

Dialogue pressures and Syntactic Change

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Abstract

On the basis of the Dynamic Syntax framework, this paper argues that the production pressures in dialogue determining alignment effects and given versus new informational effects also drive the shift from case-rich free word order systems without clitic pronouns into systems with clitic pronouns with rigid relative ordering. The paper introduces assumptions of Dynamic Syntax, in particular the building up of interpretation through structural underspecification and update, sketches the attendant account of production with close coordination of parsing and production strategies, and shows how what was at the Latin stage a purely pragmatic, production-driven decision about linear ordering becomes encoded in the clitics in the Medieval Spanish system which then through successive steps of routinization yield the modern systems with immediately pre-verbal fixed clitic templates.

1 Introduction

This paper argues that production pressures in dialogue that determine given versus new informational effects drive the progressive grammaticalization of pronouns into ever weaker forms, potentially leading ultimately to the formation of clitics with fixed positions in the clause. Grammaticalization of this sort is argued to take place

through progressive psycholinguistic routinization of general linguistic procedures that utilize context dependence (i.e. through the use of anaphoric devices) to ameliorate problems on language production with regard to lexical searches for appropriate word forms.

The case study used to support this hypothesis is the shift from Latin, with its free word order and rich case morphology, through Medieval and Renaissance forms of Spanish, with their atrophied case systems, to the modern language in which case is only expressed in the clitic pronoun system, with fixed immediate preverbal position in finite clauses. The formal framework within which this account is set out is Dynamic Syntax (Kempson *et al*, 2001; Cann *et al*, 2005).

The starting point is the DS account of dialogue and its analysis of the widespread use of ellipsis, pronouns and alignment effects involving repeating words, interpretation, and syntactic structures (Cann *et al* 2005, Purver *et al* 2006):

- (1)
- A: What should Michael give Ruth for Christmas?
 - B: A pianola.
 - C: Unless he's giving her a harpsichord.
 - D: He could give her a spinet, if you prefer.

The account analyses all such effects as the minimization of the production task of searching in the lexicon. It is this which we argue is the driving force behind the emergent syntactic properties of clitics in the shift from Latin to Medieval and Renaissance Spanish, with successive steps of routinization involving the storage of previous syntactic information from the context within the

lexicon as macros of actions associated with the parse of specific forms (in other words, as a process of grammaticalization involving the lexicalization of syntactic processes). Each new stage of routinization then develops this process as a means of reducing production costs.

2 Towards a Dynamic Syntax of Latin

DS is a parsing-directed grammar formalism, in which a decorated tree structure representing a semantic interpretation for a string is incrementally projected following the left-right sequence of the words, from a starting point with just a rootnode and a requirement for some propositional value, to an endpoint which is a fully decorated binary branching tree structure encoding functor-argument structure of a familiar sort:¹

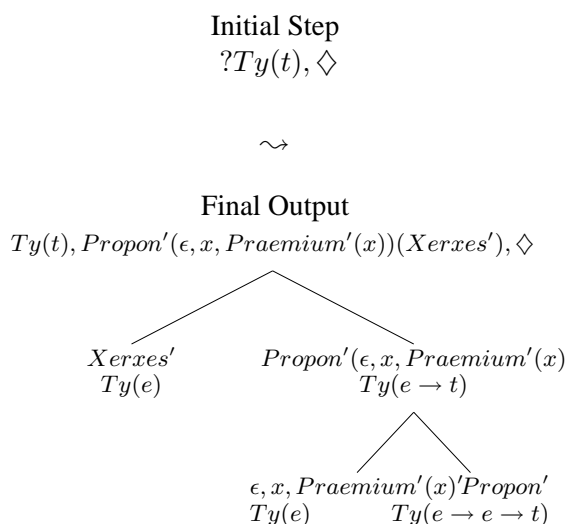


Figure 1: Parsing *Xerxes praemium proposuit*

The process of tree-growth is the basis of syntactic explanation: a sentence is defined to be well-formed just in case there is at least one possible route through that process. Central to this is the concept of requirement $?X$ for any decoration X , representing a type, formula or treenode address. For example, decorations on nodes

¹*Fo* is a predicate that takes a logical formula as value, *Ty* a predicate that takes logical types as values, *Tn* a predicate that takes tree-node addresses as values, eg *Tn(0)* being the rootnode.

such as $?Ty(t)$, $?Ty(e)$, $?Ty(e \rightarrow t)$ etc. express requirements to construct formulae of the appropriate type on the nodes so decorated, and these drive the subsequent tree-construction process.² These steps are determined either by general computational actions, such as anticipating a subject-predicate structure, or lexical actions triggered by parsing lexical items in the order in which they are presented in some string of words.³ Crosslinguistic variation is expressed in terms of the actions invoked in parsing particular classes of words. In particular, variations in word order are determined, at least in part, by how much of the argument structure of a predicate is constructed by such actions. For example, SVO order in English is accounted for by a condition on parsing a (main) verb that a subject has already been constructed and only internal argument(s) of the verb are then projected as part of the tree growth process. In Latin, however, with its freer word order and possibility of pro-drop, parsing verbs induces a whole propositional structure whose argument nodes are decorated with **metavariables**: placeholders that stand for some real value to be assigned from the context, capturing the effect of null pronouns without the assumption that such things are real parts of a *linguistic* string:⁴

²The formal system underpinning the partial trees that are constructed is a logic of finite trees (LOFT). There are two basic modalities, $\langle \downarrow \rangle$ and $\langle \uparrow \rangle$, such that $\langle \downarrow \rangle \alpha$ holds at a node if α holds at its daughter, and its inverse, $\langle \uparrow \rangle \alpha$, holds at a node if α holds at its mother. Function and argument relations are distinguished by defining two types of daughter relation, $\langle \downarrow_0 \rangle$ for argument daughters, $\langle \downarrow_1 \rangle$ for functor daughters (with their inverses $\langle \uparrow_0 \rangle$, $\langle \uparrow_1 \rangle$).

³Quantification is expressed in terms of variable-binding term operators, so that quantifying NPs like all other NPs are of type e . The underlying logic is the epsilon calculus, whose internal contains an epsilon binder, ϵ , a variable, and a restrictor: eg $\epsilon, x, Man'(x)$. Since in Latin, nouns project full specification of terms, the structure defined to be projected by *praemium* would be a subtree of which the quantifying term is the topnode, dominating a subtree decorated with binder, variable, and restrictor specification. We leave all details on one side.

⁴According to this characterization, Latin is object drop. One way to capture canonical verb object orderings within a full pro-drop system is to define the pointer to be at the object node on the tree following the parse of a verb, characterizing ordering of the object after the verb as the least marked of available options. We ignore details of tense specification throughout this paper.

(2)

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IF      ?Ty(t)
THEN   put(Tns(PAST));
       make(⟨↓0⟩) : go(⟨↓0⟩);
       put(Ty(e), Fo(U), ?∃x.Fo(x)); go(⟨↑0⟩);
       make(⟨↓1⟩); go(⟨↓1⟩); put(?Ty(e → t));
       make(⟨↓1⟩); go(⟨↓1⟩);
       put(Fo(Propon'), Ty(e → e → t), [↓]⊥)
       go(⟨↑1⟩); make(⟨↓0⟩); go(⟨↓0⟩);
       put(Fo(V), Ty(e), ?∃x.Fo(x))
ELSE   Abort

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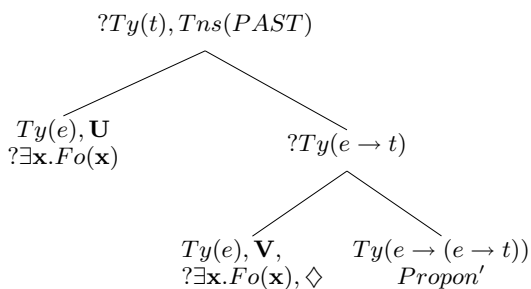


Figure 2: Result of lexical actions of *proposit*

There is in DS also the concept of structural underspecification, with the construction of only weakly specified tree relations, which licenses the introduction of a node in some newly initiated logical structure, characterized only as $\langle \uparrow_* \rangle Tn(0)$ (“this node is dominated by the rootnode”).⁵ In case-rich languages such as Latin, this strategy is manipulated in conjunction with case-specifications which are used to update an unfixed node to a fixed relation (subject, direct object, indirect object). By this strategy, a string such as (3) can be parsed using case specifications to update each weak ‘dominate’ tree-relation before the parsing of the verb.⁶

(3) Praemium Xerxes proposit
‘Xerxes offered a reward.’

Once any one relation is fixed, another unfixed node can be introduced, following through on the same sequence of actions. The verb then

⁵ $\langle \uparrow_* \rangle Tn(0)$ is the regular formal characterization of dominate: see footnote 2. The provided annotation then indicates that the rootnode dominates the current node.

⁶A formal restriction imposed by the system is that there be only one unfixed structural relation of a type at a time, any duplication leading to immediate collapse of the two nodes into one.

follows, filling out the remainder of the propositional structure to yield the appropriate output tree with $Fo(Xerxes')$ as subject argument $Fo(\epsilon, x, Praemium'(x))$ as object argument.⁷ This allows ‘free’ word order effects without any necessary interpretational difference.

This specification of verbs as inducing full propositional structure equally applies in cases where its associated metavariable argument annotations are provided from context. Such a case occurs in the building of paired, ‘linked’ trees, which are subject to a restriction that they are anaphorically linked, a process used for relative clauses, clausal adverbials, and also external topic constructions. Such secondary structures have an attendant requirement that the newly introduced proposition-requiring tree have somewhere within it a copy of that term (specified as $\langle \downarrow_* \rangle Fo(\alpha)$):⁸

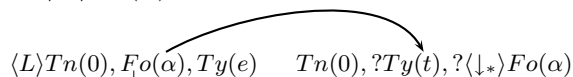


Figure 3: Building Link transitions

For example, such a structure is invoked in the parse of *My new boss, she’s insane* in which the initial term is recapitulated in context by the pronoun. Link structures of this sort provide one instance of the dependence of the parsing process in DS on contextual information, but such context dependence is invoked throughout the system to account for anaphoric and other underspecified expressions whose values may be determined from within the current tree, from some linked tree or from some tree provided by the discourse context.

⁷Unlike two case-distinguished unfixed nodes, either subject or object nodes induced by actions of the verb harmlessly collapse with those introduced as unfixed and updated through constructive use of case (Nordlinger 1998), as annotations provided by the verb are compatible with those provided by computational actions used in parsing the NPs.

⁸The process of inducing such pairs of semantic trees is permitted by defining an additional modal operator in the tree logic, $\langle L \rangle$, and its inverse $\langle L^{-1} \rangle$; and a rule is defined to yield a transition from an arbitrary node in one tree across a LINK relation to the top node of a new propositional tree.

With the options of building an unfixed node within an individual tree, and building transitions from one tree to another to yield pairs of ‘linked’ trees, there are several strategies at the outset of building structure for any single string-interpretation pair; but this is unproblematic as the parsing-directed grammar formalism makes available alternative strategies for specifying the fine structure of HOW interpretation is built up.

2.1 Production

In production, the same rules used in parsing apply: the difference is that while the parser may not know in advance the interpretation to be constructed, the producer in contrast must do so, at least in part. So in generation, the same computational actions initiate the development of some tree but each update step licensed by the parsing mechanism has to meet the restriction of being a sequence of progressive enrichments towards completing a ‘goal tree’ representing the interpretation to be conveyed.⁹ For example, in producing (3), *Praemium Xerxes proposuit*, the first action in initiating a sequence of steps to yield the goal tree is to start with a step that introduces a node decorated with the requirement $?Ty(t)$, just as in parsing; and one possible follow-up to this step is to introduce an unfixed node (as in Figure 4). Transparently, both the initial tree and this development subsume the goal tree in the sense that there is a licensed progression from these to the richer goal tree.

From this step on, there is the problem of searching in the lexicon for words to express the given conceptual array. With this weak an update in structure, a very large number of options are available; and in principle the entire lexicon needs to be scanned. Appropriate continued lexical scanning may select *praemium* as providing a licensed update, a sequence of computational actions plus lexical search which is repeated all over again in producing *Xerxes*. Given the incrementality of parsing, carried over to production, this task is computationally expensive, threatening to be cognitively non-viable, all the more

⁹Formally a subsumption relation is required to hold between the parse tree and the goal tree. For an early development of this view, see Purver and Otsuka 2003.

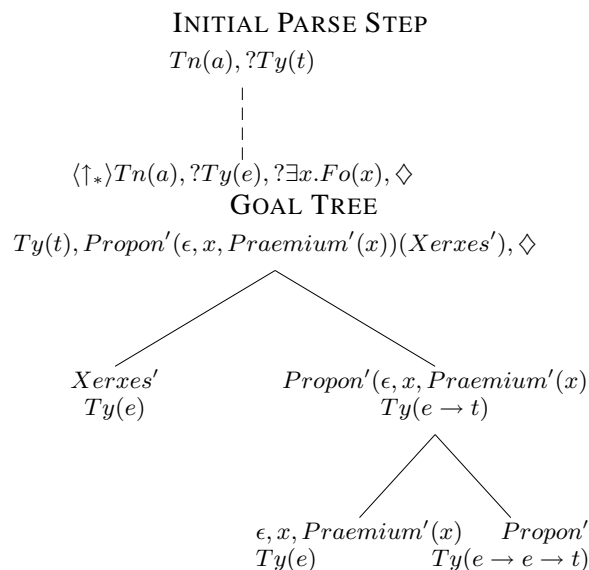


Figure 4: First production steps for *Praemium Xerxes proposuit*

so in free word order languages as there are so many parsing options. However, we assume that production is just as context-dependent as parsing, re-using structure or formula values, even actions used to construct trees, wherever possible. Any element in context that can be identified as adding appropriately to the tree may not require words to be uttered, as long as the effect of adding it as a tree update matches the subsumption condition. For example: consider the mechanisms for producing an utterance of (5) in the context of having processed (4):

- (4) *Xerxes iussit milites*
Xerxes_{NOM} ordered soldiers_{ACC}
castra captare
camp_{ACC} capture_{INFIN}
 ‘Xerxes ordered the soldiers to capture the camp.’
- (5) *Praemium proposuit*
 Reward offered
 ‘He offered a reward.’

In uttering (5), the subject argument node provided by the verb’s actions is identified from

context. And it is here that using the very same process as in parsing reaps its rewards. As long as the minimal context contains a suitable term, matching the subsumption constraint, that term can be substituted as the value of the metavariable without more ado, so there need be no explicit morphologically presented subject: the simple verb form is sufficient.

This minimization on cognitive costs in production extends beyond merely using elements in context wherever possible. It also applies to choice of words, structure, and actions. Once a word or sequence of actions has been used in processing a string – parsing it or producing it – these actions can be re-used, this being the basis for the very considerable alignment effects:

- (6) *Te, dea Te fugiunt*
 you goddess you flee
venti. Te nubila
 the winds_{NOM} you clouds_{NOM}
coeli
 of-heaven
 ‘You goddess, the winds flee from you, the clouds of heaven (flee from you).’

Minimizing on production costs also affects word order, even without alignment. Though in Latin, there may be no need of a pronoun, anaphoric expressions serve a purpose in the linearization task as they enable argument terms to be identified independently of processing the verb. This consideration, in conjunction with the parallelism of parsing and production and general cognitive constraints such as relevance, helps to explain their preferred early positioning. In relying on context, both speaker and hearer need the search for a substituent to be as small as possible (by general relevance considerations). Accordingly, unless there is reason to the contrary, the position of an anaphoric expression will be as early as possible in the setting out of any propositional structure since this ensures that the search in the context for the value to be assigned to this expression will thereby be as small as possible. In order to minimize the search space effectively, there is pressure not to introduce words expressing new information into the string before contextually determined ones. This

is of course no more than a pragmatic relevance-based explanation of the very wellknown given-before-new ordering that is regularly reported in free-constituent-order situations.

However, pronouns in Latin may be used to provide some initial term which constitutes a point of departure for what follows, or to provide a contrast, an update to what follows, in both such cases being set out initially in order to be identifiably separate from the structure to be constructed from what follows:¹⁰

- (7) “*Tibi ego dem?*” “*Mihi*
 you_{Dat} I_{NOM} give_{1st.ps.sg} me_{Dat}
hercle uero”
 by Hercules in truth
 ‘Am I to give it to YOU?’ ‘Yes, by god, to ME’

[Plautus, Pseudolus 626 (Adams (2))].

Such uses of so-called strong pronouns are analysed as involving the projection by the pronoun of a term decorating a node at the left edge of a propositional boundary, i.e. as a separate linked structure, or an unfixed node, (7). In such uses, these provide the means of identifying boundaries to propositional domains, either in the projection of a separate tree, a linked structure, or to identify the initiation of a new propositional structure within which the term that they serve to introduce will provide an update.

There are in addition so-called weak uses of pronouns, which serve only as anaphoric devices. Being by definition complementary to the strong use of pronouns, this remainder of the set of pronouns will not be associated with those very structural devices which serve to identify some initiation of an emergent propositional structure. Nevertheless, like their “strong” counterparts, the positioning of these pronouns under this use will be driven by relevance considerations. That is, once an emergent propositional structure is identified by some *other* expression, we can expect weak pronouns to occur as closely following as possible.¹¹ With all pronouns, that

¹⁰The pronouns noted in (7) are taken by Adams 1994 to be illustrative of an emphatic use “often marked by placement of the pronoun at the head of its clause”(p.104).

¹¹Following Sperber and Wilson 1995, if there are spe-

is, the search within the context has to be minimized by placing the pronoun as close to the context within which its value is to be identified as is commensurate with its function in that context.

3 Towards diachrony

We now have everything in place to explain why clitic pronouns cluster at some early position in a string. The weak pronouns of Latin occur as close to the left-edge of a clause as possible, but not quite at the edge. Rather, as noted above, they follow those devices which define an emergent propositional boundary, immediately following focussed elements, expressions containing a negative element, complementizers, relative pronouns, subordinate temporal adverbials, and verbs, these having in common their identification of some emergent edge of a new propositional domain:

(8) *quae tibi nulla debetur*
 which_{neut,pl} you_{dat} no_{neut,pl} is owed
 ‘nothing of which is owed to you.’
 [relative-pronoun+pronoun]

(9) *Nihil me aliud consolatur*
 nothing me_{acc} other_{neut,sg,nom}
 it consoles
 Nothing else gives me comfort.
 [negative-quantifier+pronoun]

(10) *Magno me metu liberaveris*
 great_{neut,abl} me_{acc} fear_{abl}
 you will have freed
 ‘You will have released me from great fear.’
 [split part+pronoun]

(11) *rogo ut mi mittas dalabram*
 I ask that me_{dat?} you send mattock
 ‘I ask you to send to me a mattock.’
 [complementiser+pronoun]

cific inferential effects to justify commensurate enlargement of the context to be searched, this would explain the lack of tightness of fit that Adams 1994 notes of weak pronoun positioning in Latin, even assuming that the effects are clause by clause (or “colon” by “colon”).

(12) *et non eum uendedi*
 and not him_{acc}/it I sold
 ‘and I did not sell him’
 [negation+pronoun]

(13) *delectarunt me tuae litterae*
 delighted me your letter
 ‘I was delighted with your letter.’
 FAM.IX.16.1
 [verb+pronoun]

In the subsequent Medieval Spanish system the clitic pronouns share this distribution:

(14) *Esto es el pan de Dios que vos da a comer*
 this is the bread of God that CL
 he-gives to eat
 ‘This is the bread of God that he gives you to eat.’ Granberg, 1988: 35
 [rel-pro+pronoun]

(15) *E non los hi fallo. and not*
 them there found.3sg
 And he did not find them there.(XIII)
 [negation+pronoun]

(16) *Dixo la mugier: Quien te hizo rey?*
 said.3sg the woman: who you made.3sg king
 ‘The woman said: Who made you king?’
 (XIII)
 [WH+pronoun]

(17) *e dizie que lo tenie del prior de Sancti Johannis*
 and he-said that CL-DO he-had of-the prior of Saint Johan
 ‘and he said that he got it from the prior of Saint John.’ [XIII; Granberg 1988]
 [complementiser+pronoun]

(18) *e todo lo metieron a espada*
 and all CL-DO they-put to sword
 que....
 that...

‘and he said that he got it from the prior of Saint John.’ [XII Granberg 1988]
[quantifier+pronoun]

- (19) *Connociola* *Jacob.*
recognised.3sg-her Jacob
‘Jacob recognised her.’ (XIII)
[verb+pronoun]

Such left-peripheral items may however be a sequence of NPs (Devine and Stephens 2006):

- (20) *caseum per cribrum*
cheese through sieve
facito transeat
make_{2nd.sg.imp} go-through_{3rd.sg.subjunct.}
in mortarium
in bowl
‘Make the cheese go through the sieve into the bowl.’ Cato 76.3
[scrambled NP pair]

And this pattern recurs in medieval Spanish, at that later point in time associated specifically with clitic pronouns:

- (21) *Et los dioses me quisieron mal*
And the gods CL want_{3pl} harm
e me lo quieren
and CL CL want_{3pl}
‘and the gods wanted to harm me and they still want to.’
(XIII; cited by Granberg 1988: 235-236)

Thus the proclisis and enclisis effects in finite clauses for the weak pronouns of Latin and the clitic pronouns of medieval Spanish, can be described by a single generalization as a minimizing of context search, given the new introduction of an appropriate-sized domain.

4 Alignment, routinization and Change

Without an explanation of the change, this is not yet the full diachronic account; but dialogue effects go further than mere use of anaphoric devices and alignment. Dialogue participants, having having set up a parse sequence of actions may, over a very short time set up routines for retrieval of a stored sequence of actions

encompassing more than one word (Garrod and Doherty 1994), yet another saving on cognitive costs since it involves retrieval from the lexicon of only one sequence of actions for a multiple string. Production, storage, and language change can now be seen as going hand in hand in the shift from Latin in the development of Spanish. One form of pronoun gets progressively phonologically reduced in virtue of predictability and recoverability from context. Given increasing phonological dissimilarity, separate clitic forms get encoded, what at that later stage has become an unstressable clitic being defined to follow the set of triggers previously established through pragmatically induced production constraints.¹² This process constitutes a form of routinization, listing, as triggers, the environments within which weak pronouns were construed as dependent for a value on some immediately preceding context.

The first observable step of encoding this heterogeneous set of triggers is a step of economy that combines computational and lexical actions as one lexical macro of actions. But this involves a disjunction of triggers, such as a negation feature, a subordinate marker inducing a new proposition-requiring node (for subordinating complementisers) the transition from a linked structure onto a decorated unfixed node (for a relative pronoun), a WH term decorating an unfixed node (for *wh* questions), and so on. This is not only clumsy, but hard to learn. So once the clitic is stored as a discretely encoded form, its macro of actions is a natural candidate for further routinization effects. In all such cases, much the commonest expression to immediately follow the clitic(s) is the verb (Adams 1994 amongst others); and a natural subsequent step of routinization, given the DS form of analysis, is to call up the actions associated with the verb together with those of the clitic, again as a further economy measure in reducing processing effort. We achieve the effect of re-bracketing,

¹²The strong pronouns subsequently come in Modern Spanish to be restricted to decorating linked structures, necessitating clitic doubling (see Cann et al 2005):

(i) le hablaron a ella
 her_{DAT} spoke_{3pl.} to her [mod.Spanish]
‘They spoke to her.’

often observed. With such routinization, restrictions on proclisis collapse, since the heterogeneous set of triggers defining the environment licensing construal of a clitic is not a property that appropriately subclassifies the verbs with which the clitics are stored; and we get the intermediate stage of Renaissance Spanish, when all constraints on pre-verbal positioning of the clitics drop (see Bouzouita 2002, Bouzouita and Kempson forthcoming, Bouzouita in preparation).

From this point in time, the Romance languages, with the disappearing free constructive use of case, face the problem of confronting a ban on more than one unfixed node at a time on its NP construal. A variety of divergent routinizations emerge to side-step the problem. Some clitics directly induce the construction of the requisite fixed structural relation (eg French *le*). Others induce the building of a locally underspecified tree relation, hence underspecified with respect to the two discrete object construals (eg. French *me, te*, Castilian Spanish *le*). And in some cases a phonologically distinct composite clitic form is introduced that induces a single unfixed relation from which are constructed two argument nodes (eg Italian *glielo*, Spanish *se lo*). It is notable that each of these possibilities corresponds to actions independently justified, albeit at this point in time stored as a lexical sequence of actions, the last alternative corresponding to the sequence of actions earlier freely available in licensing examples such as (20). The framework thus can explain the idiosyncratic, highly restricted templatic sequencing of clitics, without introducing separate morphology-specific vocabulary. Overall, the full range of idiosyncratic variation is expressible through the simple assumption of building locally unfixed nodes, with various ways in which routinized conflation of macros can take place in the wake of internalised morphological changes imposing concomitant pressures for change.

Acknowledgement

The detailed work on medieval Spanish, and the diachronic study of Spanish clitics could not have taken the form it has without the input of Miriam Bouzouita. See Bouzouita 2002,

Bouzouita and Kempson forthcoming.

References

- John Adams 1994. Wackernagel's law and the position of unstressed personal pronouns in Classical Latin. *Proceedings of the Philological Society*, 92: 103–78.
- Miriam Bouzouita 2002. Clitic Placement in Old and Modern Spanish. MSc dissertation. King's College London..
- Miriam Bouzouita and Ruth Kempson. forthcoming. Clitic placement in Old and Modern Spanish: a dynamic account Nedergaard Thomsen O. (ed.) *Current Trends in the Theory of Linguistic Change*. John Benjamin, Amsterdam.
- Ronnie Cann, Ruth Kempson and Lutz Marten. 2005. *The Dynamics of Language*. Elsevier, Oxford.
- James Devine and Laurence Stephens. 2006. *Latin Word Order: Structured Meaning and Information*. Oxford University Press, Oxford.
- Simon Garrod and Doherty G. 1994. *Cognition*, 53: 181–215. Cambridge University Press, Cambridge, UK.
- R. Granberg. 1988. *Object Pronoun Position in Medieval and Early Modern Spanish*. University Microfilms International, Ann Arbor Michigan.
- Ruth Kempson, Wilfried Meyer-Viol, and Dov Gabbay. 2001. *Dynamic Syntax*. Blackwell, Oxford.
- Rachel Nordlinger 1998. *Constructive Case*. CSLI, Stanford.
- Matthew Purver and Masayuki Otsuka. 2003. Incremental generation for dialogue. ACL workshop proceedings.
- Matthew Purver, Ruth Kempson, and Ronnie Cann, 2006. Grammars as parsers: meeting the dialogue challenge. *Research on Language and Computation*, 4.
- Martin Pickering and Simon Garrod. 2004. Towards a mechanistic account of dialogue. *Behavioral and Brain Sciences*, 27: 169–226.
- Dan Sperber and Deirdre Wilson. 1995 *Relevance: Communication and Cognition*. Blackwell, Oxford.