied piping require special cognition unique to language, or could we invoke other bits of ordinary cognition here too? Since the extra machinery amounts to just one relation, ‘pipee’, the question is whether this has analogues outside language.

What we are looking for, therefore, is a non-linguistic entity A which humans locate (by landmark) not according to its own inherent classification, but according to that of some other entity B which is subordinate to it to the extent of taking A as its own landmark. This would be exactly equivalent to a preposition A taking as its landmark the parent of a wh-word B for which A is the landmark (as in *the house in which he lives*). And if we do find a non-linguistic analog for pied piping, then we can assume that our minds establish a relation between A and B which provides a non-linguistic analog for the ‘pipee’ relation – and evidence that the cognitive apparatus for pied piping is not unique to language.

For a simple example, consider supermarkets, where all the goods are classified and located according to some system which was devised by the shop owner so as to be meaningful to shoppers – a clear case of human decisions about location, defined in terms of landmarks such as ‘aisle 24’ or ‘the back left corner of the shop’, but also based on how the items concerned are typically classified by members of the relevant culture: for example, as food, drink or household goods and more precisely as salad, fruit, meat, dressings and so on. The

crucial point of the example is that many items are sold in some kind of packaging or container such as cans, bottles, boxes and bags, each of which acts as landmark for the thing contained; so the beans are in the can, rather than the can being round the beans. But the location of the containers depends on their contents, with cans of beans and peas located near to each other, together with other kinds of container full of prepared vegetables. In short, the contents could be described as ‘pied piping’ the container. (In contrast, we might imagine a shop in which all the cans are on one shelf, all the bottles on another, and so on, all regardless of what they contain.)

Since speech is linear action, it may be helpful to find another non-linguistic example that involves the ordering of actions in time rather than physical location. In this case we need to consider a structured activity such as baking a cake that follows a ‘script’ (in the sense of Schank and Abelson 1977) of steps to be taken. Each step defines a goal and the sub-goals that lead to this goal, and each sub-goal may define further sub-goals; for example, the goal of mixing the ingredients includes the sub-goal of getting the ingredients, and the goal of decorating the cake includes the sub-goal of preparing the icing, which in turn has the sub-goal of getting the sugar. In terms of ordering, the script defines the order of the sub-goals, with sub-goals typically timed to be achieved just before their goal. But this ordering can be disrupted by various constraints which can require advanced action – i.e. preparation – such as shopping for missing ingredients, washing unwashed bowls or warming butter. In such cases, the preparation, such as warming butter for the icing, takes place before the main baking activity starts and may lead to a re-ordering of the higher sub-goal (in this case, with the icing made before the rest of the cake). In formal terms, the hard butter ‘pied pipes’ the making of the icing.

The point of these examples is to show that the special characteristics of pied piping, which centre on the ‘pipee’ relation, are by no means special to language. Instead, we find similar formal patterns in everyday non-linguistic thinking and behaviour. This is not to say that we necessarily use the same mental relation in all these cases (though it is possible that we do); and it is certainly not to say that we are born with the ‘pipee’ relation hard-wired. All it means is that we can give ourselves extra mental flexibility by creating ad hoc relations such as ‘pipee’ which produce the same effect outside language as we find in syntactic pied piping.

### 7.3 Different languages, different solutions

It is clear that there is nothing ‘natural’ about the engineering solutions offered by English to the fundamental problem of *wh*-type words, which combine two conflicting sets of properties. On the one hand, a word such as *what* in (108) is an ordinary pronoun, just like *it* in (109), with the same relations to *wants*.

(108) I wonder what she wants.

(109) She wants it.

On the other hand, *what* is also different from *it* in facing outwards as well as inwards – in this case, in providing the interrogative word that *wonder* needs as its complement. These properties are associated with conflicting word-order demands, which is why *what* is extracted from its expected default position after *wants*. Other languages offer different ways of resolving this conflict, such as ‘*wh* in situ’ which favours the clause-internal relations.

The same conflict leads to pied piping, where the *wh*-word combines its normal grammatical function (e.g. as a pronoun) with a function that requires it to stand at the start of its clause; but in pied piping, this conflict goes beyond the mere reordering of words that we find in extraction, as it threatens the fundamental principle of endocentricity because the *wh*-word is not the head of the displaced phrase. English-style pied piping is just one engineering

solution to the problem, with stranding of a preposition as an alternative in some cases. But although stranding is common in Modern English, it was rare in Middle English, when (unlike Modern English) prepositional pied piping was almost obligatory with *wh*-words (Johansson 2002). And of course, in many European languages stranding is absolutely forbidden.

English-style pied piping and stranding are not the only possible solutions, and, as we might expect, other solutions can be found in other languages. We note here two particular variations on pied piping: inversion and boundary marking. Inversion solves a problem of English pied-piped sentences such as (110).

(110)        Until when shall we wait?

The problem here is that the *wh*-word *when* is not clause-initial, in spite of the strong pressure to put *wh*-words first. As a solution, inversion is very simple: it changes the default order within preposition phrases so that the *wh*-word does come first, giving the equivalent of ‘when until shall we wait?’ Although this is not possible in Modern English, it was common in Middle English with purely pronominal *wh*-words, which were realised as *where*: *wherefore*, *whereof*, *whereon*, *wheresoever*, *wherethrough*, *whereto*, *wherewith*. Cognates are still normal in German and Dutch (e.g. German *worin*, ‘in what’). However, these may not be clear examples of syntactic inversion because the inversion may be just in the morphology, on the assumption that the pronoun is cliticized to the preposition (as indicated by standard orthography). In other words, Middle English *wherefore* may have the normal order *for what* in syntactic structure but the reverse order only in the fused morphological realisation.

A much more productive kind of inversion, called either ‘pied piping with inversion’ or ‘secondary *wh*-movement’, is found in some head-initial Meso-American languages (Broadwell 1999; Broadwell 2006). This phenomenon is more relevant to the present discussion because it clearly involves syntax rather than morphology. For instance, (111) to (114) from San Dionicio Ocotepéc Zapotec show the effect of pied piping with inversion when the piper is a possessor (Broadwell 2006). Normally the dependent possessor follows the possessed, as expected in a head-initial language; this is shown in the first two examples, where the possessor is *Màríí*. But when, as in the second pair of examples, this is replaced by an interrogative, the latter triggers both pied piping and inversion of the possessor and possessed so that the interrogative word is clause-initial.

- (111)        Cù’á        Juààny x-pèh’cw Màríí.  
               com:grab Juan    p-dog        Mary  
               *Juan grabbed Mary’s dog.*
- (112)        \*Cù’á        Juààny Màríí x-pèh’cw].  
               com:grab Juan        Mary p-dog
- (113)        Túú x-pèh’cw cù’á        Juààny?  
               who p-dog        com:grab Juan  
               *Whose dog did Juan grab?*
- (114)        \*X-pèh’cw túú cù’á        Juààny?  
               p-dog        who com:grab Juan

Such examples are easy to accommodate in the same kind of analysis as for English, based on the pipee relation. Once again, the pipee takes over the piper’s role in landmark structure, but this time it also affects this structure by reversing the normal landmark relation between the piper and pipee. Since the piper (here *túú*, ‘who’) depends on the pipee, it would normally follow the pipee; but this default, giving the order possessed-possessor, is overridden

by a special inversion rule giving possessor-possessed. Given the detailed lexical variability found in English prepositional pied piping, it is not surprising that similar variability is found among prepositions in Zapotec, or indeed that the scope of the rule, in terms of word classes to which it applies, varies from language to language.

In short, pied piping with inversion requires a very small extension of the analysis proposed for English, but (as Broadwell points out) the restricted variability gives no reason to assume that either pied piping or inversion is in any sense part of universal grammar. Given the functional benefits and costs of pied piping, inversion is a rather obvious way to reduce the costs.

The other variation on pied piping is boundary marking, an overt word which in some languages marks the end of a pied-piped phrase and which Heck calls ‘Q’ (Heck 2008; Heck 2009). The languages include Tlingit, for which Heck reports the following examples:

- (115) Daa sá aawaxaa i éesh?  
what Q he.ate.it your father  
*What did your father eat?*
- (116) Goodéi sá has oowajée wugootx i shagóonich?  
where.to Q they think he.went your parents.ERG  
*Where do your parents think he went?*
- (117) Wáa kwligeysi xáat sá i tuwáa sigóo?  
how it.is.big.REL fish Q your spirit.at it.is.happy  
*How big a fish do you want? (Lit. ‘A fish that is how big do you want?’)*
- (118) Aadóo teen sá yeegoot?  
who with Q you.went  
*Who did you go with?*
- (119) Aadóo yaagú sá ysiteen?  
who boat Q you.saw  
*Whose boat did you see?*
- (120) X’oon keitl sá ysiteen?  
how.many dog Q you.saw  
*How many dogs did you see?*

The boundary-marking word is *sá*, which is obligatory after an interrogative word, and can only occur in the position indicated in the examples. With both the interrogative word and *sá* underlined, it is easy to see how they provide a clear structural guide to hearers (not dissimilar in function to the English subordinator *that*, which signals the start of a clause). Although functional explanations are inevitably speculative, it is easy to see this strategy as yet another engineering solution to the problems of *wh*-type words. And in terms of the structural analysis, it is easy to see *sá* as a post-dependent of the pipee – a case where the pipee is more intimately related to the general dependency structure than in languages like English.

## 8 Conclusions

The main conclusion is that even pied piping, for all its apparent peculiarities, is just part of general cognition, along with the rest of language. The analysis presented is at least compatible with all the known facts about pied piping not only in English but in other languages; but it

also assumes no theoretical apparatus beyond what we know is already available in general cognition for dealing with space, society and so on. This cognition includes networks (with rich hierarchies of relationships), default inheritance and landmarks, which are enough not only for ordinary syntax, but even for such an abstruse part of syntax as pied piping.

But the ‘pipee’ relation which is the defining characteristic of pied piping is peculiar in that it interrupts the normally direct relation between dependency structure and landmark structure. Similar relations are found outside language, so the ‘pipee’ relation does not support the idea that language is conceptually unique; on the contrary, if anything it shows that language is subject to much the same functional pressures as the rest of cognition, and that our minds are so flexible that we can invent new relations as needed.

Another general conclusion is that the observed patterns of pied piping cover the expected range of engineering solutions to the problems posed by wh-words – stranding, pied piping, inversion and boundary marking. If our aim is to understand the diversity of human language, then our explanations must start with these functional pressures, plus the cognitive resources that are available for dealing with them.

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# Colloquial French Pronominal Clitic Structure in Ditransitive Constructions \*

Ryan Kotowski

## Abstract

Literature addressing the structure of Colloquial French pronominal clitics is divided on whether or not these clitics can be analysed as markers of agreement or as argument-bearing pronominal elements. This paper provides an overview of the morphosyntactic structure of nominative, dative, and accusative pronominal clitics in ditransitive constructions and their interactions with the past and future tense auxiliaries *avoir* and *aller*. The presence or lack of a KP projection within the structure of the big-DPs which house the pronominal clitics is a major determinant in what clitic combinations are grammatical. This paper proposes that in its current state, Colloquial French pronominal clitics are not markers of agreement, due to their optional doubling with arguments and their tense-invariance. However, from a diachronic point of view, this paper discusses the necessary mechanisms for these clitics, especially the nominative clitic, to become tense-variant by undergoing Fusion with the tense feature in T.

*Keywords:* Diachronic morphosyntax, French clitics, agreement, Fusion

## 1 Introduction

Linguists have long remarked upon the outward resemblance of Colloquial French (CFr) pronominal clitics to the morphemes of highly agglutinating languages. Vendreys (1920) observed that constructions containing combinations of clitics in French (such as the example given in (1)) resemble and, in fact, mirror the order of heavy morphological agreement of polysynthetic Native American languages.

- (1) Il            m'            en parle  
      3Sg-Nom 1Sg-Dat of-it speaks  
      *He speaks to me about it.*

Since then, the morphosyntactic status of CFr pronominal clitics has been the subject of debate in an extensive corpus of literature. Contributions to this debate are either of the opinion that CFr pronominal clitics are best analysed as markers of agreement or that they maintain full argumenthood in the syntax. Various theoretical frameworks have been utilised to account for the nature of CFr pronominal clitics and to provide diagnoses to distinguish between pronominal clitics and agreement. A definitive diagnosis of the status of CFr pronominal clitics is lacking. To this end, this investigation will examine the morphosyntactic nature of CFr pronominal clitics in ditransitive constructions. Indeed, the interactions between the nominative, dative, and accusative clitics in these constructions will allow us to determine whether or not CFr clitics are best analysed as markers of agreement or pronominal elements with full argumenthood in the syntax. In Section 2, I provide a summary of the various arguments used to argue the nature of CFr pronominal clitics and the various diagnoses used to distinguish clitics and agreement. In Section 3, I provide a morphosyntactic analysis of CFr clitics, comparing their structure with

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that of Basque. In Section 4, I use the notion of the Distributed Morphology mechanism of Fusion — as outlined in Halle and Marantz (1993) — to discuss the diachronic implications the differences between the syntactic structure of past and future auxiliaries have on the possible morphologisation of certain clitics with the auxiliaries. Section 5 concludes this investigation in which I conclude that from a synchronic point of view CFr pronominal clitics are not agreement features but fall on a spectrum between independent word and agreement. I will also propose that in an advanced stage of French, the person, number, and case features of the nominative clitic housed in C is prone to undergo Fusion with the tense features housed in T (or M for the future auxiliary) to create a tense-variable agreement morpheme in a cyclic process in which lexical items undergo morphologisation and grammaticalisation.

## 2 Literature Review

The literature addressing French clitics has taken either a strictly syntactic, strictly morphological, or morphosyntactic approach to their argumentation. Although I will argue that a morphosyntactic analysis of French clitics will provide the most comprehensive account of CFr pronominal clitics, the current literature using the morphosyntactic approach as well as literature using the other two approaches leave many questions unanswered in regard to the status of CFr pronominal clitics. In particular, they fail to account for the interplay between the various pronominal clitics and the past and future tense auxiliaries (*avoir* and *aller*, respectively). I will provide an overview of the claims made in this literature.

### 2.1 Literature on French Clitics

The syntactic accounts of Kayne (1975, 1991, 1994) and Rizzi (1986a, 1986b) argue against the notion that French is a pro-drop language, despite the pronominal clitics displaying agreement-like features. French pronominal clitics, at first glance, seem to be likely candidates to fulfil the heavy agreement proposal of Rizzi (1986a) whereby pro-drop is licensed by the valuation of phi-features. However, the syntactic literature argues against this notion.

Kayne (1975) argues that there exists in French an important distinction between weak and strong forms of pronouns (*moi*, *toi*, etc.) and that the weak forms are bound to the verb, thereby having clitic status. However, Kayne argues that both subject and object clitics have full pronominal properties. In particular, Kayne argues that indirect and object clitics appear in complementary distribution with full DPs (in 2.1.2, I present a rebuttal to this argument). Unlike object clitics, subject clitics can appear with a full DP, however Rizzi (1986b) argues that an occurrence of such is due to a left-dislocation of the of the DP with the subject clitic taking on the role of a resumptive pronoun. Both of these proposals maintain the pronominal nature of French clitics. In addition, Kayne gives three further pieces of evidence to support his view of French clitics. Firstly, Kayne argues that in negative constructions, the negative adverb *ne* intervenes between the subject clitic and verb, blocking an agreement relationship between the verb and subject clitic as shown in (2). Secondly, Kayne argues that in conjoined constructions, a clitic does not have to appear with the second verb as shown in (3). Kayne reasons that if clitics were indeed markers of agreement, they would be obligatory in both positions. Lastly, Kayne argues that the inversion of the clitic and verb in question formation further blocks an agreement relationship, stating the clitic should remain *in situ* as shown in (4).

- (2) Il ne mange pas le gâteau.  
3sg-Nom NEG eats NEG the cake  
*He does not eat the cake.*
- (3) Il mange le gâteau et boit le thé.  
3sg-Nom eats the cake and drinks the tea.  
*He eats the cake and drinks the tea.*
- (4) Mange-t-il le gâteau?  
Eats 3sg-Nom the cake  
*Does he eat the cake?*

Kayne (1991) gives further evidence for why French clitics do not licence pro-drop. This is based on the structural difference between French and Italian clitics when appearing with infinitives. Italian has the structure infinitive+clitic whereas French has the structure clitic+infinitive as can be seen in (5) and (6), respectively (taken from Kayne, 1991, p. 648):

- (5) Lui parler serait une erreur.  
3sg-Dat speak-Inf be-Cond a mistake  
*To speak to him would be a mistake.*
- (6) Parlargli sarrebe un errore.  
Speak-Inf-3sg-Dat be-Cond a mistake  
*To speak to him would be a mistake.*

Whilst Kayne argues that all Romance clitics are left adjoined to a functional head, he claims that in Italian the verb rises from V to T with the clitics adjoining to T, thus yielding the infinitive+clitic structure. In French, however, Kayne argues that the infinitive rises to INFN with the clitic directly adjoining to INFN, yielding the clitic+infinitive order. Kayne argues that the infinitive+clitic order is a key diagnosis for a pro-drop language. Taken together, these syntactic analyses support the notion that French clitics maintain full argumenthood in the syntax and attach to the verb at the level of phonology, thereby being special clitics of the sort in Zwicky (1977) (discussed in more detail in 2.2).

*2.1.1 Morphological Accounts.* Morphological accounts of CFr clitics maintain that constructions with clitics are generated in the lexicon itself by the morphological component and not by the syntax. Literature using this approach agree that CFr clitics are best analysed as a form of agreement in contrast to the syntactic literature discussed above. Unlike the syntactic analyses discussed in 2.1.1, analyses using the Head-Driven Phrase Structure framework (see P. H. Miller and Sag, 1997; Monachesi, 2000; and P. Miller and Monachesi, 2003) argue against the claim that Romance clitics (including those of French) are not special clitics that are attached postlexically. Furthermore, Monachesi (1998) claim that clitics are like the agreement morphemes in languages such as Swahili in that certain clitics can only appear in certain position classes mimicking the order of agreement morphemes. Morphological accounts support that Romance object clitics are a form of agreement, however we will see in later section that object clitics behave differently when interacting with certain auxiliaries. This complicates using position classes alone to argue that French object clitics are markers of agreement.

In keeping with this strict morphological approach, Fonseca-Greber (2000) proposes a set of subject agreement paradigms based on what she claims to be morphologised subject clitics in Swiss French. Fonseca-Greber also provides an exhaustive list of allomorphs for each morphologised subject clitic based on different phonetic environments. These allomorphs are outlined

in (7). This analysis essentially proposes a new conjugation system for Swiss French, however Fonseca-Greber states that certain forms (namely third-person singular and plural clitics) have not undergone full morphologisation. This suggests, from a diachronic point of view, that Swiss French has not developed a full agreement system based on subject clitics. This account, however, does not take into account object clitics or whether or not Swiss French could be analysed as having object agreement.

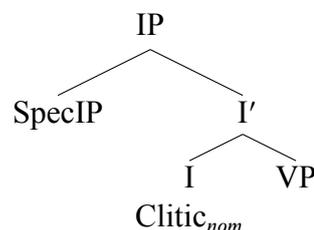
(7) Swiss French Pronominal Clitic Allomorphs

|                      | Singular           | Plural                     |
|----------------------|--------------------|----------------------------|
| 1st person           | <i>je</i> [ʒə ʒ ʃ] | <i>on</i> [ɔ̃ ɔ̃n]         |
| 2nd person           | <i>tu</i> [t]      | <i>vous</i> [vu vuz v vz]  |
| 3rd person masculine | <i>il</i> [i il]   | <i>ils</i> [i iz]          |
| 3rd person feminine  | <i>elle</i> [ɛ ɛl] | <i>elles</i> [ɛl ɛlz ɛ ɛz] |
| 3rd person neuter    | <i>ça</i> [sa s]   |                            |

*2.1.2 Morphosyntactic Accounts.* In this section, I will discuss literature that claim CFr subject clitics are agreement features. Auger (1994, 1995), Legendre and Culbertson (2008), Culbertson (2010) take a morphosyntactic approach to CFr clitics in that they affirm that constructions with clitics are handled in both a morphological component and a syntactic component. Both studies claim that subject clitics can be analysed as markers of agreement, however only Auger (1994, 1995) address both subject and object clitics. Using corpus data from the Québécois and Lyonnais dialects, both Auger and Culbertson provide data suggesting that the use of *ne*, subject-clitic inversion, and gapping in conjoined phrases are not features of the dialects in their respective studies. They claim that Kayne's (1975) analysis is based strictly on constructions found in Standard French grammar and therefore cannot apply to utterances in colloquial speech.

Culbertson further argues for an agreement-analysis of CFr subject clitics by challenging Rizzi's left-dislocation theory of clitic doubling. Culbertson argues if subject clitics are indeed affixes, that they are generated in the head of IP as shown in (8). Combination with the verb then takes places either in the syntax via movement of the verb or is combined in the morphological component. In this analysis, the clitic no longer is taken to appear in Spec IP, thereby leaving it empty for a tonic pronoun or a DP.

(8)



As stated above, Auger provides a more thorough account of French clitics by analysing both subject and object clitics. In addition to the arguments against the analysis of Kayne (1975), Auger provides an additional argument for the subject clitics as agreement claim, involving the morphological idiosyncrasy of the verb *être* 'to be' which she claims cannot be the result of phonological rules. The Québécois French paradigm for *être* is given in (9). Of particular interest is the *je suis* form which is orthographically (and phonologically, at least in Standard French) identical to the first person singular present tense of the verb *suivre* 'to follow'. Auger claims that if a mere phonological rule derives the *être* form, it should apply as well to the *suivre*

form. Auger takes the occurrence of [ʃy] to be derived morphologically. Culbertson (2010) argues using Distributed Morphology that a similar occurrence in Lyonnais French (where *je suis* is realised as [ʃqi]) is a result of Lowering followed by Fusion. In this operation, the features of the clitic are lowered and fuse with the feature of the verb.

(9) Québécois French Present Tense Paradigm for Être

|                      | Singular               | Plural                  |
|----------------------|------------------------|-------------------------|
| 1st person           | <i>je suis</i> [ʃy]    | <i>on est</i> [ɔ̃ˈne]   |
| 2nd person           | <i>tu es</i> [te]      | <i>vous êtes</i> [vzɛt] |
| 3rd person masculine | <i>il est</i> [je]     | <i>ils sont</i> [iˈsɔ̃] |
| 3rd person feminine  | <i>elle est</i> [ɛ al] |                         |

Auger (1995) argues against the claim that Québécois French object clitics are markers of agreement. She states that the doubling of accusative and dative clitics with full arguments is not obligatory and is not attested regularly in colloquial speech. This is unlike the claim put forth in Kayne (1975) who states that only subject clitics can appear with a full DP. Whilst both Auger and Kayne agree on the non-affixal status of object clitics, their differing views on subject clitics stem from analyses of two varieties of French. I argue that Auger's analysis of a colloquial variety of French accounts for the structures produced in actual speech and not those dictated by the rules of a standard grammar.

*2.1.3 Unanswered Questions.* We have hitherto reviewed literature addressing the topic of French pronominal clitics from a variety of theoretical points of view. The literature has largely analysed subject clitics alone or object clitics alone, but has not examined their interactions in a sentence together. Let us consider the sentence in (10).

- (10) Jean il            mange le gâteau  
       Jean 3sg-Nom eats    the cake  
       *John, he eats the cake.*

Whether one accepts the left-dislocation analysis of Rizzi (1986b) or the clitic-in-head-of-IP analysis of Culbertson (2010) depends on how attached one is to generative syntax or to morpho-syntactic analyses. One must ask themselves whether either of these claims or, indeed, any other of the claims outlined above would hold for a ditransitive constructions given in (11) and (12).

- (11) Jean il            te            l'            a            donné le gâteau  
       Jean 3sg-Nom 2sg-Dat 3sg-Acc Aux-pst given the cake  
       *Jean, he gave you the cake.*

In (11), we have the subject clitic separated by two object clitics and an auxiliary from the verb. Furthermore, one can observe another complication when (11) appears with the future tense auxiliary *aller* 'to go'. As can be seen in (12), the object clitics appear after the future auxiliary, unlike with the past auxiliary in (11).

- (12) Jean il            va            te            le            donner le gâteau  
       Jean 3sg-Nom Aux-fut 2sg-Dat 3sg-Acc the    cake  
       *Jean, he is going to give you the cake.*

CFr pronominal clitic structure in ditransitive sentences offers more complexities which must be accounted for. Not only must one account for the structure and movement of the clitics

themselves, but also for the difference in structure with the past and future auxiliaries.

## 2.2 Diagnosing Clitics and Agreement

Zwicky (1977) states that clitics exist in a state between a full word and agreement. He distinguishes between two types of clitics: simple and special clitics. Zwicky discusses various syntactic properties but at their most basic the former are unstressed variants of a free morpheme that appear in clitic form, bound to a host, or in its full form whilst the latter cannot exist independently of a host (as is the case with French pronominal clitics). It is these special clitics that bear most resemblance to agreement. Zwicky and Pullum (1983), analysing the English negative clitic *n't*, develop a set of six principles with which one can distinguish clitics and agreement. Monachesi (2000) claims, using this set of principles, that French pronominal clitics (as do Romanian and Italian) have a rigid dative-accusative order, must appear with all verbs in coordinated structures, show PCC effects, clitic doubling, and morphological idiosyncrasies (recall the first person singular of *être*). All this is well and good, however Nevins (2011) claims that there is one more crucial characteristic in differentiating between a clitic and agreement: tense-invariance. All CFr pronominal clitics remain unaltered in form when appearing with differently tensed verbs, thereby once more complicating our CFr clitic *histoire*.

## 2.3 Syntax of Clitic Doubling

Apart from the diagnoses discussed above, we will review literature discussing the syntax of clitic doubling and how pronouns, pronominal clitics, and agreement can be defined using their syntactic properties. Arregi and Nevins (2012), Nevins (2011), Kramer (2014), Harizanov (2014) all maintain that pronominal clitics are D-elements generated in a big-DP structure that undergo object movement whilst agreement morpheme are functional heads that undergo head movement to combine with the verb. This analysis is able to account for clitic doubling constructions in which clitics express the features of the nominal element with which they are base-generated in the big-DP. Furthermore, these studies take the raised clitics to enter into an Agree relationship with their doubled counterpart as they value the person, number, and case features. As this current study is interested in clitic structure in ditransitive constructions, we will in later sections address implications of Multiple Agree and the PCC as outlined in Nevins (2011), but applying them to CFr clitics.

## 2.4 Interim Summary

We have thus far examined two main bodies of literature: one addressing French clitics in particular and another addressing the nature of clitics and clitic doubling. The former literature provides analyses of both CFr pronominal clitics from various theoretical points of view. However, I argued that the literature does not account for how both subject and object clitics interact with each other and for the difference in structure when appearing with the future auxiliary *aller*. The latter literature serves to provide a framework with which I will examine CFr clitics in ditransitive constructions in the follow section. Based on the literature reviewed thus far, I conclude that CFr pronominal clitics are not markers of agreement for two reasons. 1) their tense-invariance and 2) non-obligatory doubling. In the following section, I will provide a morphosyntactic analysis of the interactions of CFr pronominal clitics with various auxiliaries, something that is lacking in the current literature. My analysis will be based on the analysis

of Basque pronominal clitics in Arregi and Nevins (2012). We will see that whilst French and Basque have many structural similarities, they differ in many key respects.

### 3 Morphosyntax of CFr Pronominal Clitics

#### 3.1 Comparison to Basque Pronominal Clitics

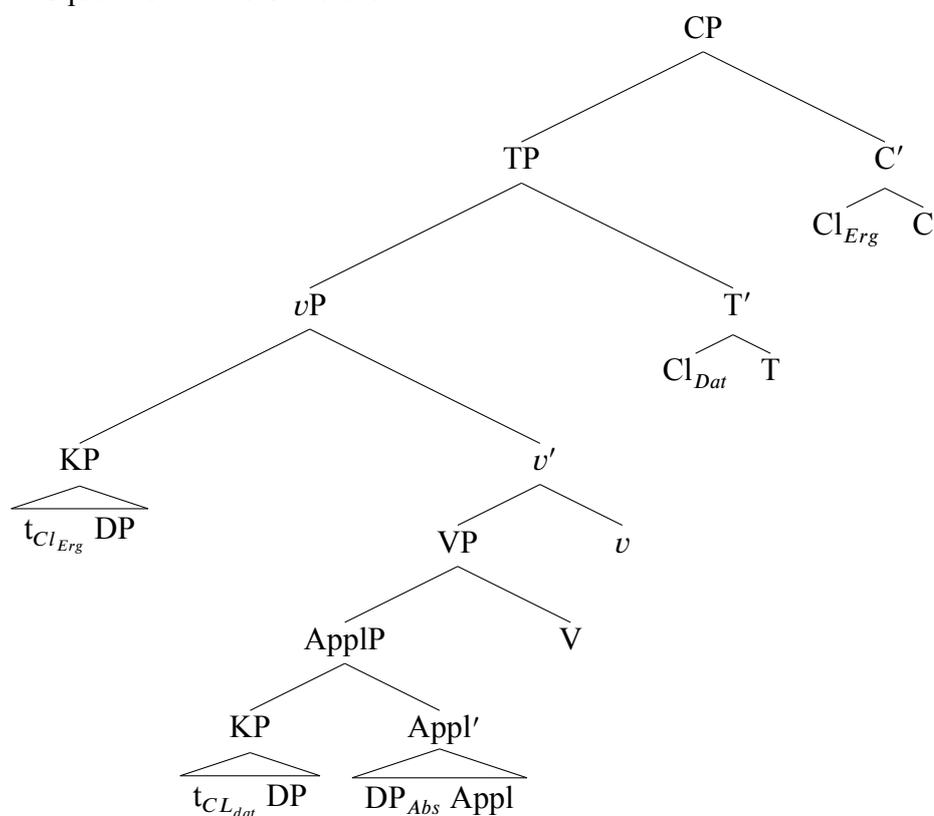
Auger (1994) states that Québécois French ditransitive constructions with doubled clitics (as shown in (13)) are a mirrored version of their Basque counterparts (as shown in (14), taken from (Laka, 1993, p. 23). This mirrored structure is due to the difference in the languages' headedness.

(13) Tu me l' a donnée, la maison, à moi, toi  
 2sg-Nom 1sg-Dat 3sg-Acc Aux-pst given the house, to me, you  
*You gave it to me, the house, to me, you.*

(14) Zuk niri etxea eman d- i- da- zu-  
 You-Erg me-Dat house-Abs gave 3sg-Abs Aux 1sg-Dat 2sg-Erg  
*You gave me the house.*

Arregi and Nevins (2012, pg. 66) give the template in (15) for clitic structure in Basque ditransitive constructions.

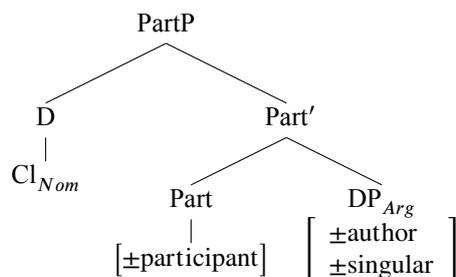
(15) Basque Ditransitive Structure



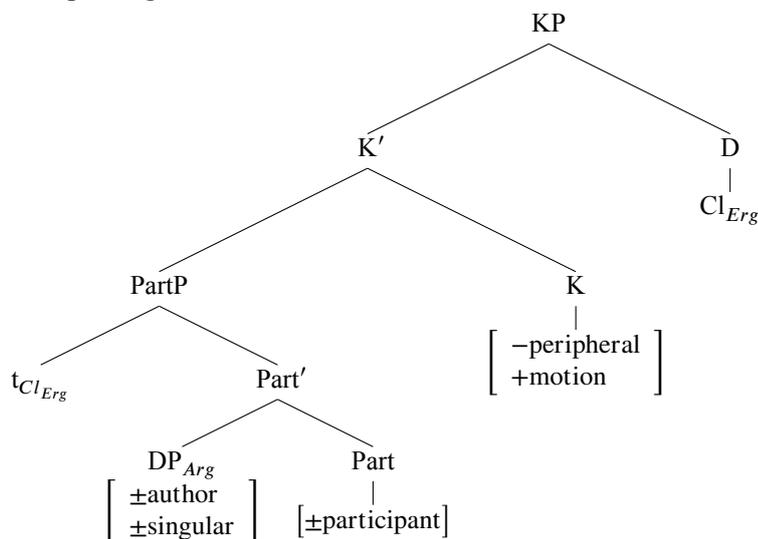
There are three important aspects of Basque clitic structure that differ from that of French. The first of which is the structure of the big-DPs that house each clitic. Since Basque is an ergative language, transitivity is marked on the subject of the sentence thereby adding an additional level of syntactic features. To house these features, the ergative clitic must have an additional

projection, KP, which houses the case features [-peripheral, +motion]. This extra layer of structure is also present for dative where the KP houses the case features [+peripheral, +motion]. In Basque, the syntactically unmarked case is absolutive, which lacks the KP projection having only a PartP projection. French, being a nominative-accusative language, lacks a KP for nominative subject clitics which—like absolutive case for Basque—are syntactically unmarked. This leaves the accusative and dative clitics to have the additional KP projection. In (16-18), I outline and compare the structures for each pronominal clitic in Basque and French.

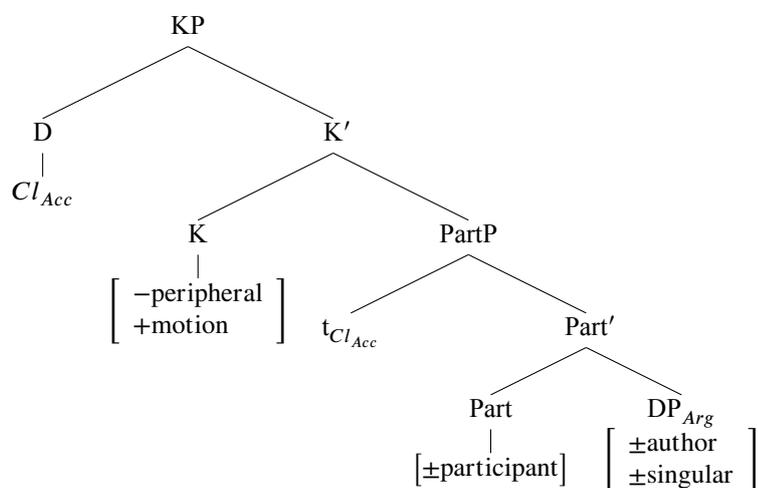
(16) a. French Nominative



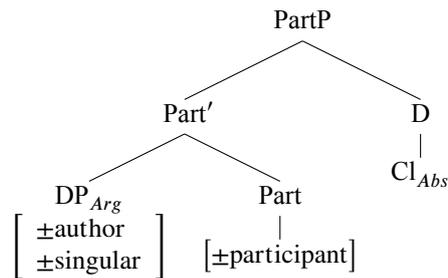
b. Basque Ergative



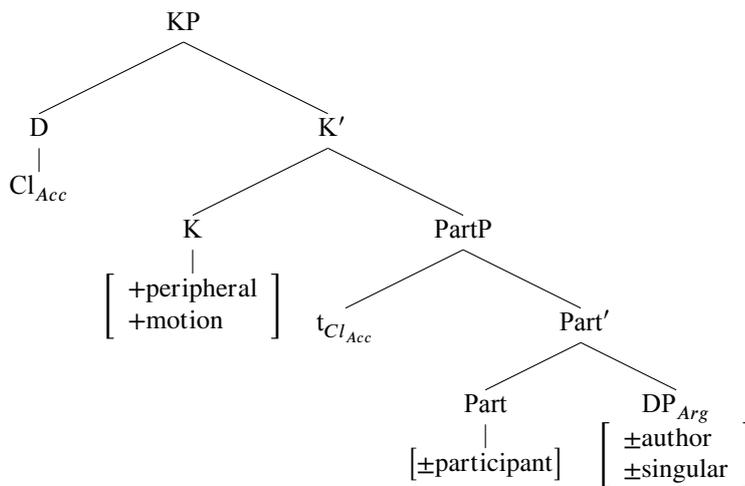
(17) a. French Accusative



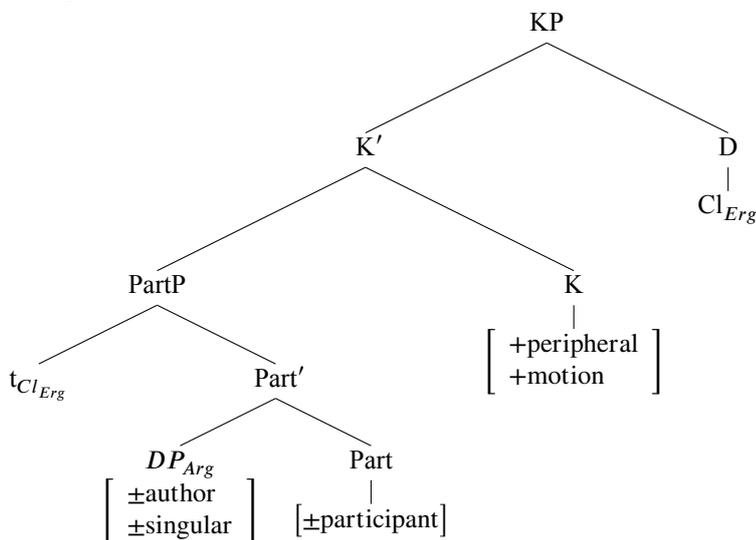
## b. Basque Absolutive



## (18) a. French Dative



## b. Basque Dative

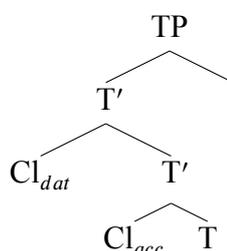


The presence of the KP projection in CFr accusative clitics is a key structural difference that sets French apart from Basque. Arregi and Nevins (2012) state that T is only able to attract one clitic (the dative clitic) in distransitive constructions. This makes a sentence such as (19) from the Ondarru dialect ungrammatical since T houses both a dative and ergative clitic. Arregi and Nevins state that because the absolutive clitics lacks the extra KP projection, it therefore lacks the structure to required for clitic doubling.

- (19) \*Eur -ak ber -ai seu -ek presenta -0 s -o -e -tz  
 they Erg him Dat you Abl.Pl introduce Prf Cl.Abs.2PL Prs.2Pl Cl.Abs.Pl Cl.Dat.3Sg  
 -0 -e  
 Cl.Erg.3 Cl.Erg.Pl  
*They introduced you(pl) to him.*

However, if we recall the sentences in (11-12) above, the clitics *te* and *le* are adjacent. Therefore, T in CFr distransitives must be able to house both the dative and accusative clitics. This is because both clitics have the KP projection, unlike the absolutive clitic in Basque, which provides the structure to allow clitic doubling. The tree in (20) illustrates the adjunction of the dative and accusative clitics under T as opposed to the Basque structure in (15).

- (20) Dative and Accusative Clitics Housed in T



It is also worth noting the order of the accusative and dative clitics when adjoined to T when compared the order of their traces in the big-DPs. In their base-generated position the order is dative-accusative, whereas in T the order is accusative-dative. The same reversal of order occurs in Basque (albeit with the ergative and dative clitics) which Arregi and Nevins claim is due to a Linearisation operation in the Morphological component. It seems that a common denominator in the differences between French and Basque clitic structure is the presence of the KP. Arregi and Nevins state that T sends out a probe that searches for absolutive and dative goals. Since the absolutive clitic lacks the KP, it prohibits its movement to T. In French, however, the accusative clitics does have the KP allowing T to house both clitics. Arregi and Nevins further claim that in addition to the Probe-Goal relation, there is the additional postsyntactic operation of Agree-Copy by which the phi-features of the Goals are copied onto the Probe thereby accounting for the appearance of clitic doubling. This is the analysis I will adopt for CFr pronominal clitics. In 3.3, we will examine in further detail the instances of Multiple Agree and Person Case Constraints (PCC) in CFr. We will now turn to the issue of tense auxiliaries and the difference between French and Basque in their how they interact with the pronominal clitics.

### 3.2 Clitic Structure with Auxiliaries

Let us again recall the sentences in (11-12) and the difference in clitic structure with the past tense auxiliary *avoir* and the future tense auxiliary *aller*. In (12), *aller* intervenes between the subject clitic and the object clitics. This difference in structure is yet another key difference between CFr and Basque clitic structure. Arregi and Nevins (2012, p. 120) give the template in (21) for Basque clitics attached to the auxiliary. This ordering of clitics remains the same for all tenses.

- (21) Abs clitic – Tense/Agreement – Dat clitic – Erg clitic – Comp agreement – Comp

I will outline the clitic structure in present tense and with the past and future auxiliaries in the following sections. Whilst accounting for the structure in the present and past tense is straightforward, we will see that we must account for an additional projection to account for the movement of the future tense auxiliary<sup>1</sup> causing it to intervene between the subject and object clitics.

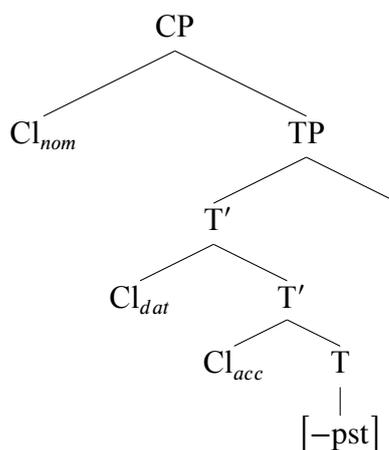
*3.2.1 Present Tense Structure.* In CFr, regular verbs in the present tense have mostly lost all agreement apart from the 2PL ending *-ez* (realised as /e/). This morphological erosion is, in fact, an argument for the analysing of CFr pronominal clitics as markers of agreement. The table in (22) gives the present tense paradigm for the verb *donner* 'to give'.

(22) Present Tense Paradigm of *donner* 'to give'

|            | Singular      | Plural            |
|------------|---------------|-------------------|
| 1st person | je donne      | on donne          |
| 2nd person | tu donne      | vous donnez       |
| 3rd person | il/elle donne | ils/elles donnent |

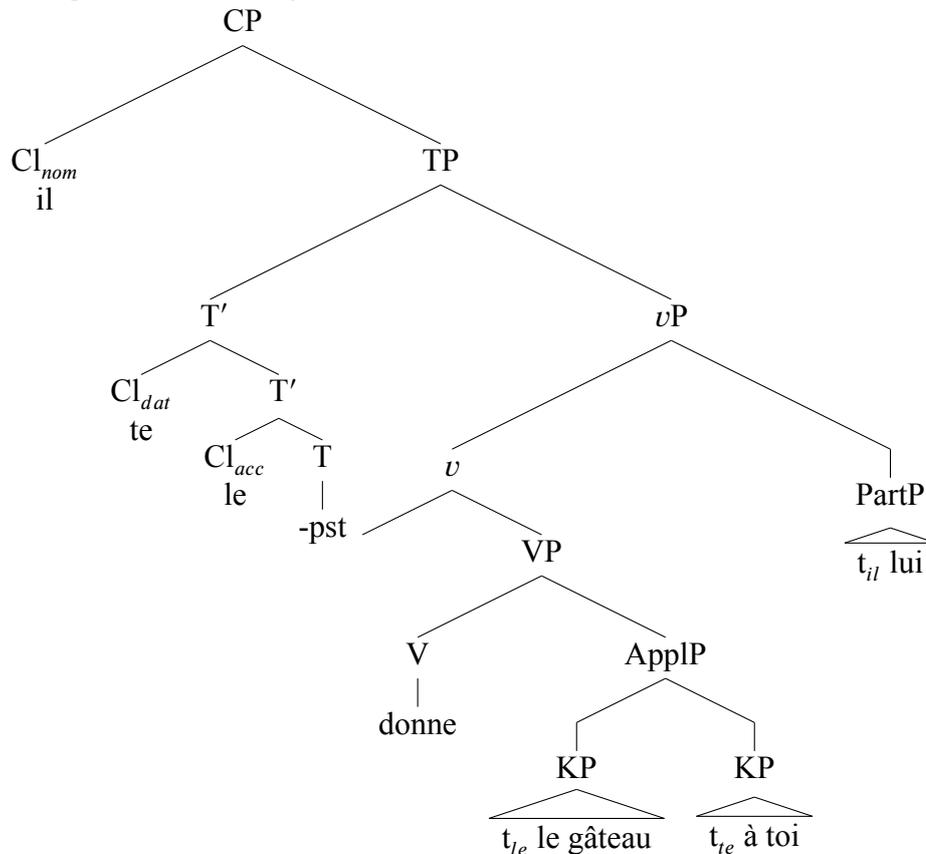
Due to the lack of a present tense auxiliary the clitics attach directly to the verb. The tree in (23) illustrates the template for CFr clitic structure in the present tense. Furthermore, if we consider the sentence and tree in (24) we can see the movement from within the big-DPs for each pronominal clitics. In the following examples, I will provide sentences which include clitic doubling for the purpose of illustrating the structure of such sentences. However, it must be borne in mind that this structure, although grammatical, is not obligatory in CFr as it is in Basque.

(23) Clitic Structure in Present Tense



<sup>1</sup> I should remark that French has separate a future tense (*le futur simple* 'the simple future') with a conjugation paradigm similar to its other Romance brethren. The constructions using the verb *aller* (known as *le futur proche* 'the near future' literally translate to 'going to'). However, just as French lost its *passé simple* 'simple past' in favour of the *passé composé* 'the composite past', the simple future in colloquial dialects is increasingly encroaching on the use of the simple future

- (24) Il te le donne, le gâteau, à toi, lui.  
 3SG-Nom 2SG-Dat 3SG-Acc gives the cake to you him  
 ‘He gives the cake to you.’



CfR clitic structure in the present is straightforward due to the lack of present tense auxiliary. This is yet another way CfR differs from Basque which uses an auxiliary for both present and past tense.

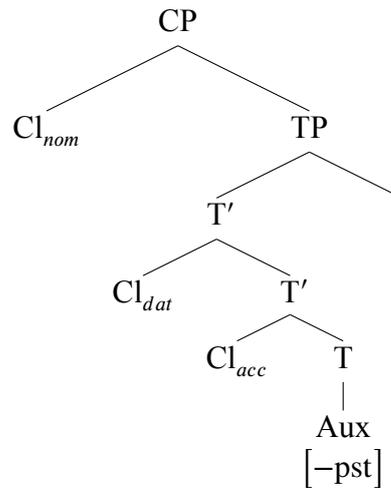
*3.2.2 Past Tense Structure.* CfR, like Basque, uses two past tense auxiliaries: *avoir* for transitive verbs and *être* for intransitive and reflexive verbs. Since this investigation is concerned with clitics structure in ditransitives, the structure of reflexive clitics is outside the scope of our analysis. The table in (25) outlines the paradigm for *avoir* which is inflected to agree with the subject.

- (25) *Avoir*

|            | Singular | Plural |
|------------|----------|--------|
| 1st person | ai       | a      |
| 2nd person | as       | avez   |
| 3rd person | a        | ont    |

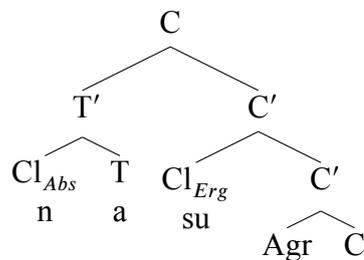
The tree in (26) illustrates the template for CfR clitic structure with the past tense auxiliary. The ordering of the clitics is the same as in the present tense.

## (26) Clitic Structure with Past Auxiliary

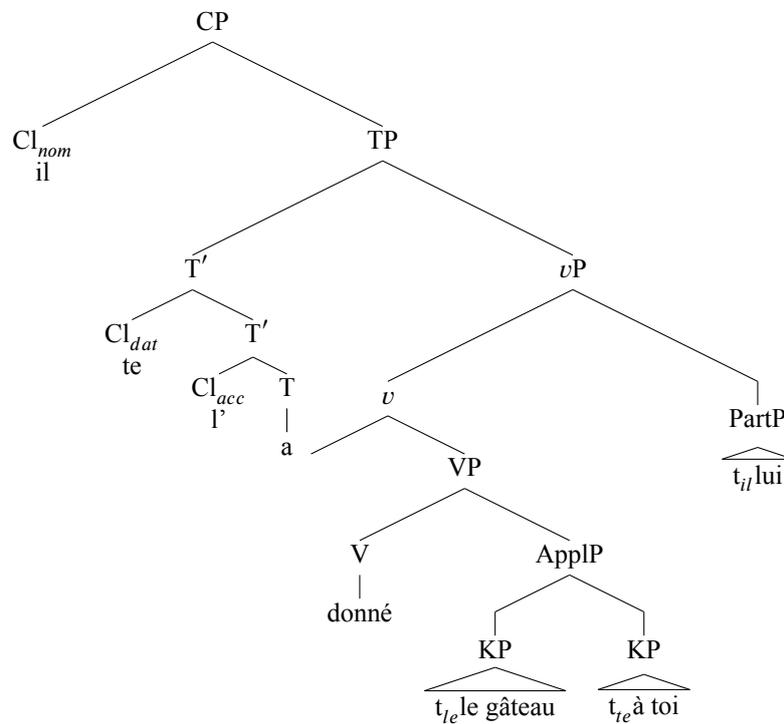


Let us consider the Basque sentence (taken from Arregi and Nevins, 2012, p. 34) and the structure of the auxiliary *nasu* given in (27). We can see that the absolutive and ergative clitics are separated by the past auxiliary *a*. This structure is unlike the French auxiliary structure given and illustrated in (26) where the past auxiliary does not intervene between any of the clitics. The sentence in (28) shows a full sentence with doubled arguments to illustrate the movement of the clitics.

- (27) Su -k ni -0 ikus -i n -a -su  
 2SG Erg 1SG Abs see -Prf Cl.1SG.Abs Aux.Pst.1sg Cl.2Sg.Erg  
*You have seen me.*



- (28) Il te l' a donné, le gâteau, à toi, lui  
 3SG.Nom 2SG.Dat 3SG.Acc Aux.Pst given the cake to you him  
*He gave you the cake.*



3.2.3 *Future Tense Structure.* We have seen that CFr clitics structure with the past tense auxiliary is similar to Basque in that the pronominal clitics cluster around the auxiliary, although with a different linear order. Unlike Basque, a template for CFr clitic structure cannot be generalised due to the lack of a present tense auxiliary and a different structure with the future tense auxiliary. We will now examine how the clitics interact with the future tense auxiliary and what additional syntactic structure is required to account for the movement of the future tense auxiliary. Similar to the past tense auxiliary, the future tense auxiliary *aller* is inflected to agree with the subject of sentence as shown in (29).

- (29) *Aller*

|            | Singular | Plural |
|------------|----------|--------|
| 1st person | vais     | va     |
| 2nd person | vas      | allez  |
| 3rd person | va       | vont   |

Just as CFr lacks a present tense auxiliary, Basque similarly lacks a future tense auxiliary. In the sentence given in (30) (taken from Arregi and Nevins, 2012, p. 338), the future tense morpheme *-iko* is not attached to the clitic-auxiliary formation, rather it appears on the verb *bidal*. The auxiliary however is marked for a non-present tense, however, there is no separate class of future tense auxiliaries.

- (30) Jon -ek eta Miren -ek lagun -ei liburu -ak bidal -iko d -izki -o -e  
 Jon Erg and Miren Erg friend Dat book Abl.Pl send Fut L -Prs.3Pl Cl.3.Dat Cl.3PL  
 -0 -te  
 Cl.Erg Cl.3PL  
*Jon and Miren will send the books to their friends.*

Consider now the sentence given (31), the same given in (13) but again with clitic doubling.

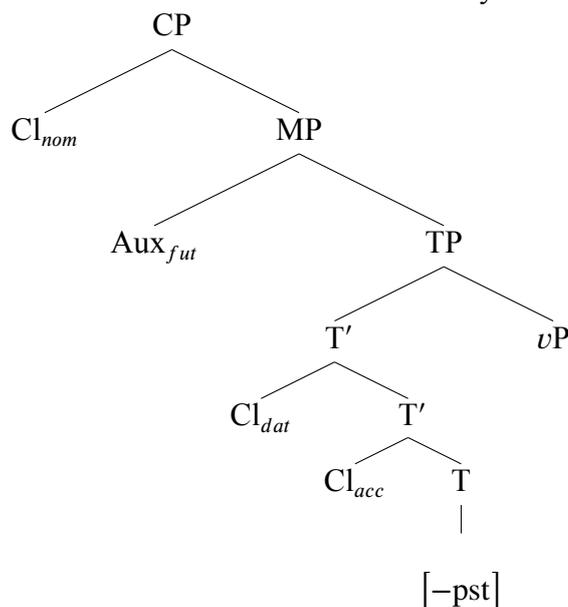
- (31) Il va te le donner, le gâteau, à toi, lui  
 3SG.Nom Aux.Fut 2SG.Dat 3SG.Acc. the cake to you, him  
*He will give the cake to you.*

We must consider how to account for the position of the future tense auxiliary between the subject and object clitics. We will now consider the analysis of Balkan clausal structure in Rivero (1994) which discusses verbal structure with future tense auxiliaries. Let us consider the Bulgarian example in (32) (taken from Rivero, 1994, p. 67).

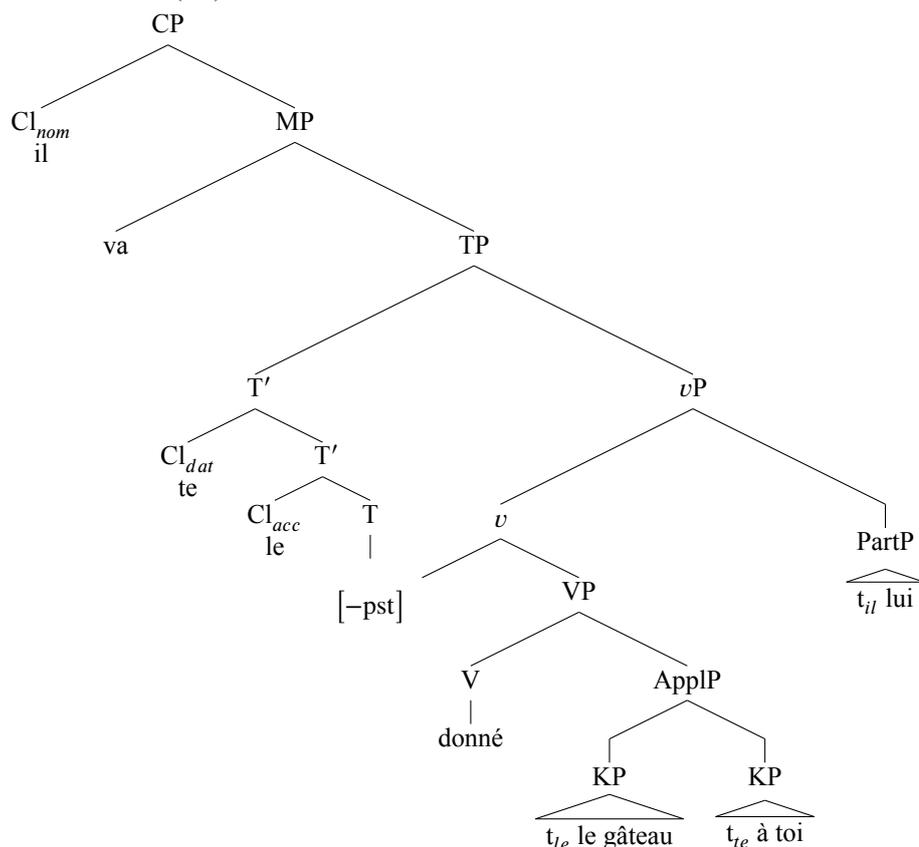
- (32) Znam će az šte četa  
 Know-1SG that I will read  
*I know that I will read.*

Rivero claims that the future auxiliary *šte* is housed in the M(ood) Phrase. However, Rivero states that in the Balkan languages only inflected items can appear after an auxiliary housed in an uninflected M. The opposite is true for French in which the future auxiliary is inflected for person and the verb appears in the infinitive. Rivero also claims that in the Balkan languages, M is the locus for subjunctive markers. Although, CFr does not have a subjunctive auxiliary, verbal paradigms (like Basque which lacks a future auxiliary) often have a past/non-past distinction with the future tense being conveyed by a subjunctive particle or morpheme. Rivero's analysis suggests that in the Balkan languages, the future auxiliary is base-generated in M. I will accept the same analysis for the French *aller*. The tree in (33) illustrates the CFr clitic structure with the future auxiliary and the tree in (34) illustrates the structure of the sentence in (31).

- (33) Clitic Structure with Future Auxiliary



## (34) Structure of (31)



## 3.3 Multiple Agree and PCC in CFr

In this section, I will examine CFr clitic structure looking at the implications of Multiple Agree and PCC have on clitic combinations constraints. Let us first layout a list of features and exponents for CFr clitics since Multiple Agree operates in terms of valuing features which are then phonological realised by the insertion of exponents in Vocabulary Insertion.

*3.3.1 CFr Exponent List*. In (35-37), I give the vocabulary entries for first, second, and third person clitics in IPA transcription. The features bundles given below are housed in the big-DP structures as outlined in 3.1.

## (35) First Person Clitics

|                          | [+auth +part -plural] | [+auth +part +plural] |
|--------------------------|-----------------------|-----------------------|
| Nom[-motion -peripheral] | [ʒə]                  | [ʒ(n)]                |
| Acc[+motion -peripheral] | [mə]                  | [nu]                  |
| Dat[+motion +peripheral] | [mə]                  | [nu]                  |

## (36) Second Person Clitics

|                          | [-auth +part -plural] | [-auth +part +plural] |
|--------------------------|-----------------------|-----------------------|
| Nom[-motion -peripheral] | [ty]                  | [vu]                  |
| Acc[+motion -peripheral] | [tə]                  | [vu]                  |
| Dat[+motion +peripheral] | [tə]                  | [vu]                  |

## (37) Third Person Clitics

|                          | [-auth -part -plural ] | [-auth -part -plural] |
|--------------------------|------------------------|-----------------------|
| Nom[-motion -peripheral] | [i(l)]                 | [ɛl]                  |
| Acc[+motion -peripheral] | [lə]                   | [la]                  |
| Dat[+motion +peripheral] | [lɥi]                  | [lɥi]                 |

|                          | [-auth -part -plural ] | [-auth -part +plural] |
|--------------------------|------------------------|-----------------------|
| Nom[-motion -peripheral] | [iz]                   | [ɛl]                  |
| Acc[+motion -peripheral] | [le]                   | [le]                  |
| Dat[+motion +peripheral] | [løʁ]                  | [løʁ]                 |

Compared to the Basque exponents outlined in Arregi and Nevins (2008) and Arregi and Nevins (2012), CFr display a higher level of syncretism, especially between the accusative and dative clitics. Across all three persons, the accusative and dative forms are identical. This suggests that the feature [+motion] is unspecified in CFr since both accusative and dative cases have this feature in common. The second person plural and third person clitics also display interesting characteristics. The former displays syncretism across all three cases, whilst the latter displays accusative and dative syncretism across both genders. If we recall, the second person plural form is the last form to have a distinct agreement morpheme. This suggests that the second person plural in CFr is marked form, just as the feminine third person plural, which Fonseca-Greber (2000) claims has become the marked form in Swiss French. One can account for this by claiming that gender in the third person plural has become unspecified.

*3.3.2 Multiple Agree.* Multiple Agree consists of two operations: the syntactic Probe-Goal relationship which establishes agreement and the post-syntactic Copy-Agree which causes the features of the Goal to appear on the Probe after Vocabulary Insertion. It is this latter operation that causes the appearance of clitic doubling. Agreement is initiated by Probes in C and T. The Probe in C searches to value the person and number features of a nominative goal. In T, however, two Probes are present searching to value the person and number features of an accusative and nominative goal. Recall that in Basque ditransitives, T is able to only attract the dative clitic whilst in CFr it is able to attract both accusative and dative clitics due to the projection of KP in French accusative clitics. Consider the ditransitive sentence given in (38).

- (38) Je        te        l'        ai        envoyé, un cadeau, à toi, moi  
 1SG.Nom 2SG.Dat 3SG.Acc Aux.Pst sent    a present to you me  
*I sent you a present.*

In this sentence, T probes for the features [ $\pm$  peripheral,  $\pm$  motion, -author,  $\pm$  participant] which are valued by the accusative and dative clitics' base-generated position in the specifier of KP. Likewise, C probes for the features [-peripheral, -motion, +author, +participant] which are valued by the nominative clitic in the specifier of PartP. The movement of these three clitics from their specifier positions in KP or PartP to T or C in essence copies the features of the Goal (the clitics in their base-generated position) and causes them to appear in the node where the original Probe initiated the Agree operation.

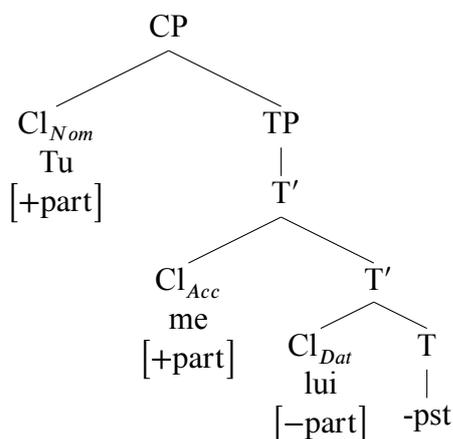
*3.3.3 PCC Effects in CFr.* Having outlined the CFr exponent list and how Multiple Agree operates in CFr ditransitive constructions, I will now discuss PCC effects in French and account for them using the Continuous Agree condition as discussed in Nevins (2011). French exhibits

Weak PCC effects whereby it doesn't allow for combinations of first person or second person accusative clitics with third person dative clitics. Therefore, the sentence in (39) is ungrammatical. To express this sentence grammatically, there must be a full pronoun present without the clitic as shown in (40). This suggests that Multiple Agree has been blocked for this combination.

- (39) \*Tu me lui présentes  
 2SG.Nom 1SG.Acc 3SG.Dat present  
*You present me to him.*
- (40) Tu me présentes à lui  
 2SG.Nom 1SG.Acc present to him  
*You present me to him.*

The sequence *me lui* is peculiar since it does not follow the usual order of dative-accusative as in all other ditransitive constructions thus analysed. One must consider why the Linearisation operation discussed in 3.1 does not occur for this sequence of clitics. Nevins (2011, p. 293) states that this structure is ungrammatical due to an underlying structure whereby the indirect object c-commands the direct object. Let us consider the features of the object clitics in (39). The accusative clitic *me* bears the features [-author, +participant, +motion -peripheral] and the dative clitic bears the feature [-author, -participant, +motion, +peripheral]. The key feature for which the Probe search is the marked feature [+participant]. The Continuous Agree condition stipulates that a non-marked feature cannot interrupt the agreement span between the Probe and Goal. If we consider the structure of (40) given in (41), we can see that the 3SG.Dat clitic and the [-participant] feature blocks Multiple Agree. Since this first step is blocked, the second operation of Linearisation cannot take place thereby leaving the object clitics in the dative-accusative order.

- (41) Continuous Agree Violated



Although I have stated French exhibits Weak PCC effects, Anagnostopoulou (2014) states that French has been claimed to exhibit Strong PCC effects as well where any direct object clitic must be third person. If, in fact, French can be analysed as a Strong PCC language where a sentence in (42) would be ungrammatical, it might have interesting implications on the debate on CFr clitics status as markers of agreement.

- (42) ?Il te me présente  
 3SG.Nom 2SG.Acc 1SG.Dat  
*He presents me to you.*

Anagnostopoulou states that languages with pronominal clitics show Weak PCC effects and languages with proper agreement show Strong PCC effects. French seems to be somewhere between these two types of PCC effects. Anagnostopoulou cites Nicol (2005) as stating French has never allowed Strong PCC effects whilst Walkow (2012) claims that some speakers show Weak PCC effects. An analysis of speakers' judgements of such constructions is beyond the purpose of this investigation, but the uncertainty of whether French is a strictly Weak PCC or strictly Strong PCC language suggests dialectical variation or a transitional stage in the language's development. This brings us to the topic of our next section in which I will address how CFr grammar in its current stage has diachronic implications.

### 3.4 Interim Summary

I have thus far provided an overview of the morphosyntactic structure of CFr pronominal clitics. Although CFr and Basque are similar in that they have pronominal clitics that outwardly resemble agreement features, they differ in three key respects: 1) The structure of the big-DPs in which the pronominal clitics are generated, 2) the difference in clitic-auxiliary structure between past and future tense, and 3) the non-obligatory clitic doubling in CFr as opposed to the obligatory doubling in Basque. The nominative-accusative structure of CFr is a major contributor to these differences in structure due to the presence of the KP projection in different cases. In addition, I have outlined how Multiple Agree and PCC effects manifest themselves in CFr causing restrictions on clitic combinations.

Let us now recall the agreement marker debate for CFr clitics. The morphological and morphosyntactic literature outlined in Section 2 differ on their views of agreement in CFr. The morphological literature leans towards treating all pronominal clitics as agreement, whilst the morphosyntactic literature (especially the analyses of Auger) lean toward CFr having only subject agreement. I concluded in 2.4 that CFr pronominal clitics are not markers of agreement due their non-obligatory doubling and tense-invariance. Even if the examples with optional clitic doubling given throughout Section 3 were instances of obligatory doubling, one would still be hard-pressed to claim that CFr clitics are morphologised agreement markers. For each pronominal clitic, I have shown that they are best analysed as pronominal elements generated in a big-DP that undergo post-syntactic movement in a Copy-Agree operation. However, there are various occurrences in CFr that lead me to conclude the language is at transitional state. In following section, I will discuss how the mechanisms necessary for CFr to develop an agreement system based on morphologised pronominal clitics whose person and case features will undergo Fusion with T.

## 4 Diachronic Implications

### 4.1 Cyclicity in Language Change

*4.1.1 Development of the Future Tense from Proto-Latin to French.* In this section, we will examine the historical development of verbal agreement in the future tense in Latin and French. Both languages exhibit periods in which they employed periphrastic constructions in which the auxiliary verbs had undergone morphologisation creating agreement morphemes. Let us first consider the future tense paradigm for the Latin verb *cantare* 'to sing' given in (43).

(43) Future Tense Paradigm of *cantare*

|               | Singular | Plural     |
|---------------|----------|------------|
| First Person  | cantabo  | cantabimus |
| Second Person | cantabis | cantabitis |
| Third Person  | cantabit | cantabunt  |

Hopper and Traugott (2003) propose that the forms given above stem from a proto-Latin periphrastic construction with the verb and an auxiliary derived from the PIE root *\*bhu* ‘become’. For example, using this analysis, the form *cantabimus* would have been derived from *\*kanta bhumos*. I should note that this construction is similar to the imperfect future constructions found in the Slavic languages which use the future verb *bud-* ‘will be’ (likewise derived from *\*bhu*) plus the imperfect infinitive form of the verb. Unlike in the Slavic languages, the future auxiliary in proto-Latin morphologised into a future tense agreement morpheme. The development of the future tense in French from Vulgar Latin is similar to the formation of the Latin future from PIE. (44) gives the future tense paradigm for the verb *chanter* ‘to sing’.

(44) Future Tense of *Chanter*

|               | Singular  | Plural     |
|---------------|-----------|------------|
| First Person  | chanterai | chanterons |
| Second Person | chanteras | chanterez  |
| Third Person  | chantera  | chanteront |

This construction stems from a periphrastic construction from Vulgar Latin in which the future forms in (43) were lost in favour of a periphrastic construction using the auxiliary verb *habere* ‘to have.’ The Latin verb *habere* eventually developed into the French verb *avoir* which exhibits a high degree of phonological erosion. The table in (45) demonstrates this progression.

(45) Development of *Avoir* from *Habere*

|               | Singular  | Plural         |
|---------------|-----------|----------------|
| First Person  | habeo >ai | habemus >avons |
| Second Person | habes >as | habetis >avez  |
| Third Person  | habet >a  | habent >ont    |

If we compare the the future forms given in (44) with the forms given in (45) we can see that the agreement morphemes for the French future are the same as the conjugated forms of the verb *avoir*. Whereas in Vulgar Latin to say ‘I will sing’ was the periphrastic *cantare habeo*, in French, after a series of phonological changes and the morphologisation of the verb *habere*, it became *chanterai*. Longobardi (2001, p. 278) suggests that languages are inert to syntactic change and that this change must be caused by other linguistic changes such as phonological or semantic changes. Using this notion, the reduced phonological nature of *avoir* might have very well been a catalyst for the verb’s morphologisation. The expression of the future tense during the development from proto-Latin to French has always included the morphologisation of an auxiliary verb resulting in the creation of an agreement morpheme. Therefore, it seems that the development of French has been cyclical with the morphologisation and grammaticalisation of a lexical item as the key turning point between stages of the language. This notion has heavy implications when analysing the CFr auxiliaries discussed above. If, in fact, a language develops cyclicly, one of the CFr auxiliaries should be prone to undergo morphologisation.

*4.1.2 Pro-Drop During the Development of French.* In its current state, I have stated that CFr exhibits neither subject nor object agreement. However, in its early stages French was a pro-drop language with subject agreement. If we recall the present tense paradigm given in (23), there exists only one distinct conjugation for the second person plural. In Old French, each person had a distinct agreement morpheme, as shown in (46).

(46) Present Tense Agreement Morphemes of Old French

|               | Singular            | Plural                 |
|---------------|---------------------|------------------------|
| First Person  | -0                  | - $\tilde{s}$          |
| Second Person | - $\epsilon s$      | - $\epsilon ts$        |
| Third Person  | - $\epsilon \delta$ | - $\tilde{\epsilon} t$ |

During the language's progression through Middle and Early Modern French, these conjugations underwent levelling with the loss of the third person singular [- $\epsilon \delta$ ], the second person singular [- $\epsilon s$ ], and the third person plural [- $\tilde{\epsilon} t$ ] until their current state in CFr. Due to the distinct agreement morphemes for each person in Old French, it was able to license pro-drop. During this stage of the language the subject clitics of Old and Middle French were able to be used as tonic pronouns. Once French had begun to lose subject agreement on the verb, it lost the ability to license pro-drop and the subject pronouns had become obligatory. Due to a series of phonological changes in which Middle French developed a final stress pattern, the subject pronouns could no longer bear stress, thereby starting the process of cliticisation.

This brings us to the current state of CFr. Just as the development of the future tense in both Latin and French went through a cycle of use periphrastic constructions and morphologisation, French has likewise gone through periods of licensing pro-drop. Although in its current form, the tense-invariance of the pronominal clitics and non-obligatory subject and object doubling prevent one to claim that CFr is pro-drop for either subjects or objects, I have suggested that the language is in a transitional state and that the pronominal clitics are likely to undergo morphologisation with an auxiliary in a future form of French. In the following section, we will take up some literature which suggests that there is a spectrum between independent word and agreement and that various sorts of clitics can occupy the space in the middle of the spectrum.

## 4.2 The Clitic-Agreement Spectrum

Although in 2.2 we looked at literature addressing the distinction between clitics and agreement, we will now look at the distinction, but in terms of existing on a continuum. Franco (2000) states that if agreement is considered as 'an absolute, full-fledged, unrestricted verb-argument relation across the board' that very few languages could be considered to have agreement. Franco further states that the concept of agreement could be relativised as an increasing continuum.

*4.2.1 Object Clitic Doubling vs Agreement.* Speaking in regard to object agreement, Franco proposes a list of ten elements, given in (47), which determine the extent to which a language falls on the agreement spectrum.

- (47)
- a. Strict Adjacency to V/Aux
  - b. Syntactic unit with host
  - c. Same specifier host
  - d. Fixed order

- e. Feature erosion in the forms
- f. Different paradigm selection
- g. Co-occurrence with accusative arguments
- h. Unrestricted co-occurrence
- i. Obligatoriness of co-occurrence
- j. Co-occurrence with prepositional NP

Franco claims that French ‘scores’ 3 out of 10, exhibiting elements (a-c) whilst Basque exhibits all ten elements. I argue, however, that CFr also exhibits element (e). If we recall the exponent lists given in (35-37), dative clitics exhibit erosion of gender feature in both singular and plural 3rd person. Likewise, there is erosion of case features across dative and accusative for non-third person clitics. This would bring CFr one more point up the agreement continuum. Based on these criteria, CFr object clitics are low on the agreement spectrum (even with the addition of exhibiting element (e)) tending towards independent words rather than agreement features. This yet adds another piece of argumentation towards CFr not having object agreement. Franks (2009) further comments on this clitic-agreement spectrum claiming that there are, in fact, two varieties of clitics: pronominal and agreement clitics. Franks states that clitics that are K heads (as are CFr dative and accusative clitics and Basque ergative and dative clitics) are of the pronominal sort and clitics that are Agr heads are of the agreement sort (as are Macedonian clitics). This puts CFr nominative clitics in an interesting position as they are neither K nor Agr heads (recall the big DP structure given in (17) for nominative clitics). In addition, neither Franco nor Franks address the continuum between subject clitics and subject agreement.

*4.2.2 Subject Clitic Doubling vs Agreement.* Fuß (2005) provides the syntactic criteria given in (48), for determining if a subject clitic is in fact a marker of agreement. We will see below that CFr subject clitics exhibit two out of four of these criteria which suggest that CFr subject clitics are still tending towards the independent word end of the agreement spectrum.

- (48)
- a. Obligatory doubling
  - b. The doubled argument can be indefinite/non-specific
  - c. Anti-agreement between clitic and the doubled argument
  - d. Clitic appears in subject gap environments

We have already encountered criteria (a), (b), and (d), in Section 2. Although, in CFr doubled subjects are a grammatical structure and are frequently used by speakers, the doubling is still not obligatory as noted by Auger. However, doubled arguments with indefinite/non-specific arguments, like that given in (49), are ungrammatical in all occurrences. However, Legendre, Culbertson, Barriere, Nazzi, and Goyet (2010) observe the occurrence of clitic doubling with the indefinite quantifier *tout le monde* ‘everybody’ with the third person singular clitic *il* in children’s speech.

- (49) \*Personne il ne mange le gâteau.  
 Nobody 3SG neg eats the cake.  
*Nobody eats the cake.*

Legendre et al. state that this is evidence suggesting that children’s speech exhibits a brief period in which they produce an advanced stage of CFr in which quantifiers are doubled as in some Northern Italian dialects. In regard to criterion (c), it would seem that colloquial varieties of French exhibit anti-agreement due to the loss of using the feminine forms, especially for third person plural. Therefore, the sentence given in (50) would be grammatical despite the feminine

subject and the inherently masculine subject clitic *il*. Criteria (d) is that last of these proposed by Fuß. Subject clitics, unlike object clitics, are obligatory in gapping environments as argued by Culbertson. Recall, that Kayne argued, using Standard French structure, that gapping is not obligatory. In addition, Fuß provides morphological criteria which essentially follow the principles given in Zwicky and Pullum (1983).

- (50) Ils mangent le gâteau, les filles  
 Cl.3PL eat the cake the girls  
*The girls eat the cake.*

To summarise, based on the criteria herein discussed, CFr subject clitics are best analysed as the pronominal sort as discussed by Franks. I propose that the key feature that pronominal clitics must have in order to become agreement clitics is obligatory doubling with full DPs. In order to traverse the ambiguous boundary between clitic and agreement, I argue that the final step is for the clitic to become tense-variant. If being able to express tense as well as person, number, and case features is a key feature of agreement, one must consider from a diachronic point of view, how tense-variance would arise on a clitic. Building on the notion of cyclicity in language change discussed in 4.1, I will consider how the difference in clitic structure with the auxiliaries *avoir* and *aller* might have an effect on the morphologisation and grammatilisation of the pronominal clitics with these auxiliaries. In the following section, I will address the steps necessary for a pronominal clitic to become a tense-variant marker of agreement.

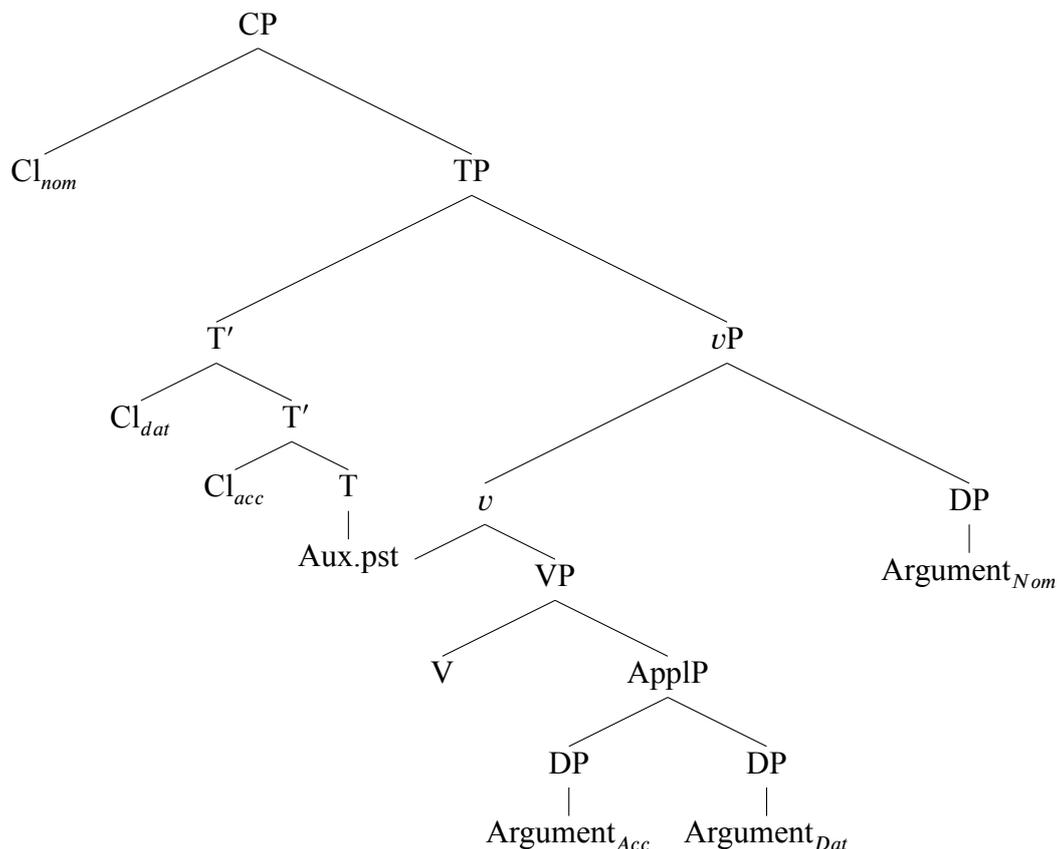
### 4.3 Traversing the Clitic-Agreement Boundary

Before CFr pronominal clitics can be reanalysed as markers of agreement, their doubling with full DPs must become obligatory, thereby causing the clitics to become of the agreement sort. As we have discussed, in the current state of CFr clitic doubling is grammatical and more frequently used in colloquial speech, however it is not yet obligatory. Determining the ways by which the mental grammar of speakers would require obligatory clitic doubling is outside the scope of this investigation. Culbertson and Legendre (2014) claim that speakers have access to both the grammar of CFr and the standard language. This access to the grammar of the standard language could be a major obstacle in speakers adopting clitic doubling in all cases. Although I doubt *L'Académie Française* will give its blessing on clitic doubling in the near future, the mere grammaticality of the occurrence in the colloquial language suggests that in a future form clitic doubling will become obligatory.

In discussing the reanalysis of Bavarian German subject clitics as agreement features, Fuß (2005) proposes a series of syntactic steps a language must undergo for the subject clitic to become agreement. The first of these steps is the structure simplification of the big-DP structures in which clitics are housed. With this occurrence, a language would lose the ability to accommodate the structure necessary for clitic doubling. This would require the clitic to be base-generated elsewhere in the syntax. This would also lead to the failure of a Multiple Agree operation as there are no clitics to copy the feature of an argument on the probe in C or T. With the loss of a big-DP structure, Fuß claims that there are two consequences: the stranding of the subject clitic in C and the loss of the clitic bearing a theta-role. In effect, with the loss of its argumenthood, the subject clitic becomes a bundle of dissociated agreement features. In order to maintain argument structure, Fuß claims that the doubled argument in the once big-DP structure now receives a theta-role from *v*. As Bavarian German is a V2 language, the verb raises from V to C causing the once subject clitic, which are now morphologised exponents of features, to appear after the verb.

Let us now consider the implications these syntactic steps have for CFr. One major difference between CFr and Bavarian German is that CFr is not a V2 language; therefore, the verb does not move to C thereby prohibiting a clitic to morphologise at the end of the verb<sup>2</sup>. This leaves the auxiliary to be the host for a morphologised pronominal clitic in CFr. Let us consider the past tense structure with *avoir* given in (51), but without the big-DP and the pronominal clitic stranded in C and T.

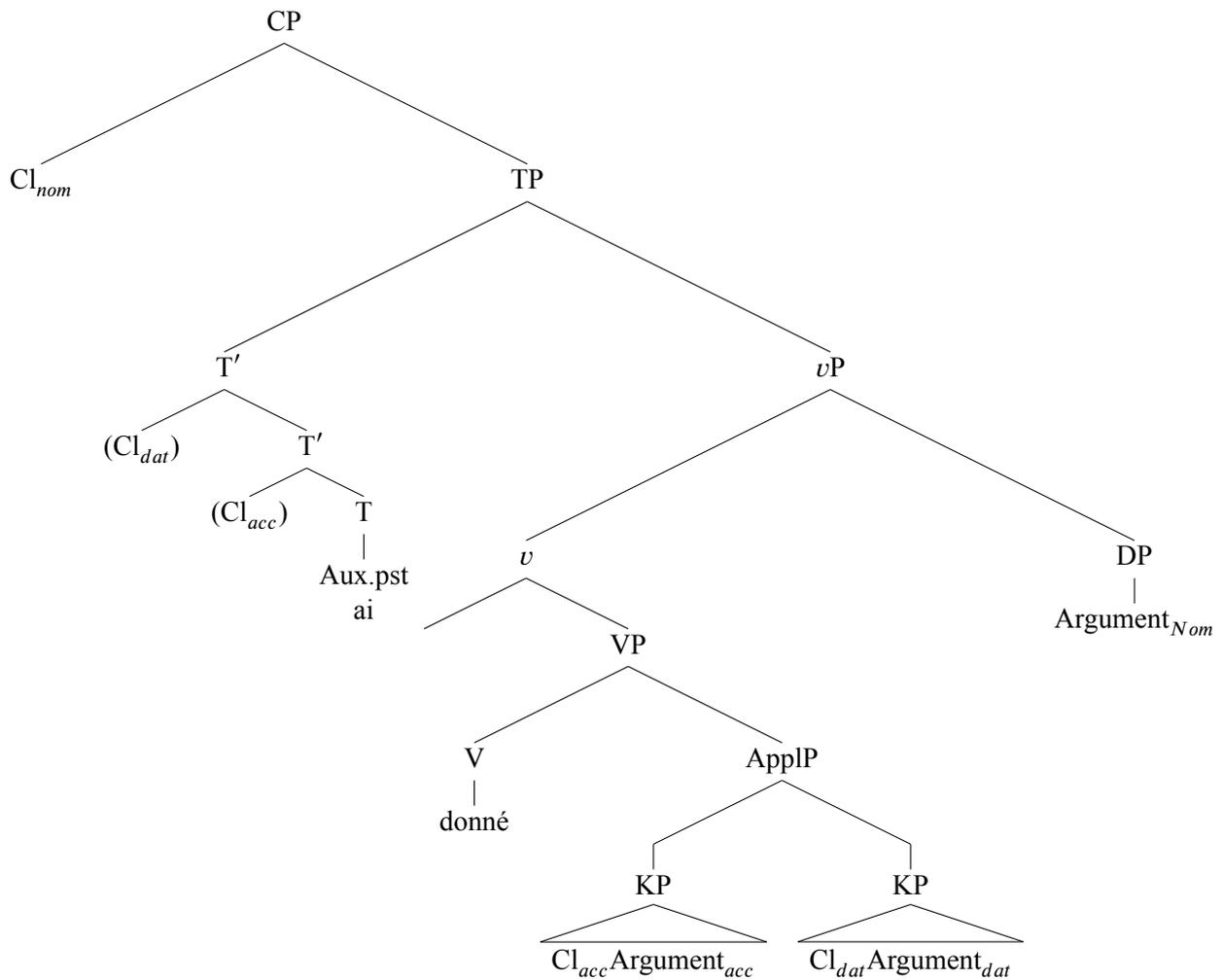
(51) Past Tense without Big-DPs



In a ditransitive construction in the past, the auxiliary *avoir* appears after all pronominal clitics. It would seem that the accusative and dative clitic would be the first to undergo morphologisation on the auxiliary due to their immediate adjacency. I would argue that this scenario is unlikely, considering the structures of the big-DPs. Recall that the accusative and dative clitics are generated in a more complex big-DP structure due to the KP projection. Because the nominative clitic is generated in a big-DP with only a PartP projection, it would be more logical for this simpler big-DP structure to undergo simplification. This would imply that subject clitic doubling would be the first to become obligatory in CFr. Therefore, I propose that the structure given (52) is the mostly likely to occur with the nominative clitic becoming a stranded feature bundle in C. This would leave the accusative and dative clitics to be optionally doubled, leaving the chance for the nominative clitic to morphologise with the auxiliary.

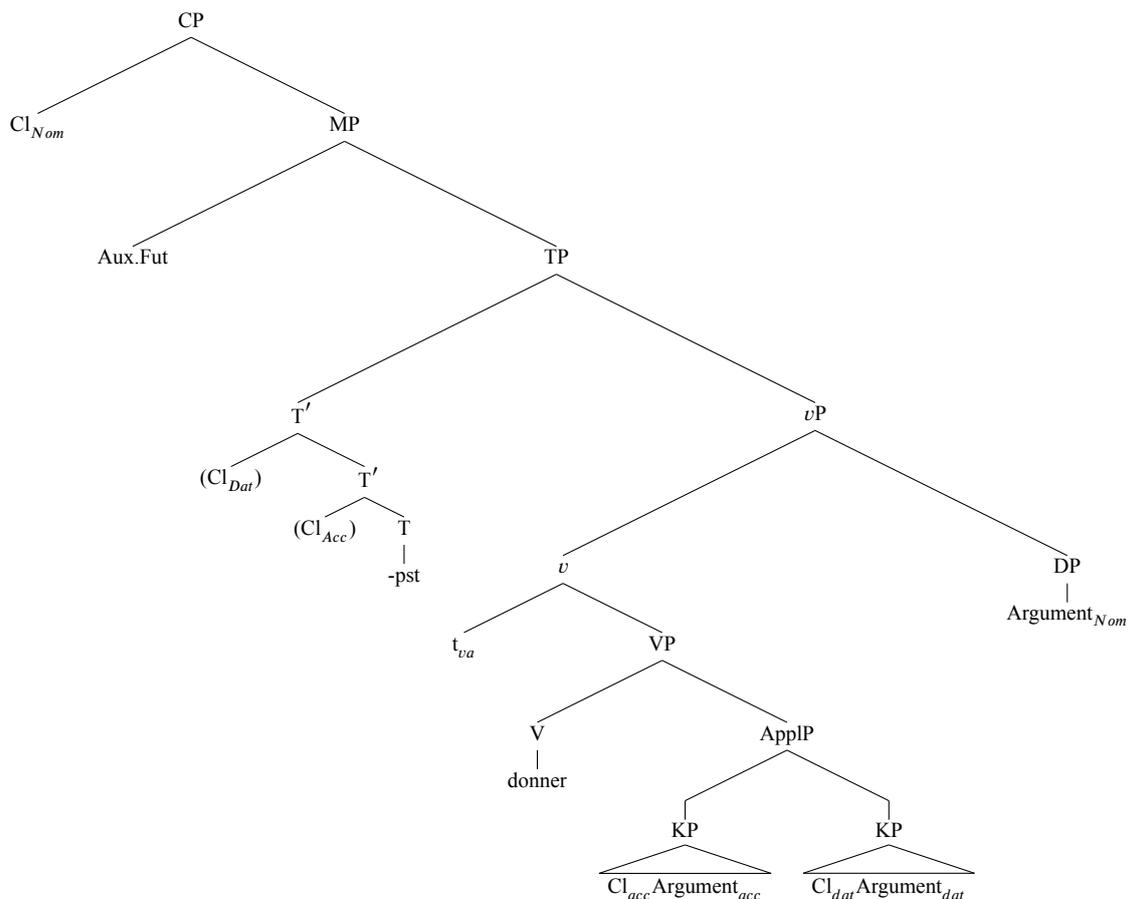
<sup>2</sup> As a reviewer suggests, directionality and headedness plays an important role in determining whether or not a morphologised element will become a suffix or prefix. Latin exhibited free word order and Old French was in fact V2 like the Germanic languages; both subsequently developed suffixal agreement. However, as CFr is uniquely head-initial and does not allow for V2 in any instance, it seems that an advanced form of morphologised clitics will remain prefixes. This relationship between headedness and the diachronic development of either prefixes or suffixes opens up an interesting line of research to be taken up in future investigations.

## (52) Past Tense with Nominative big-DP Simplification



Let us now consider the CFr ditransitive sentences with the future auxiliary *aller*. I claimed in 3.2.3 that the future auxiliary is base-generated in M, thereby intervening between the subject and object clitics. In this configuration, the nominative clitic is free to morphologise with the future auxiliary even if the object clitics were optionally doubled as shown in (53):

## (53) Future Tense with Nominative big-DP Simplification

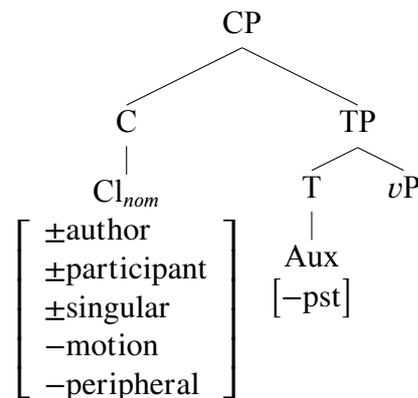


This leaves us with the structure of ditransitives in the present tense, which has no auxiliary to which the nominative clitic can morphologise. Fuß's claim that the simplification of the big-DP structure in which clitics are housed is a cause for their reanalysis begs the question of why the structure would deteriorate in the first place. This brings us to the next section, in which I will discuss the mechanism of Fusion by which I claim the morphologisation of pronominal clitics and a verbal form occurs. I will claim that it is the Fusion of the features of the nominative clitic with the tense features in T that acts as a catalyst for the simplification of the clitic's big-DP structure.

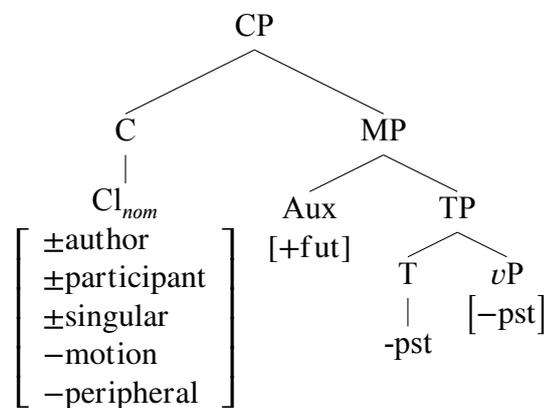
#### 4.4 The Catalyst: Fusion

Halle and Marantz (1993) describe Fusion as the joining of two sister terminal nodes into one node. As a result, only one vocabulary item may be inserted that bears both sets of features previously housed in the pre-fused sister nodes. Let us consider the clitic-auxiliary structure of all three tenses given in (53-55). Assuming that the nominative clitic would be the first clitic to undergo obligatory doubling, there are no object clitics intervening between the nominative clitic and auxiliary.

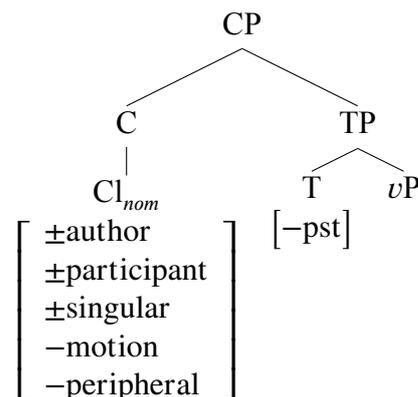
## (54) Past Tense



## (55) Future Tense



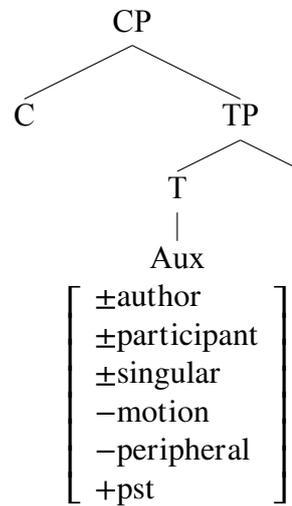
## (56) Present Tense



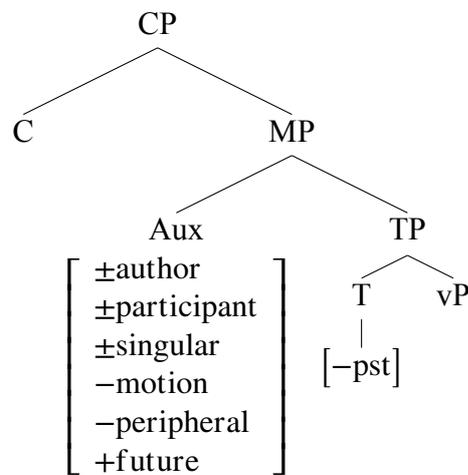
Since the C and T nodes (for present and past tense) and C and M modes (for future tense) are sisters, the mechanism of Fusion can fuse the features of the two nodes, thereby creating a tensed auxiliary capable of valuing person, number, and case features. Since Fusion operates on features and not overt lexical items, the nominative clitic can fuse with the feature [-pst], thereby itself becoming the present tense auxiliary in an advanced form of CFr. The fusion of the nominative clitics with the tense features housed in T provides the catalyst for the simplification of the nominative clitic's big-DP structure. If the clitic morphosigises with the auxiliary, in the mental grammar of a speaker it is no longer base-generated in the big-DP. Therefore, the

additional structure is no longer needed and is simplified, leaving only a simple DP in which the previously doubled argument receives case from *v*. The trees in (56-58) show the new fused person, number, case, and tense features housed together in T.

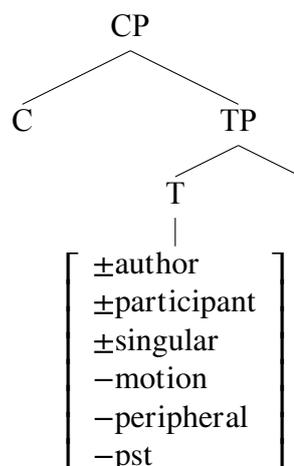
(57) New Past Tense Auxiliary



(58) New Future Tense Auxiliary



## (59) New Present Tense Auxiliary



If we recall the first person singular forms of *être* ([fʏ] and [ʃʏi]), it seems that the mechanism of Fusion has already occurred. If *je* and *suis* have in fact fused into one exponent, this would give us insight into how the mechanism of Fusion would take place in the first place. At first glance, it would seem that the fused form is simply a phonologically reduced form. However, the homophonous first person singular form of *suivre* has not undergone the same transformation. Nevertheless, if we recall the claim made in Longobardi (2001), phonological reduction is a driver of linguistic change. Kandybowicz (2007) proposes that Fusion occurs as a result of prosodically disassociated exponents that are entered together during Vocabulary Insertion causing their features to fuse in the morphological component. This mechanism of phonologically reduced exponents entering the derivation before the morphological component could potentially account for any future forms of CFr tensed auxiliaries. For both *avoir* and *aller*, there exists phonologically reduced forms with the clitic. Auger (1995) mentions that *je vais* is rendered [ʒvɛ] in Québécois French. Using Kandybowicz's notion of Fusion, [ʒvɛ] would be inserted as one exponent in Vocabulary Insertion, causing the person, number, and case features of *je* to fuse with the [+fut] feature of *vais*. Of course, proposing a hypothetical future form of French is speculation at best; however, the language exhibits the necessary components to undergo such changes.

#### 4.5 The Diachronic Cyclicity of Agreement

In this section, we have examined the historical development of future tense agreement in Latin and French, the historical development of pro-drop in French, and the implications of the clitic-auxiliary structure on the future development of a tensed agreement morpheme in an advanced stage of French. The common denominator in all these analyses is the grammaticalisation of a lexical item (*\*bhū* in proto-Latin, *habere* in Vulgar Latin, and *avoir* and *aller* in CFr) and its morphologisation on a verbal form. Based on these observations I claim that agreement, from a diachronic point of view, is a cyclical process in which independent lexical items become markers of agreement. In regard to verbal agreement, I argue that there are four stages through which a pronoun must proceed on the independent word-agreement continuum. The first step is the phonological reduction of the pronoun which serves as the catalyst for cliticisation, at which stage the pronoun can be considered a pronominal clitics. The second step is the obligatory doubling of a pronominal clitic and an argument, at which stage the pronominal clitic can be

considered an agreement clitic. In both of these latter two stages, the clitics retain their tense-invariance which is the final boundary blocking a clitic's progression to a marker of agreement. The final stage involves a further phonological erosion of the clitic and a verbal element such as an auxiliary. As proposed in Kandybowicz (2007), this acts as the catalyst for the Fusion of the person, number, and case features of an agreement clitic with the tense features housed in T. This is the point in a language's development in which the clitics become tense-variant markers of agreement. I argue that Fusion is the final step in traversing the boundary between clitic and agreement. The mechanism of Fusion then provides the catalyst for the simplification of the big-DPs (as proposed in Fuß, 2005) in which the clitic is housed, thereby causing them to lose their theta-marking ability and subsequently their argumenthood. This notion of diachronic cyclicity maintains that language change does not occur spontaneously or without reason, but rather that languages are inert to change (as proposed by Longobardi, 2001) and that there must be a catalyst to trigger a change in a language's grammar. This present investigation has only addressed verbal agreement. However, future research into the development of other morphological features such as case marking might serve to shed more light on my notion of Diachronic Cyclicity.

## 5 Conclusion

The purpose of this investigation has been two fold: (i) To provide an exhaustive analysis and diagnosis of the structure of CFr pronominal clitics in ditransitive construction and their interactions with the past and future auxiliaries; and (ii) to use the structure of these clitics to address larger theoretical implications of linguistic change and the ambiguity between clitics and agreement. I conclude that in its current state, CFr pronominal clitics are not agreement features, due mainly to their non-obligatory doubling and their tense invariance. I have demonstrated that the differences in the big-DP structures of each pronominal clitics have heavy implications for their structure and how they interact with each other in movement operations. In addition, I have also demonstrated that the nominative clitic stands out from the accusative and dative clitics in its simplified big-DP structure and its separation from these clitics by the upward movement of the future auxiliary. This allows the nominative clitic to preferentially become obligatorily doubled, thereby allowing it to be the first to be able to morphologise with the past and future auxiliaries. In examining the implications of the Fusion on the creation of verbal agreement, I have concluded that Fusion is the catalyst by which the grammaticalisation and morphologisation of a lexical item is initiated, leading to the creation of agreement morphemes. It is the likely Fusion of the features of the nominative clitic and the tense features of the auxiliary that will lead to the creation of a tense-variant agreement marker in an advanced form of French. Looking at the rise of agreement morphemes and pro-drop in Latin and French over the course of their historical development suggest a tendency for the development of agreement to be of a cyclical nature which therefore makes the future Fusion of the nominative clitics and past and future auxiliaries a likely occurrence.

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# Vowel Compensation and its Role in Metathesis\*

*Julian K. Lysvik*

## **Abstract**

Metathesis is a phonological phenomenon which has proved difficult to capture in terms of formal description and mechanism. One of the main challenges arises from the fact that metathesis is not a single, uniform process; but rather a consequence of several, unrelated processes. An additional challenge has been the assumption that vowel-vowel metathesis does not exist (McCarthy, 1995). This paper will show how a phonological process called *vowel compensation* results in metathesis, and is also able to theoretically explain the rare case of vowel-vowel metathesis found in the oceanic language Hawu (Blust, 2012).

*Keywords:* Metathesis, Compensation, Autosegmental Phonology

## **1 Introduction**

Since the time of the neogrammarians metathesis has been understood to be a phonological process (Osthoff & Brugmann, 1878). However, it was long assumed that it only existed as a sporadic and irregular type of sound change. One of the first to recognise the patterns found in metathesis was Grammont (1950), and Ultan (1978) was the first to present a typology of metathesis. However, the notion that metathesis is only sporadic and irregular has prevailed into modern linguistic literature. Hume (2004, p. 203) calls it the *metathesis myth*, namely:

the commonly held view of metathesis as sporadic and irregular, restricted to performance errors, child language, or sound change.

Even linguistic work as recent as Crystal (1997) has perpetuated this myth. It has held back the study of metathesis, as sporadic and irregular processes are less informative than regular processes. More recent research, specifically oriented towards understanding metathesis, such as Blevins and Garrett (1998, 2004), Hume (1991, 2002, 2004), McCarthy and Prince (1995), McCarthy (2000) and many more have shown metathesis to be a regular phonological operation. The evidence comes from many languages, among them Rotuman (Besnier, 1987), Hebrew (Coetsee, 1999), Faroese (Seo & Hume, 2001) and Cayuga (Blevins & Garrett, 1998). Of particular importance is Hume's database of metathesis found on <http://metathesisinlanguage.osu.edu/database.cfm>

Understanding metathesis as a regular process has not solved all the challenges of metathesis. Blust (2012, p. 208) discusses one of the major challenges which he calls the *second metathesis myth*. I.e., the assumption that all instances of metathesis will be explicable under a single theoretical framework, at the very least after all subtypes have been correctly identified. The fact that this is a myth can be argued from both the extensive list of proposed typologies (Blevins & Garrett, 1998, 2004; Ultan, 1978), and in the varying theoretical frameworks proposed to deal with it (McCarthy & Prince, 1995; Hume, 2004; Heinz, 2005; Besnier, 1987). The goal of metathesis studies must, as such, be to understand the processes which underlie and motivate metathesis. This paper will suggest that a process called vowel compensation motivates CV and VV metathesis as found in Rotuman and Hawu.

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\* Special thanks to Prof. Andrew Nevins whose support has been invaluable. I am truly grateful. Any faults and mistakes herein are solely my own.

This paper is organised by first introducing Rotuman (Besnier, 1987) and Hawu (Blust, 2012) metathesis in section 2, then presenting an analysis under the Autosegmental approach in section 3 and lastly a conclusion of the arguments presented in section 4.

## 2 Metathesis in Rotuman and Hawu

Rotuman is perhaps the most well known (and well documented) case of regular, grammatical metathesis in the literature. The original data goes back to Churchward (1940) and it is therefore used here to illustrate one type of metathesis caused by the process of *vowel compensation*. Hawu, on the other hand, is a recently documented language. The only documentation of it comes from Blust (2012). Hawu presents a case of vowel-vowel metathesis which was previously assumed in the literature not to exist. McCarthy (1995, p. 15-16) states:

While V-C metathesis is not uncommon, to my knowledge processes of V-V metathesis have been proposed on just three occasions, in Kasem (Chomsky & Halle, 1968), Latvian (Halle & Zeps, 1966), and Old English (Keyser, 1975). All three involve very abstract analyses, in which the underlying representations and/or the consequences of metathesis are by no means apparent, and all except Latvian have been reanalyzed in ways that do not involve V-V metathesis at all<sup>1</sup>.

In this context Hawu presents a challenge to the established assumptions regarding metathesis through a diachronic, regular case of VV-metathesis. This paper takes it upon itself to show how this case of metathesis also can be explained by the processes which motivate Rotuman CV metathesis.

### 2.1 Rotuman

Rotuman has two different word forms, known from Churchward (1940) as Complete and Incomplete forms. The Incomplete form of words is used in most contexts, while the Complete form is found in certain morphological, pragmatic and syntactic contexts such as in definites, sentence-finally and for emphasis. The data in in table (1) is from Blevins (1994).

|     |                 |              |                   |                    |
|-----|-----------------|--------------|-------------------|--------------------|
| (1) | <i>Rotuman</i>  |              |                   |                    |
|     | <b>Complete</b> | Intermediate | <b>Incomplete</b> | <b>Gloss</b>       |
| a)  | /tiko/          |              | /tiok/            | 'to appear to'     |
|     | /mófa/          |              | /móaf/            | 'rubbish, garbage' |
|     | /múre/          |              | /múer/            | 'to blow gently'   |
| b)  | /fúti/          | /fúit/       | /fýt/             | 'to pull'          |
|     | /móse/          | /móes/       | /mós/             | 'to sleep'         |
|     | /tófi/          | /tóif/       | /táef/            | 'six lunar months' |

Example (2) illustrates the metathesis which occurs in the allomorphic change between Complete and Incomplete forms as seen in table (1a).

$$(2) \quad tiko \xrightarrow[\text{metathesis}]{ko \rightarrow ok} tiok$$

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<sup>1</sup> Anderson and Durand (1988) additionally reject Halle and Zeps (1966)'s argument for VV metathesis in Latvian.

This same change can be seen in between the Complete and the Intermediate forms in table (1b). They also have an additional process of *vowel coalescence* (seen in the complete form in table (1b)). Three examples can be seen in the table, and they are listed in example (3)

- (3) a) /ui/ → /y/  
 b) /oe/ → /ø/  
 c) /ɔi/ → /æ/

Rotuman metathesis in table (1b) can thus be stated as in example (4).

- (4) futi  $\xrightarrow[\text{metathesis}]{ti \rightarrow it}$  fuit  $\xrightarrow[\text{coalescence}]{ui \rightarrow y}$  fyt

It is important to state that this type of metathesis (and similar processes) is not unique for Rotuman, but also found in the closely related languages Kwara'ae (Blevins & Garrett, 1998; Heinz, 2005) and Leti (van der Hulst & van Engelenhoven, 1995).

## 2.2 Hawu

Blust (2012) presents the case of Hawu, an Austronesian language spoken in the Lesser Sunda islands of Indonesia. It is a case of regular, diachronic metathesis. Hawu has two clear patterns of metathesis which are shown in this change from Proto-Malayo-Polynesian (PMP) to Hawu: \*uCa → əCu and \*iCa → əCi (additionally there is \*iCe → əCi which is only attested in one cognate set).

| (5) | PMP       | Intermediate | Hawu | Gloss            |
|-----|-----------|--------------|------|------------------|
|     | *buta     |              | βədu | 'blind'          |
|     | *kudən    | uda          | əru  | 'cooking pot'    |
|     |           | gula         | gəru | 'sugar'          |
|     | *bulan    | wula         | wəru | 'moon, month'    |
|     | *b<in>ahi | bine         | bəni | 'woman'          |
|     |           | iru          | əri  | 'to pull, drag'  |
|     | *pija     | pira         | pəri | 'how much/many?' |

It is a form of  $V_1V_2$ -metathesis, but it has some clear restrictions. Firstly, there is a general constraint on the language which disallows word-final schwa. As a consequence many words which ended in schwa after losing a final consonant turned into either /e/ or /a/.

Secondly, there are some constraints which are specific to the metathesis process: Metathesis does not apply to adjacent vowels without a (linearly) intervening consonant. Blust argues that the lack of metathesis without intervening vowels is due to a ban on prevocalic schwa (a \*əV-restriction)<sup>2</sup>, a form not found elsewhere in the language either.

| (6) | Hawu | PMP   | Hawu | Non-Form | Gloss       |
|-----|------|-------|------|----------|-------------|
|     |      | *tuak | due  | **dəu    | 'palm wine' |
|     |      | *lian | lie  | **lɛi    | 'cave'      |

<sup>2</sup> Double asterisk (\*\*) is used to mark nonexistent forms

The əV-ban explains the lack of metathesis of vowels without intervening consonants. If these forms had metathesised, the forms in table (6) in the *Non-Form* column would be expected.

Metathesis does not apply to the PMP strings: \*uCi, \*iCu, \*iCi, \*uCu, \*aCa, \*aCi or \*aCu. The common denominator for these PMP-strings is that all of them have a  $V_1$  which is less sonorous than  $V_2$ , in these cases metathesis did not occur. The reason for this restriction is not clear from the data. Examples are provided in table (7)

(7) *Hawu*

| PMP    | Hawu | Gloss          |
|--------|------|----------------|
| *kulit | kuri | 'skin'         |
| *suluq | huru | 'spoon, ladle' |
| *pitu  | pidu | 'seven'        |
| *qabu  | awu  | 'ash'          |
| *daki  | raʔi | 'dirt, dust'   |

Metathesis does not apply to strings which are more than bisyllabic. This restriction can be explained by Hawu's stress pattern. Hawu shows a "clear preference for penultimate stress" (Walker, 1982, p. 7-8). As such, Blust speculates that "The actual condition for this change thus may be stress-dependent: metathesis targets a stressed vowel and the next syllable peak." (p. 216, footnote 6). This also explains the restriction on strings that are more than bisyllabic, which is due to the metathesis targeting stressed vowels and the next syllable peak.

(8) *Hawu*

| PMP      | Hawu   | Non-Form  | Gloss     |
|----------|--------|-----------|-----------|
| *mináŋa  | menáŋa | **məníŋa  | 'estuary' |
| *sumáŋəd | hemáŋa | **səmúŋəd | 'soul'    |

If metathesis in Hawu had only relied upon sonority and vowel deletion for metathesis, the forms labelled *Non-Form* in table (8) would be expected, however, since the segment spreads from a stressed position onto an unstressed position, these disyllabic forms did not metathesise.

Hawu vowel metathesis is therefore limited by a) a ban on prevocalic schwa, b)  $V_1$  being more sonorous than  $V_2$  and c) the more sonorous vowel being stressed.

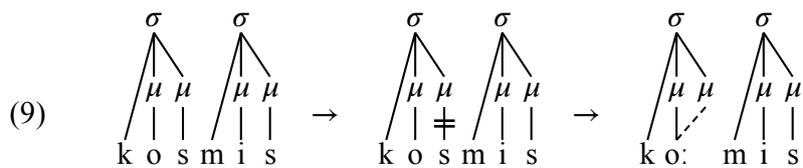
### 3 Compensation in Phonology

Within Autosegmental Phonology (AP), the only case of metathesis that has received treatment is the case of Rotuman. Besnier (1987) provided an autosegmental analysis of the language and is as such the first to comment upon the processes which result in the relevant type of metathesis. Blevins and Garrett (1998, 2004) present a typology of metathesis where Rotuman CV metathesis is classified as *compensatory metathesis*. This section will show how the notion of *compensation* is fundamental to metathesis as found in Rotuman and Leti in section 2.

#### 3.1 Compensatory Lengthening and Compensatory Metathesis

One of the earliest reference to compensation in phonology is from Hayes (1989) on *compensatory lengthening*. Compensatory lengthening in Hayes (1989) can be explained as a repair strategy. The loss of a segment in a structure is compensated for by filling the segment place with another segment. This can be illustrated by the diachronic change of Proto-Italic \**kosmis*

to Latin *ko:mis*. Hayes argue that the structural pattern is moraic and that the loss of a mora-filling segment triggers the compensation. An autosegmental illustration is found in example (9)



Example (9) shows delinking of /s/ in the first syllable (deletion). However, the weight of the mora is retained by linking it to the preceding vowel. The preceding vowel thus compensates for the deleted consonant and repairs, or fulfills, the moraic weight structure.

Blevins and Garrett (1998, p. 508) argue that compensatory metathesis has a somewhat similar basis, but illustrates it from a perceptual viewpoint. Compensatory metathesis is conditioned by a loss of a vowel at the edge of the domain (syllable, foot, prosodic word etc.) which is compensated for by coarticulating the weakened vowel with the stressed syllable, close to the tonic vowel.

Evolutionary Phonology (Blevins, 2004) argues that this can arise as an instance of CHANCE sound change, whereby an underlying form /XaY/ has several surface forms, including for example [XaY, XbY, aXY, XYa, etc.,]. There is then a CHANCE reinterpretation of the underlying form as one of these surface form. Example (10) illustrates how this could look in the case of Rotuman metathesis. Here, the speaker has an underlying form /tiko/. This form happens to have several surface forms (which are realised in Step 1). These include [tikō] and [tiökō] (which both have shortened vowels as symbolised by the half circle above), [tiokō] (which has a final devoiced vowel), and [tiok] which is fully metathesised.

|                            |                               |
|----------------------------|-------------------------------|
| (10) <b>Speaker</b>        | <b>Listener</b>               |
| /tiko/                     | /tiok/                        |
| ↓1                         | ↑3                            |
| [tikō, tiökō, tiokō, tiok] | →2 [tikō, tiökō, tiokō, tiok] |

In Step 2 in example (10), the listener perceives these variations and (in Step 3) assumes that it is a different underlying form which results in the perceived variations. Which form is perceived as underlying depends on the frequency of the variation, but it will be a self-reinforcing change; as listeners turn speakers it is more likely that they will produce a form closer to the underlying form and the process is thus reinforced.

This theoretical process also matches the diachronic changes which are assumed to have been at work in Rotuman. As a consequence of reducing the final vowel, it is retained in the tonic vowel of the word in a process called *preservative coarticulation*. When the final vowel is lost, the consequence is an apparent reordering of the final CV segments, which is labeled *metathesis*. This can be found in example (11). (Blevins & Garrett, 1998, p. 528).

|      |                                       |                                                      |                                     |
|------|---------------------------------------|------------------------------------------------------|-------------------------------------|
| (11) | ... $\acute{V}_1$ CV <sub>2</sub> ] → | ... $\acute{V}_1$ V <sub>2</sub> C $\check{V}_2$ ] → | ... $\acute{V}_1$ V <sub>2</sub> C] |
|      | Original word                         | Preservative coarticulation                          | Metathesis (vowel loss)             |

Again, the half circle above refers to a shortened vowel. This shortened vowel (final V<sub>2</sub>) becomes coarticulated with the tonic vowel, in order to compensate for the reduction. The coarticulated V<sub>2</sub> is preserved in full. This compensation/coarticulation finally (in the third step in example (11)) allows the deletion of the final vowel, and results in the surface process of metathesis.

Kavitskaya (2002) discusses additional cases of phonological compensation, specifically compensatory lengthening. Kavitskaya (2002, p. 106) deals with compensatory lengthening (hereafter CL) of CVCV structures. This type of CL occurs when deletion of a final vowel results in lengthening of the word-medial vowel. I.e., CVCV → CV:C. Her argument is that this is not a case of true compensatory lengthening, but rather of phonologisation of long vowels occurring before voiced consonants. This is exemplified by Friulian in example (12)<sup>3</sup>

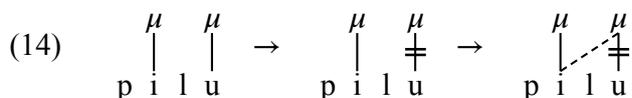
|         | <b>Stage 1</b><br>(before vowel<br>loss) | <b>Stage 2</b><br>(after vowel<br>loss) | <b>Stage 3</b><br>(phonologisation) |
|---------|------------------------------------------|-----------------------------------------|-------------------------------------|
| (12) a) | CVDV                                     | CVD                                     | CV:D                                |
| b)      | CVD                                      | CVD                                     | CVD                                 |
| c)      | CVTV                                     | CVT                                     | CVT                                 |
| d)      | CVT                                      | CVT                                     | CVT                                 |

The duration of the first vowel in example (12a) is phonetically longer than the initial vowels in examples (12b), c) and d). Kavitskaya (2002) argues that it is this inherent phonetic length difference which is phonologised, and not the weight-segment or length which is metathesised from the final vowel to the first vowel.

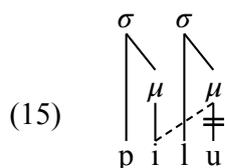
However, Kavitskaya (2002) gives an example of one case from the Milanese dialect of Italian from Repetti (1992). The data in example (13) is presented.

| <i>Milanese</i> |                   |                     |              |
|-----------------|-------------------|---------------------|--------------|
|                 | <b>Underlying</b> | <b>Compensation</b> | <b>Gloss</b> |
| (13)            | pilu              | pe:l                | 'hair'       |
|                 | krufje            | kru:s               | 'cross'      |
|                 | fotju             | fo:k                | 'fire'       |

These examples can be represented as in example (14). While positing a separate moraic tier the process in CVCV CL can be explained by a process of compensation.



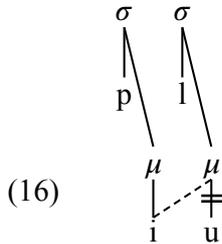
The loss of one segment which carries weight, is in example (14) compensated for by linking the weight element to the only other element which can carry weight as seen in the third step. However, this AP illustration is idealised as it only features the prosodic tiers directly relevant to the case. A full fledged illustration would quickly run into the problem of line-crossing (Goldsmith, 1976; Pulleyblank, 1986; Hammond, 1988) as seen in example (15)



In example (15) the complete syllabic structure is presented in a two-dimensional autosegmental representation. The association line from the mora in the third step crosses the association line to the onset, and as such violates the *no-crossing constraint* as referenced above. Coleman

<sup>3</sup> *T* in this example refers to any voiceless obstruent, while *D* refers to any voiced obstruent.

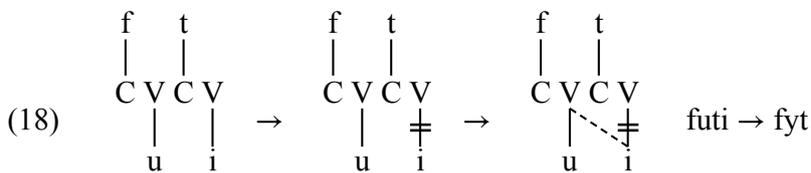
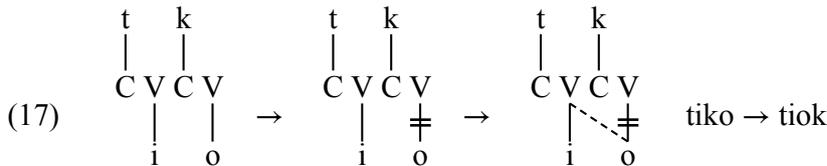
and Local (1991) points out a central problem with the *no-crossing constraint*. It is not an actual constraint on autosegmental representations, but only a constraint on the diagrammatic expression of these representations. As such, the *no-crossing constraint* can be avoided by a bypass such as example (16)



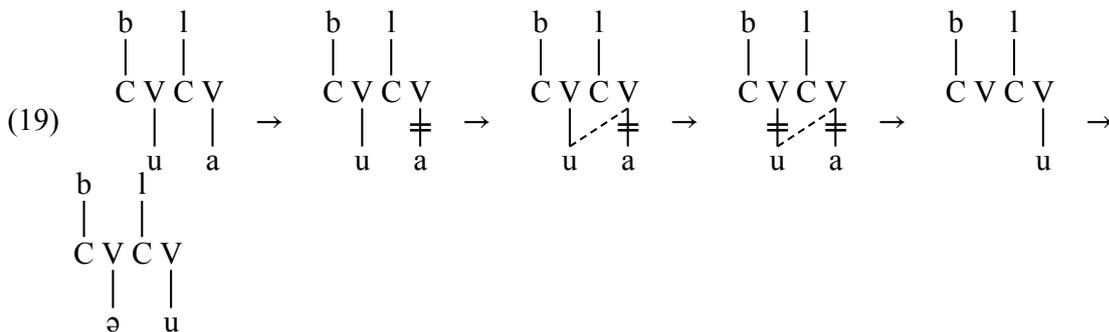
Example (16) avoids any visual line-crossing, but represents exactly the same proposition as example (15). This illustrates that this type of compensation can be formally captured by AP, without violating the no-crossing constraint.

### 3.2 Vowel Compensation

Based on the notions of compensation introduced in the previous section, vowel compensation is defined as the process whereby the loss (or reduction) of a vowel is compensated for by reattaching the delinked vowel to an adjacent vowel. Besnier (1987)'s AP analysis of Rotuman illustrates this process. Formally, the structure he proposes has many similarities with compensatory lengthening in example (9). He argues that a separate vocalic tier is necessary to accurately describe Rotuman and proposes a solution where the final vowel delinks from final vowel position, attaches to the adjacent (on the vocalic tier) stressed vowel and either results vowel hiatus, as in example (17), or vowel coalescence, as in example (18).



It is possible to posit a similar solution for Hawu metathesis, here represented in the \*mbula → bəlu 'forget' sound change, where \*mbula is simplified to \*bula, for ease of characterisation.



The three step process outlined in example (19) illustrates how VV-metathesis could arise in Hawu. The first step is a loss of word-final vowel, much as seen in Rotuman. Step two is a linking from the tonic vowel to the newly lost peripheral vowel as a structure-preserving mechanism, step three is a loss of the word-medial vowel (potentially due to a stress-shift in the language), step four shows the result of the relinking, and step five is an epenthetic insertion of schwa due to the language's ban on consonant clusters.

Vowel compensation is then, as seen, a structure-preserving repair mechanism which compensates for vowel loss. Both example (17) and (18) show vowel compensation in their final steps. This AP formalisation has the advantage of capturing Rotuman CV metathesis and the rare case of VV-metathesis in Hawu, which only requires the additional steps of delinking and epenthesis.

#### 4 Conclusion

This paper has shown how the process of vowel compensation is able to account for two uncommon types of metathesis. The process has been defined, both within the framework of AP and as a structural repair strategy. What emerges from the discussion is an understanding of a process which underlies and motivates metathesis. Additionally, the process of vowel compensation is able to account for two rare cases of metathesis as seen in Rotuman and Hawu by referencing previous cases of phonological compensation.

Vowel compensation has also been shown to be able to account for phenomena besides metathesis and is therefore a useful phonological tool. Further research must be made in other areas where vowel compensation is at work, as well as into the nature of compensation phenomena in phonology.

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# Epistemic Bias in Embedded Polar Questions \*

*Hans van de Koot, Harris Constantinou and Yan Zhang*

## Abstract

This paper argues that ‘outside negation’ in polar questions shares properties with so-called ‘subjective’ epistemic modals, but differs from such modals in having to take scope over a question operator. Both outside negation and subjective epistemic modals resist embedding under veridicals, semi-factives and proffering predicates, induce Epistemic Containment, and exhibit further peculiar scope-freezing effects. We argue that these phenomena can be given a unified treatment in terms of the scopal properties of subjective epistemic attitudes, once it is assumed that factive and veridical predicates, as well as verbs of proffering, force their complement to be closed off by a factive operator, irrespective of whether that complement is a proposition or a question (see Spector and Égré (2015) for related ideas). The proposed account relies on a theory of scope in which scope shift is encoded through percolation of scope indices constrained by a minimality condition (the Condition on Scope Shift; Neeleman and van de Koot, 2012). Therefore, to the extent that the account presented is successful, it provides support for this particular view of scope-taking.

*Keywords:* polar questions, outside negation, subjective epistemic modals, epistemic containment, scope freezing, factivity

## 1 Introduction

As is well known, sentences denoting polar alternatives can be embedded under a wide range of predicates and can also appear in subject position (see, for example, Lahiri (2002)). These environments all allow ‘inside negation’ polar questions (INPQs), which are typically associated with a bias towards the negative alternative and can license NPIs. However, their ‘outside negation’ counterparts (ONPQs), which have a bias towards the positive answer and do not license NPIs (Ladd, 1981), show variable acceptability. This contrast between INPQs and ONPQs is illustrated in (1) (for discussion of biases in polar questions, see Büring and Gunlogson (2000), Rooy and Safarova (2003), Romero and Han (2004), Asher and Reese (2007), Sudo (2013); for recent work on the syntax of polar questions, see Holmberg (2013, 2015)).<sup>1</sup>

- (1) a. John is wondering if/whether Mary doesn’t like spinach (either/too).  
b. John is asking if/whether Mary doesn’t like spinach (either/too).  
c. John knows if/whether Mary doesn’t like spinach (either/\*too).  
d. John remembers if/whether Mary doesn’t like spinach (either/\*too).  
e. Whether Mary doesn’t like spinach (either/too) is not very clear to John.

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<sup>1</sup> There appears to be considerable variation among speakers regarding the choice of *if* and *whether* as the preferred complementizer. Readers who are native speakers of English should feel free to adjust the choice of complementizer when judging the examples.

On the ONPQ reading of (1a, b), the attitude holder is the matrix subject, John; these sentences convey that John has a hunch that Mary likes spinach but that he would like confirmation of this positive supposition. This reading is also available in (1e), where again the attitude holder may be taken to be John. However, this example also appears to allow the bias towards the positive answer to be attributed to the speaker.<sup>2</sup> The examples in (1c, d), however, are unacceptable on an ONPQ reading: they do not support the relevant attitude, irrespective of whether the attitude holder is taken to be the matrix subject or the speaker. Similar data can be found in other languages, as shown in the Dutch and Greek counterparts of (1a) and (1c), in (2) and (3), respectively.

- (2) a. Jan vraagt zich af of Marie niet ook van spinazie houdt.  
John wonders self prt if Mary not too of spinach holds
- b. O Giannis anarotietai an tis Marias den tis aresei kai to spanahi.  
The John wonders if the Mary NEG cl like and the spinach
- (3) a. \*Jan weet of Marie niet ook van spinazie houdt.  
John wonders if Mary not too of spinach holds
- b. \*O Giannis kserei an tis Marias den tis aresei kai to spanahi.  
The John knows if the Mary NEG cl like and the spinach

ONPQs exhibit a further peculiarity not found with INPQs: the outside negation must outscope a quantified subject in the same way as a ‘subjective’ epistemic modal does (Epistemic Containment; von Stechow and Iatridou, 2003). ‘Objective’ epistemic modals do not exhibit this behaviour. The difference between objective and subjective readings lies in the relative reliability of the evidence one invokes to evaluate the proposition the epistemic scopes over. Subjective epistemics correspond to the invocation of less widely accepted evidence, and hence highlight someone’s personal belief state, whereas objective epistemics correspond to evidence accepted by the relevant community (see Lyons (1977), Papafragou (2006), Tancredi (2007), Anand and Hacquard (2009) for further discussion of the distinction between subjective and objective modality.)

Epistemic Containment is illustrated in (4a), where *might* takes its default subjective reading; (4b) shows that the effect is obviated when the context forces the modal to be read with an objective reading.

- (4) a. #Every party guest might be the murderer.  
(*every* > *might* relatively inaccessible)
- b. Given the currently available evidence, every party guest might be the murderer.  
(*every* > *might* easily accessible)

Epistemic Containment is not restricted to sentences with subjective epistemic modal auxiliary verbs; the effect can also be found with epistemic adverbs like *perhaps* or *possibly*:<sup>3</sup>

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<sup>2</sup> Consider, for example, a situation in which the speaker is trying to assess whether to buy spinach for a dinner with Mary, who he does not know very well. The speaker has a hunch that she might like spinach, but wants to get the opinion of John, who is an old friend of Mary’s. In such a context, (1e) seems fine with a speaker-oriented positive bias.

<sup>3</sup> In fact, for many speakers the effect is even stronger with an epistemic adverb than with an epistemic auxiliary. The objective reading seems less accessible, even with an appropriate context preceding the modalized proposition:

- (5) #Every guest is perhaps/possibly the murderer.  
 a. Perhaps/possibly every guest is the murderer. inconsistent, <sup>OK</sup>ECP  
 b. For each guest x, x is perhaps/possibly the murderer. consistent, \*ECP

That outside negation exhibits similar scopal properties can be demonstrated by the contrast between (6) and (7). The context in (6) forces wide scope of the QP and, as shown by the deviance of (6a) in this context, the QP cannot be interpreted outside the scope of outside negation. Interestingly, the example becomes fully interpretable if the outside negation is moved to a following tag question (see (6b)).

- (6) *Context: I had 30 students in my final year syntax class. They all passed the coursework, but to obtain their degree, they had to pass my exam. For about 10 of them, I was almost certain that they would. My TAs marked all the scripts and I ask ...*  
 a. #Haven't fewer than half of the students managed to pass the exam(, too)?  
 b. Fewer than half the students have managed to pass the exam, haven't they?

That the unacceptability of (6a) is context-dependent is corroborated by the fact that the same example is compatible with the context in (7), which facilitates a narrow scope reading of the QP.

- (7) *Context: I have 30 students in my final year syntax class and it is a weak cohort. They all passed the coursework. However, they also all have to pass my exam. Usually, around half of each year's cohort manages to pass the exam, as it very hard. Now I'm pretty certain that not even half will pass it. My TAs marked all the scripts and I ask ...*  
 Haven't fewer than half of the students managed to pass the exam(, too)?

ONPQs trigger a further scope freezing effect not found with INPQs, but which has also previously been observed with subjective epistemics (see Constantinou and van de Koot, 2015). In particular, an instance of outside negation behaves like a subjective epistemic in that it can give rise to scope freezing between two QPs even if it does not c-command either of them. We illustrate this using Dutch, where both epistemic adverbs and negation in ONPQs have very free placement. Consider first the data in (8). In (8a), two QPs occur in the c-command domain of *waarschijnlijk* 'probably'. Naturally, this sentence may receive a surface scope interpretation, but for a subset of Dutch speakers the inverse scope reading is available as well. However, for these speakers the inverse scope reading becomes inaccessible as soon as one of the quantifiers c-commands the epistemic adverb, as in (8b). More remarkably, the scope freezing effect is also present if *waarschijnlijk* is c-commanded by both QPs.

- (8) a. Waarschijnlijk heeft tenminste één student ieder artikel gelezen.  
 probably has at-least one student every article read  
 ( $\exists > \forall; \forall > \exists$ )  
 b. Tenminste één student heeft waarschijnlijk ieder artikel gelezen.  
 at-least one student has probably every article read  
 ( $\exists > \forall; * \forall > \exists$ )

- 
- (i) #Given the currently available evidence, every guest is perhaps/possibly the murderer.

- c. Tenminste één student heeft ieder artikel waarschijnlijk gelezen.  
 at-least one student has every article probably read  
 $(\exists > \forall; * \forall > \exists)$   
*At least one student has probably read every article.*

The data in (9) show acceptability and scope judgments for a negative polar question containing an indefinite and a universal. We report judgments for both the INPQ and the ONPQ reading. On the ONPQ reading, only (9a), with the very high negation not found with INPQs, allows inverse scope. When negation is sandwiched between the two quantifiers, as in (9b), scope inversion is blocked for both INPQs and ONPQs. But interestingly, low negation (as in (9c)) does not block scope inversion in INPQs, but does do so in ONPQs.

- (9) a. Had niet tenminste één student ieder artikel gelezen?  
 had not at-least one student every article read  
 INPQ: \*  
 ONPQ:  $\exists > \forall; \forall > \exists$
- b. Had tenminste één student niet ieder artikel gelezen?  
 had at-least one student not every article read  
 INPQ:  $\exists < \forall; * \forall > \exists$   
 ONPQ:  $\exists > \forall; * \forall > \exists$
- c. Had tenminste één student ieder artikel niet gelezen?  
 had at-least one student every article not read  
 INPQ:  $\exists > \forall; \forall > \exists$   
 ONPQ:  $\exists > \forall; * \forall > \exists$

A final indication that outside negation has properties of subjective epistemic modals comes from the observation that the attitude associated with ONPQs has indexical properties (Papafragou, 2006). Modals require evaluation of the proposition they occur in with respect to a set of possible worlds. For subjective epistemic modals in root clauses the possible worlds in the conversational background are restricted to what the speaker knows *at the time of utterance*. This is not true for objective epistemic modals, for which the set of possible worlds relevant to evaluation include all publicly available evidence to some community.

With this background in mind, consider the variant of (1e) in (10), with the context provided. The example is fine on the interpretation where the holder of the positive bias is John; the speaker, however, is entirely disqualified from this role.

- (10) *Context: Neither John nor the speaker had any evidence regarding Mary's liking of spinach before last night. But having had dinner with her last night, they now know that she loves it.*

Whether Mary didn't like spinach (too) was not very clear to John before last night.

✓Reading A: positive bias associated with John

\*Reading B: positive bias associated with the speaker

This observation is immediately accounted for if outside negation has the indexical properties also associated with subjective epistemic modals. As we will see in section 2, expressing a positive epistemic bias is incompatible with the presence of compelling evidence supporting the positive polar alternative. As the context makes clear, the compelling evidence regarding Mary's liking of spinach became available to the speaker last night. Therefore, on the assumption that any subjective epistemic bias held by the speaker is indexed to the time of

the utterance, the speaker can no longer express such a bias regarding Mary's liking of spinach at that time.

Constantinou and van de Koot (2015) account for Epistemic Containment and related scope freezing effects with subjective epistemic modals by: (i) assuming that these modals must mark clausal scope (see also Lyons (1977) and much other work); and (ii) adopting a theory of scope that predicts minimality effects: if  $QP_2$  is in the scope extension path of  $QP_1$ , then  $QP_2$  cannot extend its scope as well (the Condition on Scope Shift of Neeleman and van de Koot, 2012).

The present paper argues that the negation found in ONPQs is a special subjective epistemic modal that must take scope over a polarity operator (see Holmberg (2015) for a proposal in the same spirit). This allows us to extend the account of Epistemic Containment and scope freezing effects in sentences with subjective epistemic modals to ONPQs. In addition, the embedding restrictions observed in (1) can now be attributed to the very wide scope of subjective epistemics, which triggers incompatibility with certain embedding predicates, namely those that force an 'objective' reading of their complement.

A similar embedding restriction is found with subjective epistemic modals. As discussed by Anand and Hacquard (2009), certain predicates, such as *assume* or *imply*, signal a discourse move to update the common ground with the proposition in their complement. Such verbs do not allow the proposition in their complement to be the target of a subjective modal attitude. We first demonstrate that the relevant restriction is only imposed on the proposition under embedding, so that it must be grammatically encoded, and then argue that the matrix predicates in (1c, d) encode a similar requirement for the polar alternatives in their complement. This proposal allows the embedding restrictions noted by Anand and Hacquard (2009), as well the embedding restriction observed in (1), to be derived from the Condition on Scope Shift.

This paper is organized as follows. Section 2 provides a brief overview of bias in polar questions and argues that ONPQs are alone in being associated with an epistemic bias. Section 3 returns to the scope freezing data, presents a brief overview of the proposal developed in Constantinou and van de Koot (2015) to deal with Epistemic Containment and other scope freezing effects found with subjective epistemic modals, and shows how it captures the scope freezing data with ONPQs if outside negation, just like a subjective epistemic modal, must mark widest scope in its clause. We conclude the section by presenting data in support of the claim that outside negation differs from other subjective epistemic modals in that it must outscope the question operator. Section 4 investigates the interpretive factors that enter into the embedding restrictions observed with subjective epistemic modals (presenting data from Anand and Hacquard (2009)) and with ONPQs (see (1) above), and proposes an implementation of these factors that allows the embedding restrictions to be derived from the Condition on Scope Shift. We wrap up the discussion in section 5.

## 2 Bias in direct polar questions

Polar questions may be associated with a bias towards a particular answer (Ladd, 1981; Büring and Gunlogson, 2000; Rooy and Safarova, 2003; Romero and Han, 2004; Asher and Reese, 2007; Sudo, 2013; Holmberg, 2013, 2015). For example, as already observed by Büring and Gunlogson (2000), a positive polar question (PPQ), such as *Is it sunny?*, has an evidential bias: it is incompatible with compelling contextual evidence suggesting the negative answer, such as someone walking in with a wet coat. Büring and Gunlogson (2000) define 'contextual evidence' as follows:

- (11) *Contextual Evidence*  
Evidence that has just become mutually available to the participants in the current discourse situation.

Following Sudo (2013), we label an evidential bias involving *incompatibility* with compelling evidence as a negative evidential bias, but modify his definition slightly to include the additional word *compelling* without which the definition seems too strong:<sup>4</sup>

- (12) *Evidential Bias* ( $\neg$ )  
If a polar question is incompatible with compelling contextual evidence for the positive (resp. negative) answer, it is said to carry a [ $\neg$ positive] (resp. [ $\neg$ negative]) evidential bias.

Using this terminology, we say that that a PPQ has a [ $\neg$ negative] evidential bias.

Outside negation polar questions (ONPQs) have been argued to have a [ $\neg$ positive] evidential bias; that is, to be incompatible with compelling evidence suggesting a *positive* answer (see Buring and Gunlogson, 2000). Sudo (2013) demonstrates this for English using the context and examples below (his (9)), where the addition of *too* in the question forces an ONPQ reading (see Ladd (1981) for discussion). Note that these examples also show that ONPQs are compatible with evidence suggesting a *negative* answer (so they do not have a [ $\neg$ negative] evidential bias).

- (13) *Context: For a psychological experiment, we are looking for some left-handed subjects. We have asked some of our friends, but only Mary was left-handed so far. To my surprise, John is using a pencil with his left hand.*  
a. #Isn't John left-handed (too).  
b. Isn't John right-handed (too).

As shown by Sudo (2013), again working with English data, ONPQs exhibit a second type of bias, which he calls a positive epistemic bias. They convey that the speaker has an expectation compatible with a positive answer. In contexts in which the speaker does not have such an expectation, ONPQs are infelicitous.

Let us finally briefly consider direct negative polar questions with an 'inside negation' interpretation (INPQs). An English example, again taken from Sudo (2013), appears in (14).

- (14) *Context: Bill is right-handed and Mary is left-handed. We're wondering who else is a lefty. John is using a pen with his right hand in front of us.*  
a. #Isn't John right-handed either?  
b. Isn't John left-handed either?

The context provides evidence for the truth of the positive polar alternative of (14a) and for the falsity of the positive polar alternative of (14b). It must therefore be concluded that the IN interpretation is incompatible with evidence for the positive answer. The evidential bias is in fact a requirement for the *presence* of contextual evidence for the *negative* answer. This is shown by the infelicity of the following example:

- (15) *Context: In the same context as (14), I think that I have seen Chris, who is not around right now, use a pen with his right hand.*

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<sup>4</sup> It is too strong because it incorrectly rules out the possibility of non-compelling contextual evidence. That is, contextual evidence for *p* that is balanced by (at least) equally weighted evidence for  $\neg p$ .

#Isn't Chris left-handed either?

To capture this, Sudo (2013) defines a notion of positive evidential bias. We adopt the slightly amended definition in (16), which includes the additional word *compelling*.

(16) *Evidential Bias (+)*

If a polar question requires compelling contextual evidence for the positive (resp. negative) answer, it is said to carry a [+positive] (resp. [+negative]) evidential bias.

We may now say that INPQs have a [+negative] evidential bias.

Finally, we should ask whether INPQs are also associated with a positive epistemic bias, just like their ONPQ counterparts. Sudo (2013) claims that they are, on the grounds that the example in (14b) conveys that, prior to asking the question, the speaker expected the positive polar alternative to be true. While this may well be the case, it amounts to the claim that, in the face of compelling contextual evidence for  $\neg p$ , the speaker has abandoned this positive bias regarding  $p$ , *so that she has no epistemic bias at utterance time*. In other words, question (14b) means something like 'I have reason to believe that John is not left-handed; please confirm that I'm right'. Evidence for the absence of an epistemic bias comes from the fact that INPQs do not pass Asher and Reese's (2007) tests for speaker's commitment to a specific answer (i.e., epistemic bias) (see (17)), while ONPQs do (see (18)).

(17) *Context: same as (14)*

- a. \*After all, isn't John right-handed either?
- b. Isn't John by any chance left-handed either?

(18) *Context: same as (13)*

- a. After all, isn't John right-handed, too?
- b. ??Isn't John by any chance left-handed, too?

Asher and Reese (2007) use the 'after all' and 'by any chance' tests to investigate the interpretative properties of tag questions. As they demonstrate, *after all* is only compatible with an (expression that contains an) assertion. Tag questions pass this test, similarly to ONPQs (see (18a)), because the speaker commits to a specific answer to the question. The fact that INPQs fail this test (see (17a)) is a clear indication that the speaker is not committed to an answer at utterance time. The 'by any chance' test further confirms this evaluation. Asher and Reese (2007) show that *by any chance* is incompatible with biased questions, including tag questions. ONPQs are therefore not compatible with this expression (see (18b)), but an INPQ is (see (17b)), because the latter can be a neutral question.

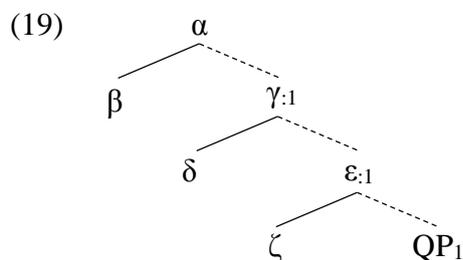
In conclusion, ONPQs seem to be alone in being associated with an epistemic bias. This strengthens the hypothesis that the embedding restriction observed in (1) is connected with epistemic bias (since the relevant restriction does not affect INPQs).

### 3 Capturing Epistemic Containmentment

#### 3.1 The Condition on Scope Shift

Constantinou and van de Koot (2015) provide an account of the scope freezing effects induced by subjective epistemics based on the theory of scope shift developed in Neeleman and van de Koot (2012). We provide a brief outline of this work, and subsume the scope properties of outside negation under those of subjective epistemic modals.

Williams (1994) assumes that an argument QP carries a scope index that may percolate to a dominating node to mark the QP's extended scope. Thus, the scope of  $QP_1$  in (19) below corresponds to the largest category that carries its scope index ( $\gamma$ ), minus the QP itself. Note that a scope index inherited by a node  $\alpha$  is placed after a colon. This distinguishes it from an index introduced by  $\alpha$ , which appears in front of any colon; we omit the colon when there is no inherited index.



In some languages, such as German and Japanese, a QP argument may also mark its scope through overt A'-movement, in which case scope is marked in the landing site. We do not discuss this further here, since scope-marking through movement will not feature in what follows (but see Neeleman and van de Koot (2012) for details). Finally, an argument QP may also fail to percolate a scope index altogether, in which case it takes surface scope.

Neeleman and van de Koot (2012) combine the index-based scope marking mechanism with the following minimality condition on inheritance of quantificational indices:

- (20) *Condition on Scope Shift (CSS)*  
No node may inherit two scope indices.

It is easy to see that this constraint is incompatible with the widely held view, originating in the work of Chomsky (1976) and May (1977), that there is a syntactic level of Logical Form (LF) that provides a transparent and complete representation of scope relations. A translation of this view into the index-based representations of Williams (1994) yields the representation in (21a) for a structure containing two QPs interpreted as taking surface scope and that in (21b) for the same structure with inverse scope. As can be easily verified, both (21a) and (21b) violate the CSS.

- (21) a.  $*[_{:1} \dots [_{:1,2} \dots QP_1 [_{:2} \dots QP_2 \dots ]]]$   $QP_1 > QP_2$   
b.  $*[_{:2} \dots [_{:1,2} \dots QP_1 [_{:2} \dots QP_2 \dots ]]]$   $QP_2 > QP_1$

There is an alternative view of scope, according to which LF only represents deviations from surface scope (see Reinhart, 1983, 2006; see also Lakoff, 1972; Huang, 1982; Hoji, 1985). On this view, scope extension is limited to structures in which it generates an interpretation that is otherwise unavailable.<sup>5</sup> Reinhart (1983, 2006) treats scope extension as QR; a translation of her proposal in terms of indices expresses the readings in (21) with the slightly simpler structures in (22), neither of which violates the CSS, as required.

- (22) a.  $[ \dots [ \dots QP_1 [ \dots QP_2 \dots ]]]$   $QP_1 > QP_2$   
b.  $[_{:2} \dots [_{:2} \dots QP_1 [_{:2} \dots QP_2 \dots ]]]$   $QP_2 > QP_1$

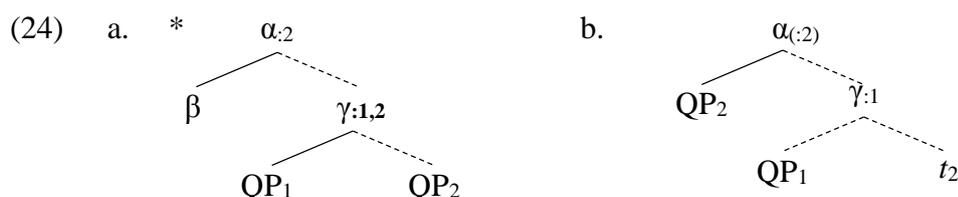
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<sup>5</sup> The view that scope extension is subject to Economy and relativized to an interpretation has been argued for in Fox (1999; 2000). However, unlike Reinhart, Fox assumes that every QP must move.

We summarize the main tenets of the proposal in (23). The Economy principle in (23b) is intended to block scope extension where it does not give rise to inverse scope, while (23c) is a mapping principle that, in the absence of scope extension, regulates the association of syntactic structures at LF with their semantic representations.

- (23) a. *Scope Extension*  
 If a QP percolates its index to a dominating node  $\alpha$ , then its scope coincides with  $\alpha$  minus the QP itself.
- b. *Economy*  
 Scope extension must give rise to an otherwise unavailable interpretation.
- c. *Default Scope Rule*  
 If a QP does not percolate its index, it takes scope over its c-command domain.

An important fact about the CSS is that it creates an asymmetry between covert scope shift, analyzed here as index percolation, and scope-taking by overt movement. Covert scope shift involves index percolation. It is therefore incompatible with any other scope extensions in its percolation path, as these give rise to CSS violations. This is shown in (24a), where covert scope extension of QP<sub>2</sub> freezes the scope of QP<sub>1</sub>. By contrast, overt movement of a QP cannot trigger CSS violations in the movement path, whether the moved QP marks scope in its landing site (because it has undergone overt QR) or not (because it has undergone A-movement, which does not mark scope). This is shown in (24b), where movement of QP<sub>2</sub> does not prevent covert scope extension by QP<sub>1</sub>.



Thus, overt scope marking is freer than covert scope shift, a prediction that is corroborated by a range of QP interactions (see Neeleman and van de Koot (2012) for extensive discussion). As will be clear, this predicted difference is hard to reconcile with theories that treat overt and covert scope shift as mediated by the same operation, for example movement. With this background, we now return to epistemic modals.

### 3.2 Scope freezing with subjective epistemics as a CSS effect

We follow much work in the literature, originating from Kratzer (1977), in taking epistemic modals to be propositional operators quantifying over possible worlds and relating them to the proposition under question. Possibility modals (e.g., *may*, *possibly*) are treated as existential quantifiers, and necessity modals (e.g., *certain*, *must*) as universal quantifiers. However, we make a distinction between subjective and objective epistemics in how they may achieve their correct semantic scope. An objective category may take surface scope and rely on existential closure to close any variables in its c-command domain. By contrast, a subjective epistemic category must mark widest scope in its clause through index percolation:

- (25) *Scope of Subjective Epistemic Modality (SSEM)*  
 A category carrying subjective epistemic modality must mark widest scope in its clause (by percolating its quantificational index).

Taken together, the SSEM and the CSS predict that QPs that are clause-mates of a subjective epistemic modal or in the c-command domain of such a modal should be unable to extend their scope across it (because the resulting structures instantiate the offending configuration in (24a)). Consider first the examples in (26), with a subjective epistemic auxiliary, and (5) – repeated here as (27) – with a subjective epistemic adverb.

- (26) a. #Every student may have left, but not every one of them has.  
 (\*every > may)  
 b. #Fewer than half the students must have passed, but perhaps all of them did.  
 (\*fewer than half > must)
- (27) #Every guest is perhaps the murderer.  
 a. Perhaps every guest is the murderer. inconsistent, <sup>OK</sup>ECP  
 b. For each guest x, x is perhaps the murderer. consistent, \*ECP

As shown in (28), these instantiate cases in which an epistemic modal merges in a position from which it has to percolate its index to the top of its own clause (presumably up to the TP level) in order to satisfy (25).

- (28) a. \*<sub>[TP:1,2 [every student]<sub>2</sub> [T:1 may<sub>1</sub> ... ]]</sub> = (26a)  
 b. \*<sub>[TP:1,2 [every guest]<sub>2</sub> [T:1 is [VP:1 perhaps<sub>1</sub> [VP ... ]]]]</sub> = (27), on reading (b)

The CSS prevents the subject QP in these structures from percolating its own scope index, as this causes TP to inherit a second scope index. It follows that QP in these structures is unable to outscope the modal category (which in the relevant examples gives rise to contextually inappropriate readings).

We have previously demonstrated that ONPQs pattern with subjective epistemics with regard to scope freezing (see section 1, examples (8) and (9)). As shown in section 2, ONPQs are the only type of polar question to signal an epistemic attitude based on personal belief. We may therefore assume that outside negation is a kind of subjective epistemic category in the sense of (25). It follows that it must mark clausal scope through index percolation. As shown in (30), we can now analyze (6a), repeated here as (29), as an instance of Epistemic Containment.<sup>6</sup> Recall that the context for this example forces widest scope for the QP, so that the scope index of QP must percolate past TP. But, by the SSEM, TP must also inherit the scope index of outside negation, so that a violation of the CSS is unavoidable.

- (29) *Context: I had 30 students in my final year syntax class. They all passed the coursework, but to obtain their degree, they had to pass my exam. For about 10 of them, I was almost certain that they would. My TAs marked all the scripts and I ask...*  
 ; Haven't fewer than half of the students managed to pass the exam(, too)?

- (30) \*<sub>[[Haven't]<sub>t</sub> [TP:1,2 [fewer than...]<sub>2</sub> [T:1 t<sub>haven't-1</sub> [VP]]]]]</sub> = (29)

Similarly, the scope freezing effects with outside negation in (31), repeated from (9), fall out from the fact that negation must percolate a scope index past any QP in its clause that c-commands it.

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<sup>6</sup> Since the head movement in (29) is not motivated by negation, we assume that outside negation takes scope from its base position.

- (31) a. Had niet tenminste één student ieder artikel gelezen?  
 had not at-least one student every article read  
 ONPQ:  $\exists > \forall$ ;  $\forall > \exists$
- b. Had tenminste één studentniet ieder artikel gelezen?  
 had at-least one studentnot every article read  
 ONPQ:  $\exists > \forall$ ;  $*\forall > \exists$
- c. Had tenminste één studentieder artikel niet gelezen?  
 had at-least one studentevery article not read  
 ONPQ:  $\exists > \forall$ ;  $*\forall > \exists$

As shown in (32), this has the effect that the CSS only allows  $QP_3$  to extend its scope in (31a), where percolation of its index to a node dominating  $QP_2$  does not overlap with the index percolation path created by *not*. This scope configuration is shown in (32a’).

- (32) a.  $[_{TP:1} \text{niet}_1 [_{QP_2} [_{QP_3} \dots ]]]$  = (31a),  $\exists > \forall$   
 a’.  $[_{TP:1} \text{niet}_1 [_{:3} QP_2 [_{:3} QP_3 \dots ]]]$  = (31a),  $\forall > \exists$   
 b.  $*[_{TP:1,3} QP_2 [_{:1,3} \text{niet}_1 [_{:3} QP_3 \dots ]]]$  = (31b)  
 c.  $*[_{TP:1,3} QP_2 [_{:1,3} QP_3 [_{:1} \text{niet}_1 \dots ]]]$  = (31c)

### 3.3 How wide is the scope of outside negation?

So far we have argued that the scope of outside negation is at least TP. But if it scopes below the question operator in C, then it is not clear in what sense it is ‘outside’ the question. As already noted by Ladd (1981), an ONPQ is answered in exactly the same way as a PPQ (see Holmberg (2015) for discussion of strategies for answering INPQs):

- (33) a. Does Mary like spinach?  
 Yes (she does).  
 No (she doesn’t)
- b. Doesn’t Mary like spinach?  
 Yes (she does).  
 No (she doesn’t)

The observation that ONPQs do not license NPIs lends further support to the hypothesis that, in a very concrete sense, outside negation is not contained in the question. In line with these observations, Holmberg (2015) assumes that outside negation must outscope the question operator. In the remainder of this section we provide a new argument in support of that analysis.

We have argued that subjective epistemic modal auxiliaries and adverbs must mark clausal scope. This chimes with the idea that semantically they associate an attitude holder with a proposition. When a subjective epistemic modal occurs in an embedded clause under a doxastic verb like *believe*, the attitude holder for the epistemic is the matrix subject (we indicate this showing the scope index of the modal as a superscript on the attitude holder):

- (34) John<sup>1</sup> believes that [<sub>:1</sub> it [<sub>:1</sub> might<sub>1</sub> be raining]]

Now consider what happens when the modal finds itself in an embedded environment that contains a competing attitude holder:

- (35) a. \*John<sup>1</sup> believes that [ [according to Bill] [<sub>:1</sub> it [<sub>:1</sub> might<sub>1</sub> be raining]]

- b. John believes that [ [according to Bill<sup>1</sup>] [:<sub>1</sub> it [:<sub>1</sub> might<sub>1</sub> be raining]]

These examples show that the epistemic auxiliary must associate with the attitude holder in the embedded clause and cannot be linked to any other attitude holder. Of course, one would like to know why the modal cannot associate with the matrix subject. It may be a kind of minimality effect, or alternatively the representation in (35b) is favoured because it is the minimal scope extension that associates an attitude holder with the proposition containing the modal.<sup>7</sup> We put this question to one side here.

If the interpretation of outside negation were completely parallel to that of the subjective epistemic modal in (35) (that is, if outside negation related an attitude holder to a proposition), then we would expect the choice of attitude holder for outside negation to exhibit similar sensitivity to the presence of an intervening attitude holder. But this prediction is not borne out:

- (36) a. John is wondering if/whether [:<sub>1</sub> it isn't<sub>1</sub> raining]  
 b. John<sup>1</sup> is wondering if/whether [:<sub>1</sub> [according to Bill] [:<sub>1</sub> it isn't<sub>1</sub> raining]]  
 c. \*John is wondering if/whether [[according to Bill<sup>1</sup>] [:<sub>1</sub> it isn't<sub>1</sub> raining]]

Just to be sure we should check that the locality effect in (35), with a subjective epistemic auxiliary, is also found in embedded questions, and as (37) shows, it is.

- (37) a. \*John<sup>1</sup> is wondering if/whether [:<sub>1</sub> [according to Bill] [:<sub>1</sub> it might<sub>1</sub> raining]]  
 b. John is wondering if/whether [[according to Bill<sup>1</sup>] [:<sub>1</sub> it might<sub>1</sub> raining]]

This data pattern receives a straightforward explanation if outside negation differs from epistemic modal auxiliaries in having to scope over polar alternatives. In that case, the only scope configuration that satisfies the semantic requirements of this item is as exemplified in (38a). The configuration in (38b) is ruled out because the intended attitude holder is contained in the scope of the attitude.<sup>8</sup>

- (38) a. John<sup>1</sup> is wondering [:<sub>1</sub> if/whether [:<sub>1</sub> [according to Bill] [:<sub>1</sub> it isn't<sub>1</sub> raining]]]  
 b. \*John is wondering [:<sub>1</sub> if/whether [:<sub>1</sub> [according to Bill<sup>1</sup>] [:<sub>1</sub> it isn't<sub>1</sub> raining]]]

## 4 Embedding subjective epistemics

### 4.1 Anand and Hacquard, 2009

Anand and Hacquard (2009) investigate which predicates do and do not allow embedded subjective epistemics. If outside negation is a kind of subjective epistemic modal, then we should expect constraints on where subjective epistemics can appear to apply to outside negation as well. We therefore outline their findings, raising some questions as we go along.

Anand and Hacquard (2009) begin by making the observation that epistemic modals can only appear in the complement of attitudes of acceptance. These are attitudes that are said to be correct whenever the proposition expressed by their complement is true (Stalnaker,

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<sup>7</sup> The latter type of explanation, essentially an appeal to Economy, would need to explain why this condition is not relative to an interpretation in this case. This may prove an insurmountable objection.

<sup>8</sup> That an attitude holder cannot scope out of a question is confirmed in root environments. The question in (i) means “Is it raining according to John? (My hunch is that it IS raining according to John.)” It cannot mean “Is it raining? (And John’s hunch is that it IS raining.)”

(i) Isn't it raining according to John?

1984). They cannot, however, appear under bouletics or commands (Anand and Hacquard's (2009) example (13)):

- (39) a. John {believes, argues, assumed} that the Earth might be flat.  
 b. \*John {hopes, wishes, commanded} that the Earth might be flat.

We therefore predict outside negation to be impossible under bouletics as well. This prediction is confirmed by the following data:

- (40) a. \*John cares if/whether Mary doesn't like spinach, too.  
 b. \*Whether Mary doesn't like spinach too is important to me.

Anand and Hacquard (2009) then distinguish two classes of acceptance attitudes, doxastic attitudes (*believe, think, know*) and proffering attitudes (*claim, argue, demonstrate*), and argue that epistemics receive a subjective reading in the complement of verbs expressing doxastic attitudes, while they receive an objective reading in the complement of profferings. The split between the two classes is primarily based on Epistemic Containment effects: these are claimed to be uniformly present in the complement of doxastics and systematically absent in the complement of proffering predicates. The contrast is illustrated in (41) (Anad and Hacquard's (2009) (17)).<sup>9</sup>

- (41) a. #Holmes believed that every guest might be the murderer.  
 b. Holmes {assumed, implied} that every guest might be the murderer.

The authors furthermore propose to analyze these differences as resulting from the type of propositional content associated with these attitudes: doxastic attitude predicates report beliefs, while profferings are reports of discourse moves which attempt to settle an issue. The objective reading of the complement of proffering predicates is then attributed to the evaluation of the proposition in the projected common ground of the discourse move, where the issue has been adopted by all participants.

Note that the objective reading of the complement concerns a non-actual common ground. It is the objective of the discourse move to move the participants to acceptance of this non-actual common ground. A proffering verb may therefore be considered a kind of modalized factive, where the modality is a teleological stance associated with the discourse move.

Let us now check whether Anand and Hacquard's (2009) observations regarding subjective epistemic modals in the complement of doxastic and proffering predicates are mirrored by outside negation. Consider first proffering attitudes. The examples in (42) suggest that the external argument of a proffering verb cannot function as the attitude holder for outside negation in its polar complement. Note that the past tense in these examples disqualifies the speaker from acting as an attitude holder in this context.<sup>10</sup>

- (42) *Context: Neither John nor the speaker had any evidence regarding Mary's liking of spinach before last night. But having had dinner with her last night, they now know that she loves it.*  
 a. \*Yesterday morning John demonstrated if/whether Mary didn't like spinach

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<sup>9</sup> The semi-factive doxastic *know* does not appear to pattern with *believe* as regards Epistemic Containment. We return to this matter below.

<sup>10</sup> Recall that subjective epistemic modality is indexical. This means that a speaker-oriented attitude must always pertain to the evaluation of a proposition whose modality is at issue at speech time.

- too.
- b. \*Yesterday morning John argued if/whether Mary didn't like spinach, too.

Things do not improve much if the examples are changed to the present tense, so that the speaker becomes a potential attitude holder. The examples in (43) assume that neither John nor the speaker has any anterior knowledge about Mary's liking of spinach.

- (43) a. \*John is demonstrating if/whether Mary doesn't like spinach, too.  
b. \*John is arguing if/whether Mary doesn't like spinach, too.

This outcome is quite remarkable and deserves some discussion. Although the examples in (42) and (43) can be analyzed as reporting a discourse move that attempts to settle an issue, the complements in these examples are not propositions that can be put forward for inclusion in the common ground. In other words, these examples do not appear to have any modalized factive presupposition and therefore the alternatives in the polar complements should be considered completely unsettled. One would have thought that these are perfect conditions for the expression of an epistemic bias by either the subject of the predicate or by the speaker, but nevertheless outside negation is completely impossible. These findings are mirrored by the relative unacceptability of subjective epistemic modals in such complements (see (44)) (and the relative acceptability of subjective epistemics under doxastics – see (45)).<sup>11</sup>

- (44) a. \*John is demonstrating if/whether Mary perhaps likes spinach.  
b. \*John is arguing if/whether Mary perhaps likes spinach.

- (45) a. John is wondering if/whether Mary perhaps likes spinach.  
b. John is asking if/whether Mary perhaps likes spinach.

These observations are potentially problematical for Anand and Hacquard's (2009) proposal, which is summarized in the quotation below (from Anand and Hacquard (2009): 46):

While [the various discourse moves] may differ in terms of what is said (*claim, imply, presuppose*), intention (*argue* vs. *claim*), or success of the move (*convince* vs. *suggest*), as a class they all describe attempts to place their complement proposition in the common ground. If *p* is in the common ground then it is mutually accepted (closed under acceptance by all discourse participants), and thus non-controversial, as all participants are aware that it is mutually accepted. We suggest, in line with von Stechow and Gillies (2007) and Stephenson (2007), that this non-controversy is the source of the objective stance we diagnosed for proffering attitudes; things feel objective in a discourse inasmuch as the participants accept it and are aware that the others accept it. Thus proffering attitudes report attempts to make their complements non-controversial, and hence objective.

But if the unacceptability of subjective epistemic modals in the complement of proffering verbs taking a declarative complement is due to the fact that the proposition in the complement has been accepted by all discourse participants, then why are subjective

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<sup>11</sup> Note, furthermore, that subjective modals give rise to a pretty strong effect of Epistemic Containmentment when embedded under doxastics:

- (i) ??John wondered if/whether every party guest might be the murderer.

epistemic modals not possible in the complement of those verbs when the complement denotes polar alternatives (that is, a question)?

Let us now turn to doxastic predicates. Such predicates do not trigger any factive presupposition when combined with a declarative complement. They should therefore lack whatever property interfered with outside negation in (42) and (43). The outside negation variants of (1a, b), repeated here as (46), show that this is correct.

- (46) a. John is wondering if/whether Mary doesn't like spinach too.  
b. John is asking if/whether Mary doesn't like spinach too.

Similarly, the predicate *be not very clear* in (1e), repeated here as (47), which also has a doxastic flavor, permits an ONPQ as its subject.<sup>12</sup>

- (47) a. Whether Mary doesn't like spinach too is not very clear to John.  
b. #Whether every guest might be the murderer is not very clear to John.

We encounter a new complication when we consider *know* and *remember*, which are also doxastic predicates, but were shown in (1c, d) not to allow an outside negation reading of their polar complement (these facts are repeated below as (48a, b)). In line with this behaviour, these verbs do not trigger Epistemic Containment in their complement, as shown by the fact that the wide scope reading for the universal in (49a, b) seems quite accessible.

- (48) a. \*John knows if/whether Mary doesn't like spinach too.  
b. \*John remembers if/whether Mary doesn't like spinach too.
- (49) a. Holmes knows that every guest might be the murderer.  
b. Holmes remembers that every guest might be the murderer.

That *know* and *remember* are different from *believe* is also confirmed by the fact that the epistemic adverb *perhaps*, which strongly resists an objective reading, is fine in the complement of *believe* but not in the complement of either *know* or *remember*:

- (50) a. John believes that perhaps Mary likes spinach.  
b. ??John knows that perhaps Mary likes spinach.  
c. ??John remembers that perhaps Mary likes spinach.

The behavior of *know* and *remember* fits quite well with the proposal put forward by Anand & Hacquard, since – being semi-factive – these verbs trigger the presupposition that the proposition in their complement is true and hence must be accommodated as part of the common ground. That is, the objective reading is associated with propositions that are either in the common ground or in a projected common ground.

However, as was the case with (42), the unacceptability of (48a, b) on the outside negation reading remains mysterious: the verbs in these examples do not combine with a proposition, so that no factive presupposition is triggered regarding either of the polar alternatives. These should therefore represent an unsettled issue and should be very compatible with the expression of a subjective epistemic bias (for example, by the speaker), contrary to fact.

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<sup>12</sup> As expected, this predicate also triggers Epistemic Containment:

(i) # Whether every guest might be the murderer is not very clear to John.

The data reviewed so far suggest that factivity is the factor that ties together the predicates that do not permit a subjective epistemic (including outside negation) to be embedded in their complement. Although we do not yet know why that is, we should complete the data overview by checking whether non-factive but veridical predicates, such as *is right about* and *correctly predicted* pattern with proffering verbs and semi-factives. We should also check that non-veridical responsive verbs pattern with doxastics.

The facts in (51) indicate that veridical predicates do indeed pattern with factives. (The judgment for (51b) assumes that its complement is read as an ONPQ.)<sup>13,14</sup>

- (51) a. \*John correctly predicted that the bakery is perhaps just around the corner.  
 b. \*John correctly predicted whether the bakery isn't just around the corner.

In line with this, such predicates also do not trigger Epistemic Containment in their complement:

- (52) John correctly predicted that every party guest might be the murderer.

Non-veridical responsive predicates, by contrast, do seem to be able to embed subjective epistemics, as well as outside negation, as shown in (53).

- (53) a. John conjectured that the bakery was perhaps just around the corner.  
 b. John conjectured (about) whether the bakery wasn't just around the corner.

This then leads us to expect that such verbs might also trigger Epistemic Containment, and that too appears to be the case:

- (54) #John conjectured that every party guest might be the murderer.

## 4.2 Embedding matters

Recall that the proposal by Anand and Hacquard (2009) is based on the intuition that “proffering verbs induce objectivity of their complements because the complements are intended to become part of the common ground” (Anand and Hacquard (2009): 48). In other words, the expression of a subjective epistemic attitude by speaker A towards a proposition should be inappropriate once a discourse move causes that proposition to be tendered as part of a projected common ground of a group of speakers that includes A.

We think that this take on conversational moves overstates their actual impact, since a discourse participant may well wish to qualify the status of the tendered proposition on the basis of their personal beliefs, even if they accept it as true.<sup>15</sup> The discourse in (55) illustrates such a case:

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<sup>13</sup> We are grateful to Yasu Sudo for bringing these data to our attention.

<sup>14</sup> Veridical predicates entail, but do not presuppose, that the attitude holder has the correct belief.

<sup>15</sup> This point echoes von Stechow and Gillies (2007), who point out that “... solipsistic readings for the modals – readings on which the modals quantify over the evidence available to the speaker at the time of utterance – are virtually always available”.

(55) *Context: John has had dinner with his new girlfriend Mary in posh vegetarian restaurant where every course features at least a few leaves of spinach. He reports on his evening out to Fred, who has known Mary for some time. He concludes by saying “I’m implying that Mary likes spinach.” To this Fred replies...*

Well, it is also my personal belief that Mary likes spinach, so I do not need to be convinced of that.

This is a first indication that the objective reading for a proposition in the complement of proffering verbs is only forced on that proposition in that particular structural environment. We should therefore check whether the unacceptability ONPQs under proffering verbs, and semi-factive and veridical predicates also only arises under embedding. An example of unacceptable embedding of an ONPQ appears below.

(56) \*John knows if/whether the bakery isn’t just around the corner.

Consider next the dialogue in (57). Here, unlike in (56), the factive verb *know* is embedded in the conversational context. But a continuation in this context with an ONPQ built on the question embedded under *know* is just fine.

(57) *Context: I am in the car with Mary, driving through an area of London that she knows much better than I do. We are looking for a particular bakery that is supposed to be somewhere around there. At some point Mary says “I know whether the bakery is around the next corner. Do you?” And I answer...*

Yes, isn’t it around the next corner?

And, just to be sure, the acceptability of the ONPQ in (57) is completely on a par with that of the ONPQ in (58), where the context contains the non-factive verb *wonder* rather than *know*:

(58) *Context: I am in the car with Mary, looking for a particular bakery that is supposed to be somewhere around there. At some point Mary says “I’m wondering whether the bakery is around the next corner.” And I continue...*

Yes, isn’t it around the next corner?

Taken together, the data in this section indicate that the factor responsible for the ban on subjective epistemics and outside negation in certain environments must be grammatically represented, since it only affects the acceptability of these phenomena *in embedded environments*.

### 4.3 Towards an alternative analysis

Let us assume that the factive or veridical import of a predicate is encoded through the presence of an operator that scopes over the embedded proposition. We furthermore assume that this operator is present whether the complement of the predicate is semantically a proposition or a set of polar alternatives (see Spector and Égré (2015) for a related proposal). If the latter, it attaches below the question operator and thereby encodes that the answer to the embedded polar question should be taken to be true. This does not, of course, result in a factive presupposition (or a veridical entailment), since the complement of, say, *know* when it selects a question is not a proposition (but a set containing two factive polar alternatives). However, it does have two effects: (i) of encoding that the subject stands in the relation expressed by *know* to a true proposition; and (ii) of triggering existence presuppositions for indefinites in the polar complement of *know*, and for predicting that such presuppositions are absent in the complement of non-factive predicates like *wonder*:

- (59) a. John is wondering whether Mary owns a unicorn.  
       >/> Unicorns exist.
- b. ?John knows whether Mary owns a unicorn.  
       >> Unicorns exist.

The relative unacceptability of (59b) is due to the fact that, although John can know that Mary does not own a unicorn (since unicorns do not exist), he cannot know that Mary owns a unicorn (since that presupposes the existence of unicorns).

We analyze proffering predicates and veridical predicates analogously. Recall that Anand and Hacquard (2009) analyze proffering predicates as encoding a kind of modalized factivity: the complement is treated as a fact in the projected common ground. This approach is supported by the fact that these predicates pattern with true factives in triggering existence presuppositions for indefinites in their complement. That veridical predicates should do so, too, is of course expected.

- (60) a. John believes that Mary owns a unicorn.  
       >/> Unicorns exist.
- b. ??John implied that Mary owns a unicorn.  
       >> Unicorns exist.
- c. \*John correctly predicted that Mary owns a unicorn.  
       ⊨ Unicorns exist.
- d. \*John regrets that Mary owns a unicorn. >> Unicorns exist.

With these assumptions in place, the embedding restrictions on subjective epistemic modals (including outside negation) follow from the combined effect of selection for factivity, the SSEM, repeated in (61) below, and the CSS.<sup>16</sup>

- (61) *Scope of Subjective Epistemic Modality (SSEM)*  
 A category carrying subjective epistemic modality must mark widest scope in its clause (by percolating its quantificational index).

Consider the potential representations for (50b) in (62). The verb *know* requires its complement to be in the scope of a factive operator. The SSEM requires the subjective modal adverb *perhaps* to have widest scope in its clause. Therefore, depending on which requirement takes precedence, either the predicate's selectional requirement is violated (see (62a)) or the SSEM (see (62b)). If the factive operator ( $Op_F$ ) and the subjective epistemic take widest scope jointly, a violation of the CSS occurs ((see (62c)).

- (62) a. \*John knows [that [<sub>:2</sub>  $Op_F$  [<sub>:2</sub> Mary [<sub>:2</sub> perhaps<sub>2</sub> likes spinach]]]] (\*selection)  
       b. \*John knows [that [  $Op_F$  [<sub>:2</sub> Mary [<sub>:2</sub> perhaps<sub>2</sub> likes spinach]]]] (\*SSEM)  
       c. \*John knows [that [<sub>:1,2</sub>  $Op_{F-1}$  [<sub>:2</sub> Mary [<sub>:2</sub> perhaps<sub>2</sub> likes spinach]]]] (\*CSS)

By hypothesis, the factive operator is also present when the verb selects a polar question:

- (63) John knows [if/whether<sub>Q</sub> [ $Op_F$  Mary likes spinach]]

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<sup>16</sup> The definition of the SSEM does not refer to the difference between subjective epistemic modal auxiliaries and adverbs, which mark scope over a proposition, and outside negation, which marks scope over polar alternatives. We assume that this difference falls out from the semantic selection requirements of these items.

Therefore, if this complement includes a subjective epistemic modal, the same constellation of competing requirements will rule the structure out:

- (64) a. \*John knows [if/whether<sub>Q</sub> [:<sub>2</sub> Op<sub>F</sub> [:<sub>2</sub> Mary [:<sub>2</sub> perhaps<sub>2</sub> likes spinach]]]]] (\*selection)  
 b. \*John knows [if/whether<sub>Q</sub> [ Op<sub>F</sub> [:<sub>2</sub> Mary [:<sub>2</sub> perhaps<sub>2</sub> likes spinach]]]]] (\*SSEM)  
 c. \*John knows [if/whether<sub>Q</sub> [:<sub>1,2</sub> Op<sub>F-1</sub> [:<sub>2</sub> Mary [:<sub>2</sub> perhaps<sub>2</sub> likes spinach]]]]] (\*CSS)

If the complement contains outside negation, then – assuming that a factive operator cannot extend its scope across a question operator – either the SSEM or the selectional requirements of the embedding predicate will be violated:

- (65) a. \*John knows [:<sub>1</sub> if/whether<sub>Q</sub> [:<sub>1</sub> Op<sub>F</sub> [:<sub>1</sub> Mary [:<sub>1</sub> doesn't<sub>1</sub> like spinach]]]]] (\*selection)  
 b. \*John knows [if/whether<sub>Q</sub> [ Op<sub>F</sub> [:<sub>1</sub> Mary [:<sub>1</sub> doesn't<sub>1</sub> like spinach]]]]] (\*SSEM)

Given the assumption we have made about the presence of a factive operator in the complement of verbs of proffering and veridical predicates, this analysis will carry over to these predicates.

The absence of Epistemic Containment in the complement of predicates of proffering, and factive and veridical predicates follows from the incompatibility of the factive operator with a subjective epistemic modal. We illustrate this for a proffering verb in (66). On the objective reading of the modal in (66a), all is well: no index percolation occurs and the modal is interpreted as part of the proposition tendered for acceptance into the common ground. The QP outscopes the modal by the default scope rule (hence no containment effect). The subjective reading of the modal in (66b-d), is unavailable, because it gives rise to the constellation of competing demands also present in (62). (Note that the CSS violation in (66d) happens irrespective of whether the QP extends its scope.)

- (66) a. John implied [that [Op<sub>F</sub> [[every guest] [might be the murderer]]]]]  
 b. \*John implied [that [:<sub>2</sub> Op<sub>F</sub> [:<sub>2</sub>[every guest] [:<sub>2</sub> might<sub>2</sub> be the murderer]]]]] (\*selection)  
 c. \*John implied [that [ Op<sub>F-1</sub> [:<sub>2</sub> [every guest] [:<sub>2</sub> might<sub>2</sub> be the murderer]]]]] (\*SSEM)  
 d. \*John implied [that [:<sub>1,(2),3</sub> Op<sub>F-1</sub> [:<sub>(2),3</sub> [every guest]<sub>2</sub> [ might<sub>3</sub> be the murderer]]]]] (\*CSS)

As discussed in section 4.2, the ban on subjective epistemics is not present if the proposition tendered for acceptance into the common ground is not embedded under a proffering verb. Similarly, the ban on outside negation in the complement of factive predicates also only manifests itself under embedding. This follows from the present account if root assertions are never embedded under a factive operator. This seems entirely plausible, since there are also no factive assertives (as noted by Anand and Hacquard (2014)).

Finally, we should ask why doxastics force a subjective reading of their complement. One might try to argue that this is a consequence of the fact that, all else being equal, modals favour a subjective reading. But there are good reasons to assume that it is in fact a matter of selection. The meaning of these verbs presupposes the existence of an event in the mind of the referent of their external argument that is concerned with the evaluation of a proposition (as in the case of *believe*) or of the relative plausibility of polar alternatives (as in the case of *wonder*). In the case of doxastics selecting polar alternatives, this lexically encoded attitude holder has exclusive access to the verbal complement for the purposes of epistemic bias: it is

impossible to attribute any such bias to the speaker (the always available external attitude holder).<sup>17</sup>

#### 4.4 Epistemic bias and semi-factivity

Verbs like *know* and *remember* are classed as semi-factives, because their factive presupposition is cancelled under negation (67b), epistemic downgrading (67c, d), and yes/no question formation (67e).

- (67) a. John knows that Mary likes spinach.  
       >> Mary likes spinach
- b. John does not know that Mary likes spinach. (He's only guessing.)  
       >/> Mary likes spinach.
- c. It is possible that John knows that Mary likes spinach. (But then again, he may only be guessing.)  
       >/> Mary likes spinach
- d. John might know that Mary likes spinach. (But then again, he may only be guessing.)  
       >/> Mary likes spinach.
- e. Does John know that Mary likes spinach? (Or is he only guessing?)  
       >/> Mary likes spinach.

This leads us to expect that *know* will permit an ONPQ in environments in which its factivity is cancelled. The following examples show that this expectation is borne out:

- (68) a. \*John knows if/whether Mary doesn't like spinach (too).  
       b. John doesn't know if/whether Mary doesn't like spinach (too).  
       c. It is possible that John knows if/whether Mary doesn't like spinach (too).  
       d. John might know if/whether Mary doesn't like spinach (too).  
       e. Does John know if/whether Mary doesn't like spinach (too)?

Note that the epistemic bias in (68b-e) may be attributed to the speaker or some other discourse participant whose epistemic bias regarding Mary's liking of spinach is at issue. This can be illustrated with the following examples in the context provided:

- (69) *Narrator: Tonight Bill and Fred will be meeting their new flat mate Mary and they are out shopping for the meal that they will prepare for her. Bill is considering buying some spinach but neither he nor Fred know for sure whether Mary likes spinach. Fred thinks that everybody like spinach and so Mary should like it too, but Bill is less sure. Since Mary was recommended to them by Fred's friend John, Bill suggests that Fred give John a ring. Fred agrees that that is a good idea.*
- a. Fred: After all, it is possible that HE knows if/whether Mary doesn't like

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<sup>17</sup> One might assume that doxastics require their complement to be in the scope of a 'subjective' operator and that a doxastic predicate relates the indexical properties of this operator (Papafragou, 2006) to the event in the mind of the referent of its external argument. This would come close to postulating an 'internal logophoric centre' in the sense of Bianchi (2003). While such ideas seem compatible with the proposal advanced here, the simpler implementation developed here seems adequate.

- spinach.
- b. Narrator: After all, it is possible that HE knows if/whether Mary doesn't like spinach.

In (69a), the epistemic bias is associated with Fred, who is also the speaker. In (69b), this bias can again be attributed to Fred, but the sentence is uttered by the narrator, who is outside the conversational context.

It is notable that although it seems possible to attribute the epistemic bias to the matrix subject *John* in (68b, e), this is not possible with examples involving epistemic downgrade. This is not surprising, given that having an epistemic bias regarding *p* is conditional on a [–positive] evidential bias regarding *p*. In (68b, e), it is not predicated of John that he has knowledge regarding Mary's liking of spinach. Therefore, in the absence of an evidential bias, he is free to entertain an epistemic bias. (Note that this again shows that the attitude holder for outside negation does not have to be the speaker.) On the other hand, if it is predicated of John that he *has* knowledge regarding Mary's liking of spinach, as it is in (68c, d), then he cannot simultaneously entertain an epistemic bias with respect to one of these alternatives. This is because an evidential bias supporting the positive answer is incompatible with ONPQ, while an evidential bias favouring the negative answer calls for an INPQ.<sup>18</sup>

Finally, given the indexical properties of subjective epistemic bias, we should also expect (68a) to improve if the polar alternatives concern an issue whose outcome can only be determined in the future. As the acceptability of (70) shows, this prediction is borne out.

- (70) John will know tomorrow evening if/whether Mary doesn't like spinach (too).

While the presupposition of semi-factives is cancelled in various environments, we do not expect that to be the case for the entailment of veridical predicates. These should therefore remain incompatible with outside negation under manipulations that affect factivity. This is correct:

- (71) a. \*John is correctly predicting if/whether the bakery isn't around the corner.  
 b. \*John might be correctly predicting if/whether the bakery isn't around the corner.  
 c. \*Is John correctly predicting if/whether the bakery isn't around the corner?  
 d. \*John will correctly predict tomorrow if/whether the bakery isn't around the corner.

As shown in (72), verbs of proffering pattern with veridicals in this respect. This suggests that the modalized factivity of these verbs is akin to the strong factivity of verbs like *regret*, or alternatively that these verbs encode modalized veridicality. We leave this matter for future exploration.

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<sup>18</sup> As discussed earlier in connection with (12), the expression of a positive epistemic bias is also possible in a context that provides evidence for the positive answer, as long as that evidence is not compelling enough to force one to accept that answer. The following examples confirm that, also in this kind of context, the acceptability of ONPQs is in line with these expectations.

- (i) *Context: Last week John told me that he was going to New York for a day on Friday. But when Mary shows me his diary, it indicates that John had meetings in London all day that day. I say...*
- a. I'm wondering if John wasn't in New York on Friday (after all), because I saw him wearing an NYU t-shirt on the tube this morning.
- b. Well, Fred, who unfortunately isn't here, might well know if John wasn't in New York on Friday (after all), because he met him last night.

- (72) a. \*John is not demonstrating if/whether Mary doesn't like spinach, too.  
 b. \*John might demonstrate if/whether Mary doesn't like spinach, too.  
 c. \*Is John demonstrating if/whether Mary doesn't like spinach, too?  
 d. \*John will demonstrate tomorrow if/whether Mary doesn't like spinach, too.

Finally, the unacceptability of modals under bouletics is maintained under negation, epistemic downgrade and yes/no question formation:

- (73) a. \*John {hopes, wishes, commanded} that the Earth might be flat.  
 b. \*John does/did not {hope, wish, command} that the Earth might be flat.  
 c. \*John perhaps {hopes, wishes, commanded} that the Earth might be flat.  
 d. \*Does/did John {hope, wish, command} that the Earth might be flat?

The same is true of the unacceptability of outside negation:

- (74) a. \*John cares if/whether Mary doesn't like spinach, too.  
 b. \*John does not care if/whether Mary doesn't like spinach, too.  
 c. \*John perhaps cares if/whether Mary doesn't like spinach, too.  
 d. \*Does John care if/whether Mary doesn't like spinach, too?

It is not clear why this should be so.<sup>19</sup> Note that the issue is not confined to subjective epistemics. Bouletics do not permit any epistemic in their complement, whether subjective or objective.

#### 4.5 Dutch *wel*

The data in this section provide further support for our claim that the properties exhibited by outside negation cluster around the fact that it is a *subjective* epistemic category. We compare Dutch outside negation *niet* 'not' with Dutch *wel*, a particular variant of which is also restricted in its use to polar environments.<sup>20</sup> This variant of the particle signals the absence of personal beliefs that could support a positive epistemic bias regarding *p*. In fact, it is typically used to indicate a retreat from a previous positive epistemic bias regarding *p*. In other words, the attitude holder has lost confidence in the truth of *p*. Thus, *wel* has pretty much the opposite interpretive effect of *niet*, since use of the latter conveys a positive epistemic bias.<sup>21</sup>

The opposing effects of the use of *niet* and *wel* can be brought out with a context such as the one in (75), where the use of *niet* is completely unacceptable, while the use of *wel* is perfect. We do not believe that English has a word that means *wel*, but perhaps focus on the main verb comes closest to indicating a similar epistemic move, as shown in the translation of (75b).

- (75) *Context: I have a new friend, Mary, coming over for dinner. I did not know anything about what foods she likes when I went shopping and went for spinach on a whim, thinking that most people like spinach. When Mary arrives and walks into the kitchen, I suddenly lose confidence in my choice and say...*

<sup>19</sup> But see Anand and Hacquard (2013) for a take on the issue.

<sup>20</sup> Like other such particles, *wel* cannot bear stress (Elffers, 1997).

<sup>21</sup> Note that this use of *wel* is restricted to polar environments, just like that of *niet*. When the modal particle *wel* occurs in a declarative clause its meaning contribution is to indicate the absence of personal beliefs that could support a *negative* epistemic bias regarding *p*. So a sentence like *Jan zal wel komen* means "John will come, as far as I know".

- a. #Hou je niet van spinazie?  
*hold you not of spinach*  
 ‘Don’t you like spinach?’ (I believe that you do)
- b. Hou je wel van spinazie?  
*hold you prt of spinach*  
 ‘Do you LIKE spinach?’ (I thought that perhaps you did, but now I don’t know.)

It does not seem too much of a stretch to regard *wel* as marking an objective attitude; that is to say an epistemically neutral attitude based on evaluation of evidence in the public domain (none in the example above).

Recall that we analyzed the unacceptability of *niet* in the complement of veridical predicates as a grammatical phenomenon: a factive operator and a subjective operator compete for widest scope and are therefore incompatible with each other. The proposed analysis of *wel* therefore predicts that it should be at home in a veridical environment, since its interpretation does not involve any subjective bias. The following data show that this prediction is borne out.

- (76) a. Jan vraagt zich af of Marie wel/niet komt.  
 John ask self PRT if Mary PRT /not comes  
*John is wondering whether Mary is(n’t) coming.*
- b. Jan weet of Marie wel/\*niet komt.  
 John knows if Mary PRT /not comes  
*John knows if Mary is(\*n’t) coming.*
- c. Het maakt Jan niet uit of Marie wel/\*niet komt.  
 John makes John not out if Mary PRT /not comes  
*John doesn’t care if Mary is(\*n’t) coming.*
- d. Of Marie wel/niet komt is Jan niet helemaal duidelijk.  
 Whether Mary PRT /not comes is John not quite clear  
*Whether Mary isn’t coming is(n’t) clear to John.*
- e. Of Marie wel/\*niet komt is irrelevant voor Jan.  
 Whether Mary PRT /not comes is irrelevant for John  
*Whether Mary is(\*n’t) coming is irrelevant to John.*

We also expect that *wel* should not give rise to scope freezing effects, which indeed it does not do:<sup>22</sup>

- (77) Jan vroeg zich af of...  
 John asked self PRT whether...
- a. ?wel tenminste één student ieder artikel gelezen had.  
 PRT at-least one student every article read had  
 ( $\exists > \forall; \forall > \exists$ )
- b. tenminste één student wel ieder artikel gelezen had.  
 at-least one student PRT every article read had  
 ( $\exists > \forall; \forall > \exists$ )
- c. tenminste één student ieder artikel wel gelezen had.

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<sup>22</sup> The particle *wel* seems a little less comfortable in the very high position – above the subject – occupied by outside negation in (77a).

at-least one student every article PRT read had  
 $(\exists > \forall; \forall < \exists)$

The data in this section provide further support for our claim that the properties exhibited by outside negation cluster around the fact that it is a subjective epistemic category.

## 5 Conclusion

This paper has explored similarities between sentences containing ‘outside negation’ and sentences containing subjective epistemic modals. Both resist embedding under semi-factives, veridical predicates and predicates of proffering, trigger Epistemic Containment, and exhibit further peculiar scope-freezing effects. We have argued that these phenomena can be given a unified treatment in terms of the scopal properties of subjective epistemic attitudes. The obligatory very wide scope of such epistemics is incompatible with the selectional properties of proffering, veridical and semi-factive predicates, which is expressed through a factive operator in both declarative and polar complements of such verbs. We argued that outside negation differs from other subjective epistemic categories in that it must obligatorily take scope over the question operator. The proposed account relies on a theory of scope extension in which scope shift is encoded through percolation of scope indices constrained by a minimality condition. Therefore, to the extent that the account presented here is successful, it provides support for this particular view of scope-taking.

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# Beyond Speaker's Meaning \*

*Dan Sperber and Deirdre Wilson*

## **Abstract**

Our main aim in this paper is to show that constructing an adequate theory of communication involves going beyond Grice's notion of speaker's meaning. After considering some of the difficulties raised by Grice's three-clause definition of speaker's meaning, we argue that the characterisation of ostensive communication introduced in relevance theory can provide a conceptually unified explanation of a much wider range of communicative acts than Grice was concerned with, including cases of both 'showing that' and 'telling that', and with both determinate and indeterminate import.

*Keywords:* communication, showing vs telling, paraphrasability, manifestness, ostension

## **1 Introduction**

In *Relevance: Communication and Cognition* (Sperber and Wilson, 1986; revised edition, 1995) we put forward a number of novel ideas, several of which have been influential and others more controversial. However, there is one idea that we feel did not get the discussion it deserved. We proposed a characterisation of communication which, although inspired by Grice's definition of speaker's meaning, implied that speaker's meaning does not have the degree of unity or autonomy needed to make it the proper object of a philosophical definition or a scientific theory. Communication, on the other hand, or rather the kind of 'ostensive' communication that humans engage in, is such a proper object of inquiry. We argued that our account of communication does a better job of explaining how utterances are interpreted than a standard Gricean approach, and also makes good sense of our fuzzy intuitions about speaker's meaning without giving the notion an unduly important theoretical role. Here, we take up the issues again. In the first part of the paper, we discuss some difficulties with Grice's notion of speaker's meaning, and in the second part, we consider how to resolve them.

## **2 Difficulties with Grice's notion of speaker's meaning**

### **2.1 The continuum between meaning and showing**

Grice was aware of two particular problems with the notion of speaker's meaning. The first, linked to his sharp distinction between natural and non-natural meaning, arises when one tries to separate 'meaning that' from 'displaying direct evidence that'<sup>1</sup> in cases like the following (Grice, 1967/1989, p. 109):

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<sup>1</sup> Of course, if a reliable speaker both says that *P* and means it, this is evidence that *P*. However, it is indirect evidence (in the sense in which we want to make the direct/indirect distinction here) in that the content of the

- (a) Herod, showing Salome the head of St. John the Baptist, cannot, I think, be said to have meant that St. John the Baptist was dead.
- (b) Displaying a bandaged leg (in response to a squash invitation)

In (b) the displayer could mean (i) that he cannot play squash, or (dubiously) (ii) that he had a bad leg (the bandage might be fake), but not (iii) that the leg is bandaged.

In discussing case (a), Grice comments:

Herod intended to make Salome believe that St John the Baptist was dead and no doubt also intended Salome to recognise that he intended her to believe that St John the Baptist was dead... Yet I certainly do not think that we should want to say that we have here [a case] of meaning<sub>NN</sub> ... What we want to find is the difference between, for example, ‘deliberately and openly letting someone know’ and ‘telling’ ... (Grice, 1957/1989, p. 218).

Grice’s solution was to add a third clause to his definition of utterer’s meaning. In order to mean something by an utterance, the utterer must intend the addressee

- (1) to produce a particular response *r*
- (2) to think (recognise) that the utterer intends (1)
- (3) to fulfil (1) on the basis of his fulfilment of (2),

where (3) is understood as stipulating that the addressee’s recognition of the utterer’s intention in (1) must be “at least part of his reason for producing *r*, and not merely the cause of his producing *r*” (Grice, 1967/1989, p. 92). Despite some debate in the literature about whether this third clause was needed (Schiffer, 1972; Vlach, 1981; Recanati, 1986; Bach, 1987; Neale, 1992; Wharton, 2009), it remained central to Grice’s later discussions of meaning and his distinction between natural and non-natural meaning (Grice, 1989, pp. 290–97, 349–59).

In characterising ostensive communication, we built on the first two clauses of Grice’s definition and dropped the third. This was not because we were willing to broaden the definition of utterer’s meaning – we agreed with Grice that talk of ‘meaning’ is awkward in certain cases – but because it seemed obvious that there is a continuum of cases between ‘meaning that’ (typically achieved by the use of language) and ‘displaying evidence that’ (in other words, showing), and we wanted our account of communication to cover both (Sperber and Wilson, 1986, pp. 46–54). Grice’s example of the bandaged leg suggests how the continuum of cases can be constructed. The communicator wants the addressee to come to believe that *P*. In pure cases of showing, as in (biii), what is being shown provides sufficient evidence for the addressee to believe that *P*, and the fact that the communicator intended him to believe that *P* does not even strengthen that evidence. In pure cases of meaning, as in an ordinary linguistic assertion, all the evidence that *P* is provided by the communicator’s giving overt evidence of her intention that the addressee should believe that *P* (and it is good evidence provided that the addressee trusts her competence and honesty in the matter). But of course, the evidence can come both from whatever is displayed (either shown or uttered) and

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evidence depends on the interpretation of the communicator’s meaning, and the force of the evidence depends on the communicator’s trustworthiness.

from what the communicator's communicative behaviour indicates of her intention, as in (bi) and (bii).

When a piece of evidence is shown to an addressee, it is typically interpreted in the light of the fact that it is being shown. In Grice's example (b), the bandage on the leg may in itself be only weak evidence that the communicator cannot play squash: as he puts it, the bandage may be "fake", and the condition it covers may be quite compatible with playing squash. However, the fact that it is being shown in answer to the question suggests that the condition it conceals makes playing squash impossible, or at least undesirable. Thus, (bi) is neither a pure case of meaning nor a pure case of producing direct evidence. Make the evidence stronger, say by showing a cast instead of a bandage, and the addressee will arrive at the intended conclusion mostly, if not wholly, on the ground of what is shown.

We described (biii) above as a pure case of showing. Could showing a bandaged leg ever 'mean' that the communicator has a bandaged leg (as some commentators have been willing to accept)? Suppose the showing was in response to the question *Is your leg bandaged?*; how does this differ from simply answering *Yes*? One difference is that the addressee has to trust the communicator in the 'yes' case and not in the showing case. Suppose, then, that the communicator pulls up her long skirt just enough to show what could be the bottom of a large bandage, giving weak, inconclusive evidence that her leg is bandaged. Since some trust is needed to accept the intended conclusion, would this now be a case of meaning? There is, of course, a continuum of positions to which the communicator could pull up her skirt, exposing a little more of the bandage each time, until the fact that the leg is bandaged is perceptually beyond doubt. At each point, less trust would be needed, exemplifying the continuum between meaning and displaying direct evidence.

Suppose Salome has never seen John the Baptist before, and is unable to recognise him. Then for her, seeing a severed head would not be compelling evidence that John is dead. When the head is shown to her by Herod, the evidence is stronger, because it is combined with recognition of his intention. This revised scenario seems to involve both direct and indirect evidence (i.e., both showing and meaning): Herod showed Salome that the person whose head he is displaying was dead, and meant that this person was John. Of course, Herod also overtly intended Salome to think that he was responsible for John's death, and that he had had John killed to satisfy her wishes; since these were not wholly evidenced by John's severed head, they must have been meant.

Perhaps Grice could have said that as long as recognition of the communicator's intention plays a role – however small – in the addressee's coming to the intended conclusion, the case is one of meaning. This seems to fit with his stipulation, in the third clause of his definition, that the audience's recognition of the utterer's intention should be "at least part" of their reason for producing the intended response. It would follow that any case of 'showing that' in which the evidence for the intended conclusion was less than decisive would have to be reclassified as a case of 'meaning that'. But surely, if the part played by recognition of the utterer's intention can vary from 100% to less than 1%, then many, if not most, cases of showing a piece of evidence seem to involve meaning, and the common-sense understanding of meaning, and of the distinction between 'showing that' and 'meaning that', is lost. A more sensible response would be to study the whole continuum – characterised by its two end points of pure meaning and pure showing – as such, and get rid of the third clause. However, this amounts either to extending the notion of speaker's meaning far beyond what is intuitively recognisable as such, or to demoting it from its central theoretical role to a loosely descriptive use that may nonetheless be adequate when dealing with fairly standard cases of linguistic communication.

## 2.2 The continuum between determinate and indeterminate ‘meaning’

A second difficulty Grice was aware of with the notion of speaker’s meaning arises when one tries to complete a description of the form: *The speaker meant that* \_\_\_\_\_. As Grice recognised, it is not uncommon for at least part of the intended meaning to be less than fully determinate, so that the best rendering of it may be an open disjunction of propositions, and hence not itself a proposition. As Grice put it (1967/1989, pp. 39–40),

Since, to calculate a conversational implicature is to calculate what has to be supposed in order to preserve the supposition that the Cooperative Principle is being observed, and since there may be various possible explanations, a list of which may be open, the conversational implicature in such cases will be an open disjunction of such specific explanations, and if the list of these is open, the implicatum will have just the kind of indeterminacy that many actual implicata do in fact seem to possess.

But this is tantamount to saying that there are some cases of speaker’s meaning where *The speaker meant that* \_\_\_\_\_ cannot be properly completed, not because the speaker failed to communicate a meaning, but because that meaning is not a proposition.<sup>2</sup>

We argued in *Relevance* that there is a continuum of cases from those where the communicator’s meaning is a proposition, or can be paraphrased as such, to those where it is not paraphrasable at all. At one end of the continuum are utterances such as the railway official’s reply to the passenger’s inquiry below:

*Passenger:* What time is the next train to Oxford?  
*Railway official:* 12.48.

Assuming that he has spoken in a neutral tone of voice and with an impersonal facial expression, his meaning could be paraphrased as the proposition that the next train to Oxford leaves at 12.48, and nothing more. Add an urgent tone of voice or a warning look, and although his assertion would remain the same, part of the intended import would be rather less determinate: he might be implicating, for instance, that the train is about to leave, that the seats are filling up fast, that the platform is further away than the passenger might have thought, that the passenger’s estimated walking speed may not be enough to get her there on time, and so on. In that case, his meaning would be partly precise and partly vague.

With a hyperbole such as *I could kill for a glass of water*, some of the speaker’s words (e.g., *kill*, *glass*) are loosely used and no determinate proposition is asserted. Despite this element of indeterminacy, it is easy to see roughly what she is implicating: for instance, that she is very thirsty, that she has an urgent need or desire for water, and/or that getting hold of some water is a top priority for her. Although her meaning is less than fully determinate, identifying it is unlikely to give ordinary addressees much pause for thought.

With a poetic metaphor such as *Juliet is the sun*, the speaker’s meaning comes closer to the ‘indeterminate’ end of the continuum, and has the type of vagueness Grice saw as best rendered by an open disjunction of propositions. As Stanley Cavell comments (1965/1976, p. 78),

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<sup>2</sup> In his ‘Retrospective Epilogue’, Grice described non-natural meanings as “conceptions or complexes which involve conceptions”, and suggested that it would be legitimate to ask “how conceptions enter the picture and whether what enters the picture is the conceptions themselves or their justifiability” (Grice, 1989, p. 350). This is very different from the picture normally presented in philosophy of language and linguistics.

Romeo means that Juliet is the warmth of his world; that his day begins with her; that only in her nourishment can he grow. And his declaration suggests that the moon, which other lovers use as emblem of their love, is merely her reflected light, and dead in comparison, and so on. ... The ‘and so on’ which ends my example of paraphrase is significant. It registers what William Empson calls ‘the pregnancy of metaphors’, the burgeoning of meaning in them.

Vaguer still are non-verbal cases such as the following, taken from *Relevance* (Sperber and Wilson, 1986/1995, p. 55):

Mary and Peter are newly arrived at the seaside. She opens the window overlooking the sea and sniffs appreciatively and ostensively. When Peter follows suit, there is no one particular good thing that comes to his attention: the air smells fresh, fresher than it did in town, it reminds him of their previous holidays, he can smell the sea, seaweed, ozone, fish; all sorts of pleasant things come to mind, and while, because her sniff was appreciative, he is reasonably safe in assuming that she must have intended him to notice at least some of them, he is unlikely to be able to pin down her intentions any further.

We went on to comment,

Is there any reason to assume that her intentions were more specific? Is there a plausible answer, in the form of an explicit linguistic paraphrase, to the question, what does she mean? Could she have achieved the same communicative effect by speaking? Clearly not. (Sperber and Wilson 1986/1995, pp. 55–6).

If asked what she intended to convey in this case, one of the best answers Mary could give is that she wanted to share an *impression* with Peter. Thus, at one end of the paraphrasability continuum are cases where the speaker’s meaning is fully determinate, and at the other are those involving the communication of impressions, where the communicator’s meaning cannot be paraphrased without loss.

### 2.3 The two continua combined

In raising these two issues, in arguing that there is a continuum between meaning and producing direct evidence and that paraphrasability is a matter of degree, we were not just being finicky: we were not making the trivial and boring point that there may be unclear, mixed or borderline cases along both dimensions. If that was the problem, a good theory of meaning and/or a good theory of showing could be used to arrive at theoretically-grounded decisions in unclear cases; and indeed, while awaiting the development of such good theories, one could ignore or abstract away from fuzzy or borderline cases and investigate speaker’s meaning by focusing on prototypical cases: that is, one could go on with philosophical business as usual. But our point was that to do this would be to idealise away essential features of communication, raising questions about the appositeness of the resulting theories.

Let us call the overtly intended cognitive effect of a communicative act its *intended import*. We want to argue that the two dimensions of intended import we are considering – meaning/showing and determinate/indeterminate – are orthogonal. As we have seen, completing the description *X meant that* \_\_\_\_ with a proposition is sometimes unproblematic, sometimes impossible, and there is a continuum of cases in between. We will shortly demonstrate that the same point applies to *W showed that* \_\_\_\_\_. The two continua interact to

yield a two dimensional-space, with intended imports occurring anywhere in this space. This is illustrated in Figure 1 and the examples immediately below:

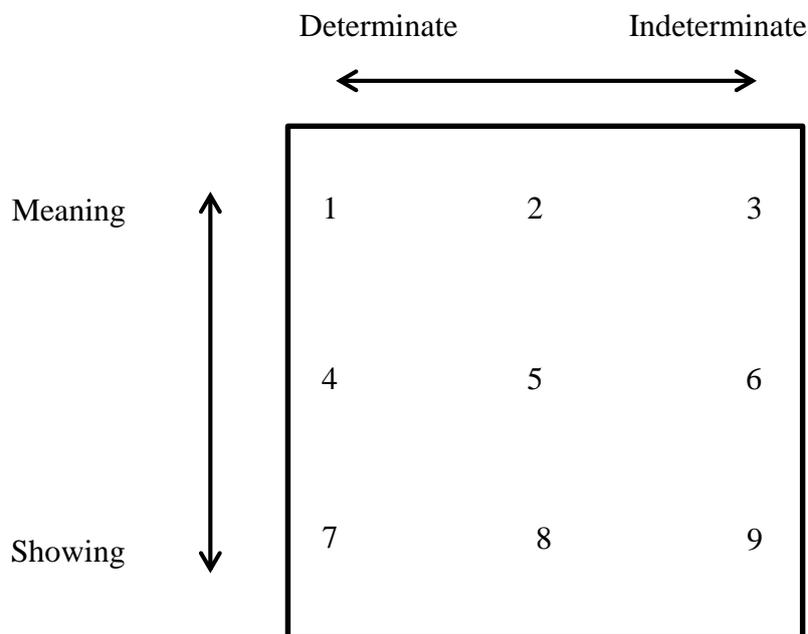


Figure 1

‘Determinate meaning’ (vicinity of 1): an example would be the railway official’s reply 12.48 to the passenger’s question about the time of the next train to Oxford, spoken in a neutral tone with an impersonal facial expression. This is a case of pure meaning, since all the evidence for the intended import comes from the speaker’s intentions, and the meaning is determinate, since it is paraphrasable as a proposition. Most discussions of meaning in philosophy of language and linguistics focus exclusively on this type of case.

‘Semi-determinate meaning’ (vicinity of 2): an example would be the hyperbole *I could kill for a glass of water*, where the intended import is vaguer than with the railway official’s reply 12.48, but it is easy to see roughly what type of conclusions the addressee was intended to derive. This is a case of meaning, since all the evidence for the intended conclusions is indirect, but the meaning is less than fully determinate.

‘Indeterminate meaning’ (vicinity of 3): with a poetic metaphor such as *Juliet is the sun*, the intended import is still vaguer, and is not paraphrasable as a proposition at all. This is again a case of meaning, since all the evidence for the intended import is indirect, but it is closer to the ‘indeterminate’ end of the paraphrasability continuum.

‘Determinate meaning/showing’ (vicinity of 4): when asked who the tallest pupil in the class is, the teacher points to an individual who at first sight is the tallest in the class (although some pupils might be absent) and says, *He is*. She both means that the pupil she is pointing at is the tallest (since some of the evidence for the intended conclusion comes from her intentions), and displays direct evidence that he is the tallest. In both cases, the intended import is paraphrasable as a proposition.

‘Semi-determinate meaning/showing’ (vicinity of 5): on a tourist trip, Mary points to the view and says, *What a view!* Here, the linguistic meaning of her utterance (combined with her tone of voice, facial expression etc.) indicates roughly what type of conclusions she expects the addressee to derive, but does not pin them down precisely, so the utterance falls towards the middle of the ‘determinate/indeterminate’ continuum. Moreover, the evidence for

the intended conclusions comes both from Mary's intentions and from what she has pointed out, so the utterance also falls towards the middle of the 'meaning/showing' continuum.

'Indeterminate meaning/showing' (vicinity of 6): on a tourist trip, Mary points to the view and says, *Wow!* This time, the linguistic meaning of her utterance (to the extent that it has one) gives no more than a rough indication of the type of conclusions the addressee is being encouraged to derive, and the intended import is not paraphrasable as a proposition at all. In Grice's terms, what Mary communicates is an open disjunction of propositions; in our terms (to be discussed further below), what she communicates is an impression.

'Determinate showing' (vicinity of 7): when asked for the time, Mary points to a clock showing the time as five o'clock. Here, the intended import is as determinate as if she had said *It's five o'clock*. However, the case is one of showing rather than meaning, since all the evidence for the intended conclusion comes from the clock itself, rather than from the fact that it has been pointed out.

'Semi-determinate showing' (vicinity of 8): Peter and Mary are out for a walk when she points to menacing clouds on the horizon. Here it is easy to see roughly what she intends to convey – that it may rain soon, that they should reassess their plans and maybe think about curtailing their walk – but the intended import is less than fully determinate.

'Indeterminate showing' (vicinity of 9): an example might be showing pictures of one's children. Here, there is no proposition that would complete the description *The communicator showed that \_\_\_\_*, and the intended import cannot be rendered as a proposition at all.

Notice that it is possible to mean and show the same thing, as when the teacher, asked who the tallest pupil in the class is, points to the tallest individual in the room and says *He is*. This allows us to handle a type of example that seems to be incompatible with the third clause of Grice's definition of meaning, and led him to contemplate dropping this clause entirely. When the communicator is producing a logical argument, she typically intends her audience to accept the conclusion of this argument not on her authority, but because it follows from the premises (this type of case is insightfully discussed by Schiffer (1972)):

*Conclusion of argument: p, q, therefore r (from already stated premises):* While *U[ttterer]* intends that *A[ddressee]* should think that *r*, he does not expect (and so intend) *A* to reach a belief that *r* on the basis of *U*'s intention that he should reach it. The premises, not trust in *U*, are supposed to do the work. (Grice, 1967/1989, p. 107).

Since the third clause was crucial to maintaining Grice's distinction between 'meaning that' and 'displaying direct evidence that', he was reluctant to drop it. We would analyse this type of example as a case of determinate meaning/showing. The speaker provides both direct and indirect evidence that the conclusion follows from the premises: that is, she both means it and shows it.

There is another type of case that Grice did not discuss, but that does raise a serious problem for his distinction. Many utterances contain deictic elements whose function is not just to specify a referent but also to specify conceptual content (the referent being a token that contributes to the interpretation a type to which it belongs). Compare, for instance:

To open a champagne bottle, you can do this (*demonstrates how to open a champagne bottle by opening one*).

To open a champagne bottle, you should do this (*demonstrates how to open a champagne bottle by opening one*).



The questioner is here already presumed to believe that the girl's name is Rose (at least in a dispositional sense); it has just slipped his mind. The intended effect seems to be that A should have it in mind that her name is Rose.

*Review of facts:* Both speaker and hearer are supposed already to believe that  $p$  ( $q$ , and so forth). The intended effect again seems to be that A (and perhaps  $U$  also) should have 'the facts' in mind (altogether).

In response, Grice (1967/1989, p. 109) suggested that declarative acts might be intended to induce not just a belief but an 'activated belief' (in his terms, a belief that the addressee not only has, but "has in mind"). An addressee might fall short of having an activated belief in one of three ways. He might:

- (1) neither believe that  $p$  nor have it in mind that  $p$
- (2) believe that  $p$  but not have it in mind that  $p$
- (3) not believe that  $p$  but have it in mind that  $p$

Ordinary assertions, reminders and recapitulations could then be seen as addressing different types of shortfall, inducing activated beliefs by different routes.

Grice's suggestion raises a more general question about distinctions among types of belief (roughly captured by contrasts such as 'activated/latent', 'occurrent/dispositional', 'explicit/implicit'), and the extent to which declarative acts are intended to induce some specific type of belief in the audience. We will argue that the typologies of belief-states common in philosophical psychology may not be adequate to answer this question.

### 3.1 Occurrent, dispositional and implicit beliefs

Beliefs are commonly seen as playing a central causal role in the explanation of thought and behaviour. In the kind of accounts we are concerned with here, a belief is a representation that has to be occurrent or activated in the mind in order to play such a causal role. Occurrent or activated beliefs contrast with inactive or dispositional beliefs, which are also understood as being 'in the mind' (in a different sense from Grice's), although not immediately available for use as premises in theoretical or practical inferences.

A somewhat psychologically richer way of describing this distinction might be to say that activated beliefs are in working memory, whereas latent beliefs are in long-term memory and have to be retrieved in order to play a causal role. Or, to borrow a metaphor from Robert Audi (1994, p. 420),

What is dispositionally as opposed to occurrently believed is analogous to what is in a computer's memory but not on its screen: the former need only be brought to the screen by scrolling – a simple retrieval process – in order to be used, whereas the latter is before one's eyes. Compare a dispositionally believed proposition's needing to be 'called in', as in answering a request to be reminded of what one said last week, with an occurrently believed proposition's being focally in mind, roughly in the sense that one attends to it, as where one has just formulated it to offer as one's thesis.

Activated and latent (or occurrent and dispositional) beliefs are seen as representations 'in the mind'. Both are also described as 'explicit', and contrast with contents that an agent may be

said to believe even though they are not represented in her mind; these are sometimes called ‘implicit’, or ‘tacit’, beliefs.

Here is how Eric Schwitzgebel (2006) presents the distinction between explicit and implicit beliefs in the *Stanford Encyclopedia of Philosophy*:

One believes *P explicitly* if a representation with that content is actually present in the mind in the right sort of way – for example, if a sentence with that content is inscribed in the ‘belief box’... One believes *P implicitly* (or *tacitly*) if one believes *P*, but the mind does not possess, in a belief-like way, a representation with that content.<sup>3</sup>

This raises the question of how to distinguish implicit beliefs from contents that are not themselves believed, although they follow logically from one’s beliefs. Schwitzgebel (2006) suggests that there may be no clear cut-off point between the two:

Perhaps all that's required to implicitly believe something is that the relevant content be swiftly derivable from something one explicitly believes ... Thus, in the planets case, we may say that you believe explicitly that the number of planets is 9 and only implicitly that the number of planets is less than 10, less than 11, etc. Of course, if swift derivability is the criterion, then although there may be a sharp line between explicit and implicit beliefs (depending on whether the representation is stored or not), there will not be a sharp line between what one believes implicitly and what, though derivable from one's beliefs, one does not actually believe, since swiftness is a matter of degree.

In keeping with this suggestion, Robert Audi (1994, p. 419) argues that what are generally called implicit beliefs are better viewed not as beliefs at all, but as ‘dispositions to believe’:

Do you believe that this sentence has more than two words? And do you believe that 98.124 is larger than 98? It would be natural to answer affirmatively. And surely, for most readers considering these questions, that would be answering truly. [...] Antecedent belief may be the readiest explanation of our spontaneous answers, but it is not the best explanation. I contend that, here, what may seem to be antecedently held but as yet unarticulated dispositional beliefs are really something quite different: dispositions to believe.

Integrating these ‘dispositions to believe’ into his computer screen metaphor, Audi (1994) writes:

By contrast with both of these cases of actual belief [i.e., occurrent and dispositional beliefs], propositions we are only disposed to believe are more like those a computer would display only upon doing a calculation, say addition: the raw materials, which often include inferential principles, are present, but the proposition is not yet in the memory bank or on the screen. The suggested difference between a dispositional belief and a disposition to believe is in part

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<sup>3</sup> Schwitzgebel (2006) notes that some philosophers use the term ‘dispositional’ for what he is calling implicit beliefs. However, he reserves the term for latent (as opposed to occurrent) beliefs, and we will follow him on this.

that between accessibility of a proposition by a retrieval process that draws on memory and its accessibility only through a belief formation process.

As a result of these considerations, one might divide beliefs into three categories, as in Figure 2:

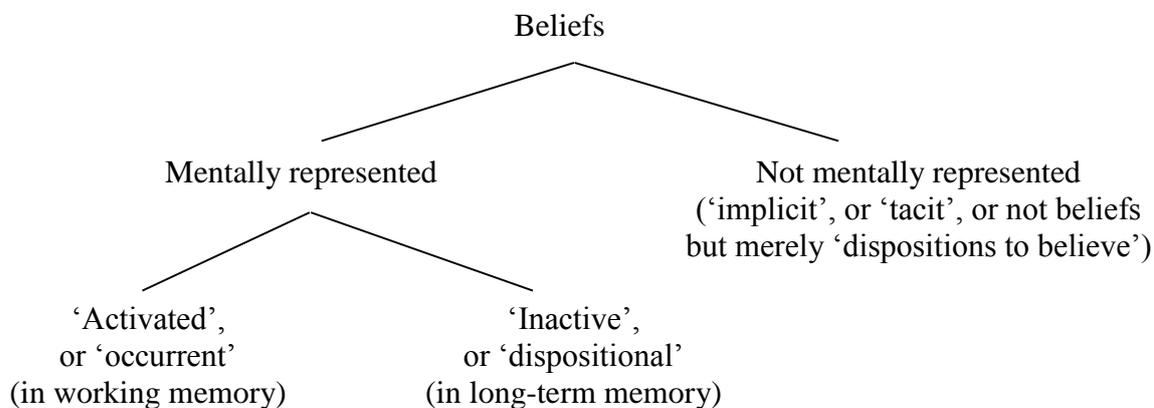


Figure 2

The problem with this proposal is that what actually exists, at least in the case of dispositional beliefs and dispositions to believe, are not distinct categories but a continuum of cases. Arguably, we do actually have activated representations in working memory. However, there is a long-standing consensus in the psychology of memory that what we have in long-term memory is not a repertoire of representations that we can simply move to working memory (or scroll down to), but traces or bits of information from which actual representations are reconstructed for use in working memory. This is not to deny that there are also likely to be some full-fledged representations which can simply be activated (as when you remember the Pythagoras theorem you learned by heart at school). But when you remember facts about the last departmental meeting – say, that John spoke after Jean, and that she seemed irritated – you are not simply moving these representations from long-term to short-term memory: the chances are that they were not stored there as distinct representations in the first place. What you have in long-term memory is information from which these representations can be accurately constructed, as opposed to just being pulled out. With some pieces of memorized information, retrieval – a misleading term – involves more inferential reconstruction than with others. But the point is that, since retrieval from long-term memory typically involves some inference, it is not possible to distinguish implicit beliefs from latent/dispositional beliefs on the ground that one is derived via inference and the other is not.

Here is a continuum between dispositional and implicit beliefs in the spirit of Audi’s (1994) argument that we merely have a disposition to believe that 98.124 is larger than 98. If the only requirement for a belief of yours to be dispositional is that you have memorized this information at some point in the past and are now remembering it, then your belief that 9 is larger than 8 is surely dispositional: the sequence of numbers from 0 to some small number is permanently represented in your mind.<sup>4</sup> Your belief that 99 is larger than 98 might also be dispositional, since you have probably also entertained it (in some form), for instance when counting to 100. What about your belief that 7899 is larger than 7898? Well... for some  $n$ , your belief that  $n$  is larger than  $n-1$  has been previously represented in your mind, whereas

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<sup>4</sup> This is not the same as having the relation between any two successive numbers in that sequence itself stored as a distinct representation, but we will ignore this for the time being.

your belief that  $n+1$  is larger than  $n$  has not (and of course you don't know the value of  $n$ ). However, there is no interesting epistemic or psychological difference between beliefs about successive numbers lower than  $n$  and beliefs about successive numbers higher than  $n$ . Moreover, reaction time studies show that such beliefs are constructed on the basis of a mental number line, in a way that goes quite against the idea that previously held beliefs are merely reactivated (Dehaene, 1997). These studies provide evidence that, for any two numbers  $m$  and  $n$ , it takes more time to answer the question, *Is  $m$  larger than  $n$ ?* when  $n$  and  $m$  are closer than when they are further apart. Thus, it takes more time to answer *Yes* to the question *Is 29 larger than 28?* than to the question *Is 69 larger than 28?* Yet when  $n$  and  $m$  are close, and even more so when they are adjacent, it is much more likely that the proposition  *$m$  is larger than  $n$*  has already been entertained than when  $n$  and  $m$  are distant. So if activating a belief was a matter of retrieving past representations, the answer should be faster for adjacent numbers.

With numerical examples of this type, the propositions we are disposed to believe follow logically from what we explicitly believe. But we are also disposed to believe propositions that follow non-demonstratively from our mentally represented beliefs. So, for instance, we implicitly believe (or are disposed to believe, and in any case would assent to the claim) that the weather in New York will be warmer next July than next January, that more people were born in 1992 than in 1932, that Helsinki is east of Naples, and so on.

How readily we assent to some statement that does not express an activated belief of ours depends on two factors, one epistemic, and the other cognitive. On the epistemic side, we do not simply believe or not believe a proposition: we believe it more or less strongly. The less strongly we believe it, the less willing we may be to assent to it when expressed, and the less appropriate it is to describe our attitude to it as one of belief. The point being that here, too, there is a continuum, between propositions we believe and propositions we neither believe nor disbelieve, with no cut-off point or even a bimodal distribution of instances. On the cognitive-processing side, a given dispositional or implicit belief of ours may be more or less salient, more or less easy to reconstruct or infer. The salience of a belief is not just a function of its epistemic strength: some logical entailments of what we strongly believe may not be salient at all, whereas a merely probable implication of what we weakly believe may be highly salient. For instance, when someone tells us that her sister Jane is in town, the implication that Jane or the Pope is in town is unlikely to become very salient, although it follows logically from what we have been told (and may quite strongly believe). By contrast, when someone tells us that a neighbour of theirs may have Alzheimer's, the probable implication that the neighbour is old is likely to be quite salient, although our evidence for this is not conclusive. So dispositional and implicit beliefs are on a continuum with propositions we do not believe in any sense (activated, dispositional or implicit), either because they are too hard for us to infer, or because we are not disposed to give them enough credence.

There are also propositions that we are disposed to believe although they don't follow either logically or non-demonstratively from what we already believe, but follow instead from what we already believe together with what we perceive. Consider Audi's (1994) example: *Do you believe that this sentence has more than two words?* It is conceivable (just) that on reading this sentence, you formed the mentally represented belief that you were reading the sentence *Do you believe that this sentence has more than two words?* and are able to infer from that belief, together with your ability to inspect it in memory, that the sentence has more than two words. What about, *Do you believe that there are more than 50 words in this paragraph?* You will probably answer affirmatively, but the way you arrive at this answer will be by looking at the paragraph rather than consulting your memory. Here again, there is a continuum of cases between those where you have a disposition to believe

immediately, and those where, in order to answer the question, you have to attend perceptually to more than you were attending to already. In these latter cases, the disposition to believe is not (so to speak) wholly inside you, but also involves the environment. However, the fact that the environment is involved does not stop it being a disposition. This environment-dependent disposition to believe may in fact be stronger than a purely internal disposition to believe.

With all this in mind, let's return to Grice's suggestion that a declarative act might be intended to induce not just a belief but an 'activated belief'. In the case of reminders, this suggestion seems quite plausible, but how far does it generalise? Consider the following dialogue:

*(John is offering drinks to his guests; some have already taken whisky, vodka, cognac or orange juice)*

*John (to Rita):* Do you want some whisky?

*Rita:* I don't drink alcohol.

Rita is explicitly communicating that she does not drink alcohol, and implicitly communicating several further propositions:

- (a) She doesn't want whisky
- (b) Her reason for refusing his offer of whisky is that she doesn't drink alcohol
- (c) She doesn't want cognac
- (d) She doesn't want vodka
- (e) She might accept orange juice

But does Rita intend John to entertain all these implicatures as activated beliefs? Certainly, she intends him to form the activated belief that she doesn't want whisky (implicature (a)). Of the other implicatures, though, she would typically intend him to activate only those that may turn out to be relevant to his actions. Suppose that, instead of forming the activated belief that her reason for refusing his offer is that she does not drink alcohol (implicature (b)), he merely holds it dispositionally, to await activation should the need arise. Even so, it would be quite wrong to say that communication has failed: a belief can be communicated without being activated in the addressee. In appropriate circumstances – for instance, if it crosses his mind to offer her vodka instead of whisky – he may form the activated belief that she does not want vodka (implicature (d)); otherwise, the fact that he is disposed to form this belief as a result of her utterance should be enough for communication to succeed.

This description of the different kinds of credal disposition an utterance may cause in an audience is sensitive to distinctions Grice does not envisage; however, it is still not fine-grained enough. In many cases of verbal or non-verbal communication, what the communicator wants to do is not to induce a specific belief or set of beliefs in the audience, but to cause what might be roughly described as an impression, giving rise to a range of non-paraphrasable effects. Grice's suggestion that what is conveyed in this type of case might be analysed as an "open disjunction" of propositions is not really helpful; we will try to improve on it here.

### 3.2 Impressions

What is an impression? In section 2, we used the example of Mary, newly arrived on holiday, sniffing appreciatively and ostensibly at the fresh seaside air in order to share an impression with Peter. Here are two more examples:

Robert, working at his desk, is wondering whether to take a break and go for a walk. He gets up and opens the window: the sky is grey; the air is chilly; clouds, some of them rather dark, are moving fast. The impression he forms of the conditions outside make him change his mind. He will stay at home.

John has told Julia – who believed him – that the artist is a pretentious and rather conventional painter. However, he has to go to the exhibition, and he begs her to come too. As she walks through the gallery, she is pleasantly surprised by several of the paintings. Although she couldn't have pinpointed what she likes about them, she finds them arresting and somehow insightful. The impression she forms makes her change her mind. What John has told her is false. The painter, she comes to believe, is original and talented.

As these examples show, the formation of an impression, just like the formation of a belief, can bring about a theoretical or practical change of mind.

Bringing about a change of mind in one's audience is a typical goal of communication: indeed, with a suitably extended understanding of 'change of mind', it is the goal of any act of communication. The goals of communication, then, can sometimes be achieved by conveying an impression. For instance, Robert says to Susan, *Let's go for a walk*. She might answer by opening the window and showing him the poor weather outside. She would thereby be causing him to form an impression about the weather, and doing so ostensibly (i.e., in such a way as to let him know that she is trying to communicate with him). Robert could then infer from his impression that it is not a good idea to go for a walk, and moreover that she intended him to form that impression and come to that conclusion, both of which they now share. Or as they walk through the exhibition, Julia might say to John, *I don't know how to put it... not what I expected... these paintings have something..., I'm sure you too must...Thanks for making me come!* As a result of her utterance, John might form an impression of Julia's impression, which in turn might help him share it, or at least revise his first impression in the direction of hers. In many circumstances, this might be quite enough for Julia's communication to succeed.

But what exactly is an impression? Does this common-sense notion pick out some mental state that we should be able to describe in cognitive terms, or is it irrelevant to scientific psychology? In any case, what is the process commonly described as forming an impression, and how does it achieve its cognitive impact? How can an impression be what a communicator wants to convey? How is it triggered and exploited in communication?

### 4 Manifestness

What occurrent, dispositional and implicit beliefs have in common is that there is some proposition that you are likely to some positive degree to entertain and accept as true. Following our proposal in *Relevance*, we will say that this proposition is *manifest* to you. Manifestness depends on two factors mentioned in section 3.1 above: strength of belief and

salience.<sup>5</sup> These factors are quite different – one is epistemic and the other cognitive – and for some purposes it would be unsound to lump them together. However, we need to consider their joint effect in order to explain or predict the causal role of a piece of information in the mental processes of an individual. The greater the degree of manifestness (i.e., the resultant or vector sum of these two factors, epistemic strength and salience) of some piece of information to an individual, the greater the causal role of that information in the individual's thought and behaviour.

Here, then, is a definition of manifestness that differs marginally in formulation, though not in import, from the one given in *Relevance* (Sperber and Wilson, 1986/1995, pp. 38–41), followed by some clarificatory comments:

### *Manifestness*

A proposition is manifest to an individual at a given time to the extent that he is likely to some positive degree to entertain it and accept it as true.

### *Comments:*

- In *Relevance*, we talked not of propositions but of assumptions as being manifest. Either term will do, as will 'pieces of information'. What we are talking about are things that can be true or false and that, when they are true, are facts.
- The time referred to is not a time point but a time span within which an inferential process may take place. Since such processes can be more or less extended in time, the time span may vary from a fraction of a second to a much longer period in which a protracted inference process such as a scientific discovery takes place. What makes a proposition manifest in such a time span is not only the mind-brain state of the individual during that time, but also the environment of the individual and the information it provides him with via perception and communication. Of course, if we are talking about what is manifest to Robert at the moment he opens the windows, or what is manifest to Julia as she walks through the exhibition, or what was manifest to Eratosthenes while he was calculating the circumference of the earth, the situations are quite different. Depending on the time span, what is manifest to the individual may involve information provided by the environment, or communicated by others, to a lesser or greater degree. Another way of putting this is that the mental processes involved may be more or less extended not only in time, but also in physical and social space, and include processes characteristic of what is described in the literature as embodied, situated, or distributed cognition. We see this not as a problem with our definition but as an advantage. Here, though, we will be concerned with the kind of short time span and organism–environment interactions involved in understanding an utterance.
- In *Relevance*, we described the two factors that contribute to the manifestness of a proposition: its salience ('accessibility') and the degree to which it is accepted as true. These two factors affect the probability that a proposition will influence an individual's beliefs or decisions: the higher the probability that it will be accessed, the higher, *ceteris paribus*, the probability that it will have some influence, and the higher the degree to which it is accepted as true, the stronger that influence.

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<sup>5</sup> In *Relevance*, we used the term 'accessibility' rather than 'salience' to refer to the same property.

However, manifestness is this *ceteris paribus* probability of influence, rather than the factors that contribute to it. The same point can be made on the basis of the Cognitive Principle of Relevance ('Human cognition tends to be geared to the maximisation of relevance'): given a belief which has a cognitive effect and which is therefore relevant in a categorical sense, its relevance will be comparatively greater (i) to the extent that its processing is less costly because it is more salient, and (ii) to the extent that its epistemic strength is greater. If a proposition is relevant at all, then the greater its manifestness, the greater its relevance.

In *Relevance*, based on this notion of manifestness, we introduced several further notions. A 'cognitive environment' of an individual at a time is a set of assumptions/propositions that are manifest to that individual at that time. A cognitive environment can be shared between two or more individuals if it is a cognitive environment of each of them. Among the propositions manifest in a 'shared cognitive environment', some may enumerate or identify the people who share that environment. In that case, this shared environment is also a 'mutual cognitive environment', and all the propositions in it are mutually manifest. In *Relevance*, we spend some time showing that the notion of 'mutual manifestness' is more realistic, more psychologically relevant, and at least as cogent as the notions of mutual knowledge, common knowledge or common ground (Lewis, 1969; Clark and Marshall, 1981; Sperber and Wilson, 1986/1995: chapter 1, sections 3, 8; Stalnaker, 2002) used in particular to explicate the Grice–Strawson insight that communicative intentions are 'overt'. We will not discuss these uses of the notion of manifestness here.

We also used the notion of manifestness to redefine the content of communicative intentions so as to provide an explicit and unitary account of cases involving the communication of single propositions, on the one hand, and of what Grice describes as "open disjunctions", on the other. This is the use of 'manifestness' that we will now elaborate and discuss.

We will begin our account in the next section by reassessing the types of mental state discussed in section 3 in the light of this characterisation of manifestness. We will argue, first, that the rather artificial categories of occurrent/dispositional/implicit beliefs are on a continuum of degrees of manifestness; and second, that we can give a better account of what it is to have an impression using the notion of manifestness.

## **5 Manifestness, beliefs and impressions**

### **5.1 Beliefs and manifestness**

Occurrent beliefs are not all equally manifest. In the first place, they are not all equally salient. Suppose you are asked to recommend your two favourite restaurants. You activate a number of beliefs about each, but some of them stand out more than others: for instance, your belief that the desserts at Pierre's are exceptional may be the most salient of all your beliefs about either restaurant, whereas your belief that it is hard to park at La Cantina, although activated, may not be much attended. In the second place, occurrent beliefs may be epistemically stronger or weaker: you might think of both restaurants as having an excellent wine list, but be more convinced of this in the case of La Cantina than of Pierre's. *Ceteris paribus*, the activated beliefs that are more salient, and those that are more firmly held, are more likely to inform your conclusions.

At a given moment, there may be a genuine functional difference between occurrent beliefs in working memory and dispositional beliefs in long-term memory. However, since the contents of working memory are constantly changing, with some elements being added

and others dropping out, a belief that is about to be recovered from long term memory may well play a greater role in a given inference than a belief that is still in working memory (though not for long) because of the role it played in a preceding inference. If we look at the mental status of beliefs dynamically (as we should), it should be clear that an occurrent belief is not necessarily more manifest than a dispositional one. Dispositional beliefs of course vary along the dimensions of salience and strength, and hence of manifestness. Some of our dispositional beliefs may well be less manifest – indeed, much less manifest – than implicit beliefs we have never entertained before but for which there is strong and salient evidence, either in memory or in the environment. For instance, you may be able to answer the question, “Would the children prefer Pierre’s or La Cantina?” immediately and with confidence, even though you had never previously entertained the answer you now give; by contrast, it may take you some time to answer the question, “What is the name of the chef at La Cantina?” and your answer may not be entirely confident, even though you have heard the name before (*hmm, I remember commenting that it was not an Italian name but a Hungarian one, a famous name actually, Kadar? Molnar? Lukács? Yes, Lukács, like the philosopher, I think*).

To sum up, the division of beliefs or potential beliefs into three categories is too coarse. A gradient in terms of manifestness is more helpful.

## 5.2 Impressions and manifestness

Using the notion of manifestness, we can also give a more precise account of impressions. When Robert, intending to go for a walk, opens the windows to see what the weather is like and alters his plans, what happens to, and in, his mind? We might be tempted to say that, on the basis of his perceptions, he has formed new beliefs and used them as premises in a practical inference. Which new beliefs? Well, maybe the belief that the sky is grey and the air is quite cold, that it is therefore likely to rain, and that the weather is not right for taking a walk. Many combinations of similar and related beliefs would indeed warrant the practical conclusion he has arrived at. Although we cannot know exactly which beliefs Robert formed and used as premises, we might assume that only such a determinate set of beliefs could have caused Robert to change his mind. It might suit our theoretical agenda to think that there are facts of the matter, and that Robert knows them, or may have known them, however fleetingly, at the time.

But we have all been in Robert’s position, and we should envisage the possibility that he might have come to his decision without ever being aware of clear and distinct premises, or of deriving his decision from those premises. Here is an alternative description. When Robert opened the window, an array of propositions became manifest or more manifest to him, in the sense characterised above: they became more likely to be attended to, and more likely to be taken as true, than they had been before, and were therefore more likely to influence his decision. He may have been aware of this increase in the manifestness of an array of propositions, and of their general drift, without entertaining all of them, and maybe even without entertaining any of them as a distinct proposition, except for the practical conclusion that he would not go for a walk.

Not all inferences involve step by step logical derivations of explicit conclusions from explicit premises. Arguably, the vast majority of inferences made by humans and other animals do not involve such derivations. What happened in Robert’s brain when he opened the window might be better described as changes in patterns of activation, none of which would properly speaking amount to the fixation of a distinct credal representation, but the totality of which would correspond to the formation of an impression. These changes would then jointly inhibit what may have been a distinct volitional representation, his desire to take

a walk. Thus, rather than a step-by-step derivation of an explicit conclusion from explicit premises, the inferential process might have consisted in John's impression of the weather undermining his desire to go for a walk. More generally, many (if not all) inferences can be described not as more or less standard logical derivations, but as competitions between alternative conclusions (it will rain/it won't rain, let's go for a walk/let's not, and so on). The winner of such competitions is determined by activation or inhibition caused by brain states that represent information in all kind of ways (from consciously entertained propositions to unconscious weightings of features – where 'represent' is broadly understood as meaning 'fulfil the function of making some information available for processing'). If the mental mechanisms which decide the outcome of such competitions tend to favour warranted conclusions, then although the process is quite different from a sequence of good old syllogisms, it would still be genuinely inferential. We are not arguing for this view of human inference here, but merely arguing against tying our understanding of the role of inference in communication to an old, narrow, and questionable view of what such inference must be like.

We are suggesting, then, that an impression is a change in the manifestness of an array of propositions which all bear on our understanding the same phenomenon, answering the same question, or deciding on the same issue. This is not intended as an analysis of the ordinary use of the word 'impression'. If someone told us that this account of impressions does not capture the ordinary usage of the term, we would say that we are proposing to use 'impression' as a technical term, to denote a psychologically relevant category, whether or not this category is recognised as such in common-sense or philosophical psychology. In fact, though, we believe our technical use corresponds fairly closely to – and, if anything, sharpens – the typically vague common-sense meaning of 'impression'. It may be worth briefly showing this by considering a possible objection. *To have the impression that* can be construed as expressing a propositional attitude that takes a proposition as its complement. For instance, Robert might say, *I had the impression that it would rain*. Does this use of *impression* differ in meaning from the one we were trying to capture above? One might be tempted to say that *to have the impression that* denotes a weak credal state, not quite a belief that *P*, but a belief that *probably P*. However, this is demonstrably wrong. Suppose you enter a classroom and say, *I have the impression that there are more than fifty and fewer than a hundred people in this room*. This is an appropriate use of the phrase, and corresponds to a situation where you have formed an impression in the sense we described earlier, from which a conclusion follows. That is, an array of propositions have become manifest to you, and although you are not aware of them individually, this overall change in your cognitive environment warrants the inference that there are probably more than fifty and fewer than a hundred people in the room. Now suppose you were to say instead, *I have the impression that the number of people in the room is not a multiple of 11*, drawing on your knowledge of the fact that the chance of a random integer being a multiple of 11 is one in eleven. In this case, your use of the phrase would not be appropriate, even though you would be expressing the attitude of taking the proposition embedded in your utterance to be probably true. Thus, *impression* does not simply pick out a weak credal attitude; it picks out a certain type of vague information basis for such an attitude.

We now have all we need to address Grice's worries about the kind of effects a declarative act is intended to induce in the audience, and to provide a framework in which the full range of possible effects – including prototypical cases of speaker's meaning – can be treated in a conceptually unified way.

## 6 Manifestness and communicative intentions

In *Relevance*, we began by proposing an informal and incomplete definition of the two intentions involved in ostensive communication (corresponding to the first two clauses of Grice's definition of meaning) (Sperber and Wilson, 1986/1995, p. 29):

*Informative intention*: to inform the audience of something;

*Communicative intention*: to inform the audience of one's informative intention.

Using the notion of manifestness, we then gave a more precise and fuller version which we reformulate slightly here (Sperber and Wilson, 1986/1995, chapter 1, section 10):

*Informative intention*: to make manifest or more manifest to the audience an array of propositions *I*;

*Communicative intention*: to make it mutually manifest to audience and communicator that the communicator has this informative intention.

We will not discuss here the role of mutual manifestness in the communicative intention. Instead, we want to highlight and develop the claim that in all cases of communication, wherever they fall on the meaning/showing continuum or the determinate/indeterminate continuum, the intended import is achieved in the same way: by making mutually manifest one's intention to make an array of propositions manifest or more manifest to the audience.

Consider the version of Robert's story where he says to Susan, *Let's go for a walk*, and she responds by opening the window and showing him the poor weather outside. By responding in this way, she makes manifest to him her intention to make manifest or more manifest an array of propositions which are relevant to his proposal to go for a walk, and which have become perceptually salient as a result of her opening the window. Of course, these are not the only propositions that her behaviour has made more manifest: it has become more manifest, for instance, that the window can be easily opened, that the street is noisy, and that she doesn't want to go for a walk because of the bad weather. However, out of all these propositions that her behaviour has made more manifest, Robert is able to identify the array of propositions that she manifestly intended to make more manifest. How? They are the propositions whose increase in manifestness makes her communicative behaviour relevant in a way she may have intended and expected.

In another version, Susan responds to Robert's proposal by saying, *The weather is really awful!* By replying in this way, she makes manifest to him her intention to make manifest the proposition that the weather is really awful. Her behaviour also makes manifest a variety of other propositions: for instance, that she has a sore throat, and that she doesn't want to go for a walk because of the bad weather. Again, Robert is able to identify the array of propositions she has intentionally made manifest: as before, they are the propositions whose increase in manifestness makes her communicative behaviour relevant in a way she may have intended and expected.

When Susan's response is verbal, the array of propositions she communicates can be partly characterised by enumerating some of its members. These include the explicature(s) of her utterance (in this case, that the weather is awful) plus any implicatures that she made it wholly manifest that she intended to communicate (in this case, that she doesn't want to go for a walk). However, the full array of propositions communicated by Susan cannot be enumerated by listing (or providing a procedure for listing) all its members. Of course, enumerating all the members of an array is not the only way to identify it. For instance, it can also be identified by description. The array of propositions communicated by Susan contains

the explicature and the one clear implicature of her utterance, plus all those implications of her utterance that were to some degree manifest to her and that she expected and intended her utterance to make more manifest to Robert in a way that would make her utterance optimally relevant.

When Susan responds non-verbally, by opening the window, the array of propositions she communicates can be characterised purely by a description: she intends to make more manifest to him those propositions which have become more manifest both to her and to Robert – i.e., which have become part of their mutual cognitive environment – as a result of her opening the window, and which are relevant because they imply an answer to Robert’s proposal; the gist of this answer being that she doesn’t want to go for a walk because of the bad weather.

Enumeration and description are not the only two ways in which an addressee may identify the array of propositions that a communicator manifestly intended to make (more) manifest to him. For instance, as a result of the communicator’s behaviour, the addressee may experience a certain change in his cognitive environment, and identify this change, or part of it, as something the communicator intended to cause in him and to have him recognise as what she intended to communicate. In this case, what is needed to identify the array is neither enumeration nor description, but merely metacognitive acquaintance.

Note that in talking of metacognitive acquaintance, we are not bringing onto the scene a new and unheard of kind of psychological awareness of the effects of other minds on our own. On the contrary, our awareness of the psychological effects that others have on us is a quite unremarkable aspect of our interactions with one another. We know it when our understanding of what others have in mind pleases us, angers us, shames us, makes us feel proud, and – less emotionally – makes us see things in a new light, makes us like or dislike things, makes us rethink the past and anticipate the future differently. We are often aware of the fact that a change of mind (whether or not we could spell out its exact content) was brought about by what we understood of the minds of others. What people do when they communicate is precisely to overtly reveal something of their own mind in order to bring about such changes of mind in their audience.

A central claim of *Relevance* and later elaborations of the theory is that, because of the Communicative Principle of Relevance, the addressee can intuitively identify the array of propositions communicated by an act of ostensive communication by following a task-specific ‘modular’ inferential procedure (Sperber and Wilson, 2002). The same procedure applies whether the act is one of ‘meaning that’ or of ‘showing that’, and whether the intended import is determinate or indeterminate.

There are two specific propositions that any communicator, using any form of ostensive communication, makes it mutually manifest that she intends to make manifest: these serve as premises for the interpretation of her communicative act, rather than being part of that interpretation. The first proposition describes the particulars of the communicative behaviour of the communicator: for instance, that Susan opened the window in response to Robert’s proposal, or that Susan said *The weather is really awful!* in response to Robert’s proposal. Any theory of comprehension assumes that some such information is represented in the comprehender’s mind. Relevance theory claims that for any act of ostensive communication, there is a second immediately identifiable proposition that the communicator makes it mutually manifest that she intends to make manifest: the presumption that this act of communication is optimally relevant to the addressee (in a precise sense of ‘optimal’ defined in *Relevance*, pp. 266–71).

Interpreting an utterance involves using these two propositions as premises (together with contextual information) in order to identify the array *I*. It is this identification that constitutes the interpretation of the communicative act. A central claim of relevance theory is

that this array is identified by following a path of least effort, and stopping when the resulting interpretation is such that the communicator could have expected it to satisfy the presumption of relevance automatically conveyed by that communicative act. On this approach, the intended import of a communicative act is not inferred on the basis of general maxims or principles, but on the basis of a presumption of the relevance of that specific act, which is communicated by the act itself without being part of its interpretation.

The addressee can identify the array *I* of propositions that an act of ostensive communication makes manifest in a variety of ways. We will consider cases of verbal communication in the next section. Here are some examples of non-verbal communication.

Peter asks Mary: *Did you bring your cell phone?* She answers by showing him her cell phone. Here, the array of propositions she makes it mutually manifest that she intends to make manifest to Peter may be a singleton: the proposition that she did bring her cell phone.

If Peter had said, *I'm sure you forgot to bring your cell phone*, Mary's act of showing him her cell phone would have made manifest an array containing, on the one hand, two distinct propositions – that she did bring her cell phone and that Peter was wrong to be sure she had forgotten to bring it – and on the other hand a vague sub-array of propositions whose increase in manifestness would amount to shaming Peter for his lack of trust in Mary.

In a case of non-verbal communication with indeterminate import, as when Mary sniffs appreciatively and ostensively at the seaside air, the whole array *I* is vaguely identified as that array of propositions which makes (or is expected to make) the communicator's behaviour optimally relevant to Peter. Suppose, for instance, that Peter was already appreciating the seaside air on his own: then her act may achieve relevance just by making mutually manifest that what is becoming manifest to each of them is mutually manifest.

## 7 What, if anything, remains of speaker's meaning?

One of our aims in this paper was to show that building an adequate theory of communication involves going beyond Grice's notion of speaker's meaning. Another was to provide a conceptually unified explanation of how a wider variety of declarative acts than Grice was concerned with – including both cases of 'showing that' and 'telling that' – are understood. We will end by considering where the resulting account leaves the notion of speaker's meaning we began with, and what light, if any, it sheds on the rather fuzzy intuitions that Grice's definition was designed to capture. In this last section, we focus on linguistic cases.

One intuitive distinction that Grice originally wanted his definition of speaker's meaning to capture was between 'deliberately and openly letting someone know' (by displaying direct evidence for the intended conclusion) and 'telling' (where all the evidence would be indirect). As discussed in section 2, the existence of a continuum of mixed cases involving both direct and indirect evidence (in different proportions and combinations) presents problems for this approach. In cases of 'showing that', either the evidence for the intended conclusion is not only direct but conclusive, or else some of the evidence (or at least some strengthening of the evidence) has to come from the communicator's intentions, and this cannot but lead to over-attributions of 'meaning' as defined by Grice. On the other hand, under-attribution of 'meaning' should occur with cases of 'telling that' where no evidence from the communicator's intentions is needed in order to accept the message, either because the logical structure of the utterance makes it self-confirming (as in Grice's example of a logical argument), or because the utterance refers to an object or event that provides conclusive evidence for the truth of the message (as in the utterance, *To open a champagne bottle, you can do this*, where *this* refers to a demonstration of how to open a champagne bottle).

For philosophers of language and linguists who only want to use Gricean notions to discuss linguistic cases, one rather convenient, though un-Gricean, way to go to is to forget about the third clause of his definition of utterer's meaning, forget about his extended sense of 'utterance', and forget about his concern with providing a principled distinction between cases of meaning<sub>NN</sub> and cases of mere showing. Linguistic pragmatics is based on the distinction between what is linguistically encoded and what is verbally communicated. Grice illuminated our understanding of what is verbally communicated, i.e., of 'speaker's meaning' in the ordinary sense, so let's forget his attempt at a more ambitious theoretical definition, treat the first two clauses of his definition as necessary conditions characteristic of speaker's meaning, and make it a tacit rule only to study cases of verbal communication (or gestures like nodding that stand for verbal behaviour) for which this two-clause definition of speaker's meaning seems to pick out the intended phenomena.

We have given two reasons not to go that way. The first is that Grice was right to characterise, in a novel and ground-breaking way, a type of communicative behaviour – what we have called ostensive-inferential communication – that encompasses, but is not restricted to, verbal communication. The first two clauses of his definition of speaker's meaning (or better, the informative and communicative intentions proposed in relevance theory and inspired by Grice) do identify a fundamental form of human interaction, in the context of which, inter alia, verbal communication can be better understood and studied. The second reason is that one and the same conceptual twist – starting from the assumption that the aim in all cases of human ostensive-inferential communication is to make an array of propositions (more) manifest – makes it possible to handle both the meaning/showing continuum and the determinate/indeterminate continuum in a unified way. Focusing solely on the study of verbal communication does not resolve the problem that this second continuum raises for the Gricean approach.

In verbal communication, as in non-verbal communication, we find that addressees exploit the full range of methods for identifying the array of propositions that the communicator intends to make (more) manifest.

In a case of 'telling that' with no implicatures, where the information the speaker intends to communicate is a single clear, paraphrasable proposition, the array is a singleton. An example would be the railway official's reply 12:48 to the question, *When is the next train to Oxford?* In relevance theory, we define a notion of strength of communication which applies to individual members of a communicated array. A proposition is strongly communicated to the extent that it is strongly mutually manifest that the communicator intends to make this specific proposition manifest to the addressee. Any strongly communicated proposition falls unproblematically under the description 'speaker's meaning'. Thus, the proposition that the next train to Oxford leaves at 12:48 is strongly communicated by the railway official and is also a clear case of speaker's meaning. Whenever the array of propositions *I* is a singleton, its single member is strongly communicated and is a prototypical case of speaker's meaning.

In a case of 'telling that' with clearly identifiable explicatures and implicatures, the array can be identified by enumerating its members. Consider, for instance, the following exchange between new acquaintances chatting at a dinner party in London:

*Rob:* Do you live in London?

*Jen:* I live in Chelsea

Here, the relevance of Jen's utterance depends on two clearly identifiable propositions: the explicature that she lives in Chelsea, and the implicature that she lives in London. These two are strongly communicated and are good cases of speaker's meaning. Given that the

exchange takes place in London, Jen may take the precision of the phrase *in Chelsea* to be relevant to Rob and not to carry any further implicatures. However, in appropriate circumstances it might carry such implicatures, and her tone of voice, looks, and so on (although not indispensable) might help to achieve these further effects. Since Chelsea is a distinctly posh neighbourhood, Rob's social status would be a highly relevant contextual factor in interpreting Jen's utterance. If he were of a similar social status, her utterance might make weakly manifest that she is willing to share with him more personal information than he has requested, that she is not unwilling to see him again, and so on. The gist is clear, but no single proposition is strongly communicated or could be confidently described as part of Jen's meaning. On the other hand, if Rob were, say, a poor academic, then Jen's utterance, depending on the tone of voice, might weakly implicate that she belongs to a different and superior milieu and is not eager to deepen their acquaintance, or, especially if her tone of voice is apologetic, that she is aware of living in privileged circumstances and wishes he would not hold it against her, and so on. In all these cases, if Rob is at all savvy, he will correctly understand that something more than an answer to his question has been subtly communicated. The array *I* in this case is identified by its two strongly communicated members plus an awareness of some further cognitive effects that Jen was overtly intending to achieve by answering in the way she did.

It is all too easy for pragmaticists simply to ignore these weak effects and implicatures, and concentrate on strong implicatures that fit straightforwardly with the notion of speaker's meaning. However, as we have been arguing and will illustrate again below, there is a continuum of cases which should signal that the research is not quite on the right track.

The problem raised by such effects becomes harder to ignore when it affects not only implicatures but also explicatures. As we have argued (Sperber and Wilson, 1998, 2008; Wilson and Sperber, 2002), the content of implicatures and explicatures is inferred through a process of mutual adjustment whose goal is to produce an overall interpretation consistent with the addressee's expectations of relevance, and where the implicatures are warranted by the explicatures. The linguistically encoded sense of an utterance serves as a piece of evidence of the intended meaning, and provides a point of departure for constructing a contextually appropriate meaning that may be narrower or broader than the encoded meaning, or overlap with it, or even be identical with it, this latter outcome being neither preferred nor arrived at 'by default'.

Recent work in lexical pragmatics confirms that most encoded concepts are adjusted, or modulated, in the course of the interpretation process (Carston, 1997, 2002; Sperber and Wilson, 1998, 2008; Wilson and Carston, 2007). Here is an example where the explicature contains an ad hoc concept constructed for the purposes of that particular interpretation:

*Mark:* We can't afford La Cantina

*Pamela:* I've got money.

Pamela's utterance would be literally true if she had 50c in her pocket; but it would not be optimally relevant. In fact, if she only had 50c, it would have been more relevant to produce the literally false utterance, *I have no money*. What Pamela's reply communicates to Mark is the relevant information that she is both able and willing to pay for a meal at La Cantina. This implicature would not be warranted by the literal interpretation of her utterance, hence the construction of an ad hoc concept, MONEY\*, whose presence in the explicature warrants the implicature. But what exactly does she communicate explicitly when she says *I've got money*? The explicature, although not very vague, is not that easy to spell out. Pamela is asserting more than simply that she has money: if it turned out that she has 50c, Mark could justifiably complain that she had not just misled him but lied to him. Nor does she *explicitly*

communicate that she has enough money to go to La Cantina: this is a consequence, rather than a rendering, of what she explicitly conveys. Basically, what she is referring to is an amount of money such that she is willing and able to pay for a meal at La Cantina, an amount which cannot be less than what the bill is likely to come to, but which may be quite a bit more. Mark might know her well enough to figure out roughly what amount she means, or he might just defer to her as the ‘expert’ (without this being a case of deferential meaning!). But in any case, there is no word or expression in English, or in any meta-language used by semanticists, which denotes what Pamela has in mind, and which she succeeds more or less in communicating. In other words, Pamela’s explicit meaning in this case has a certain vagueness both for her addressee and for the analyst, and while this does not compromise communication between her and Mark in any way, it does compromise a standard account of her speaker’s meaning.

Elsewhere, we and others working in the framework have given many examples and analyses of ad hoc concepts: some, like ‘money’ in the preceding example, involve narrowing the linguistically specified meaning, while others involving broadening it, and others overlap with it. Note that we have described the case of ‘money’ as one of narrowing, but in most situations, it could be a case of both narrowing and broadening, and hence of overlap. For instance, Pamela could very well say *I have money* when she has only a few dollars in her wallet, but also a credit card. In all these cases, pinpointing a proposition that would constitute the speaker’s meaning is difficult or impossible. On the other hand, all these cases can be easily described as making more manifest an array of propositions any of which would warrant the implicature. The speaker is encouraging the hearer to accept any proposition from this array as quite probable, while not committing to one of them in particular. This is not quite what is understood by ‘speaker’s meaning’, then, but perhaps it might be close enough for some people to be tempted to idealise away the complexity and ignore our proposal about how to treat it.

These were cases of fairly strong communication. But as we have emphasised, there is a continuum between these and cases of very weak communication, where any conceivable paraphrase of the speaker’s meaning would be quite defective. This happens when both implicatures and explicatures are weak, as is typically the case with metaphors.

Suppose that in an idle chat among friends, someone tells you, *Freddy is a waste of space*. The idea that a person could be a waste of space has no clear literal sense, and you will have to construct an ad hoc concept WASTE OF SPACE\* in the course of the mutual adjustment process in order to arrive at an array of implicatures that satisfies your expectations of relevance (which in this case are themselves likely to be rather vague and unconstraining). What you will probably end up with is a general impression of Freddy, based on the explicature that Freddy is a WASTE OF SPACE\*, an ad hoc concept derived by adjusting the linguistically encoded meaning in the light of whatever information is available to you about Freddy, your friend, and the relations between them. In this example, both the explicature and the implicatures are weak: neither is easily paraphrasable, and although your friend has succeeded in communicating with you, you may find it hard to say exactly what she meant. On the other hand, the description of what is communicated in terms of increasing the manifestness of an array of propositions can be developed without idealising anything away. It won’t inject into the description the kind of precision and crispness that some would feel more comfortable with, but the phenomenon itself lacks both precision and crispness.

Or, to conclude with the classic example *Juliet is the sun*, the explicature (one might say) is Juliet is the SUN\*, where SUN\* is an ad hoc concept whose meaning is (vaguely) specified by mutually adjusting explicatures and implicatures in order to satisfy expectations of relevance: the explicature that Juliet is the SUN\* must carry an array of implicatures which makes the utterance relevant as expected, and the sense of SUN\* must be such that the

explicature does indeed contextually imply these implicatures. These implicatures are weak, and cannot be enumerated. Hence, the explicature that warrants these implicatures is itself weak. There is no paraphrase in an adequate metalanguage – or even in English used as such a metalanguage – that provides a plausible analysis or rendering of the speaker's explicit meaning. Even adding starred concepts to the metalanguage (as someone might suggest) would not allow us to identify a proposition as the speaker's explicit meaning, since what a starred concept does in this context is to vaguely indicate a range of possible interpretations that are all made more manifest (i.e., more probable and salient) without any one of them being THE correct interpretation. Just as Romeo need not have intended any one of these propositions to be taken as his exact meaning, so the audience need not, indeed should not, aim to attribute any exact meaning to him.

So the intended import of *Juliet is the sun*, as of so many creative metaphors, is best described as an array that the audience identifies not by enumeration but by metacognitive acquaintance, by attributing to the communicator's intention what they mentally experience. In general, what is needed for successful communication is that the addressee's mind be changed in the way overtly intended by the communicator, i.e., that the addressee be now disposed or more disposed to draw the kind of inferences the communicator intended (or at least that the addressee should understand the communicator's intention, even if he does not fulfil it). The communicator need not intend the addressee to make this or that specific inference; her intentions may concern only the general drift of the addressee's inferences and remain quite vague, and so may the addressee's understanding, without this amounting to a failure of comprehension. What is aimed at in such cases of weak communication is a degree of cognitive alignment, not a duplication of precise contents.

What, then, remains of speaker's meaning? Cases in one corner of the bidimensional continuum we have described; cases that have held the attention of linguists and philosophers of language at a time when pragmatics was non-existent, underdeveloped or, more recently, ignored; cases that we have tried to show do not have the kind of unity and autonomy needed to constitute a proper object of theorising. Like the proverbial drunkard in the night looking for his glasses under the lamppost not because of any strong reason to believe that they were there, but because at least he could see there, students of language have stayed close to the lampposts of semantics and logic. The drunkard's strategy need not be irrational. But after a while ... especially if there are glimmers of light around...

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