

### On the Asymmetry of Aspect Structure

1. I focus on the syntax of aspect in word-structure, and show that theoretical and psycholinguistic results converge in our understanding of the properties of aspect structure.

2. The configurational properties of affixes determining the aspectual properties of verbal projections, whether an event has or not an end point, whether it is a single event or part of a sequence of events, are subject to debate. According to Roeper and Keyser (1992) and Hale and Keyser (2002), an affix that modifies an entire event, such as the iterative affix, is generated as a sister to the verb, and moves to a higher position in the verbal projection. In Di Sciullo (1997), the iterative affix is generated outside of the full verbal projection, while directional affixes are more locally related to the verb, and in recent works (Di Sciullo, forthcoming) aspectual affixes are part of a bipartite structure sister-containing the verbal shell.

Psycholinguistic experiments can provide evidence for the cognitive processing of aspectual affixes, and in particular if there is a configurational difference between sorts of affixes, such as the iterative and the directional affixes. If there is no structural difference between aspectual affixes with respect to a verbal head, psycholinguistic experiments would reveal no significant difference in the processing of prefixed verbs, whether the affix is iterative or directional. If there is a configurational difference between sorts of affixes, significant differences in processing should emerge.

In the first part of this paper, I show, on the basis of precede, dominate and asymmetric c-command relations, that prepositional affixes form an Aspect Shell, which is structurally superior to the Verbal Shell, in the sense of Chomsky (2000, 2001). Empirical support comes from Romance and Slavic languages. In the second section I discuss the results of an experiment which provide psycholinguistic evidence for the asymmetric nature of Aspect Shells. The experiment is based on French data.

3. I argue for a shell analysis of prepositional affixes within the Asymmetry Theory (Di Sciullo 2002, forthcoming). A shell is a two-layered asymmetrical relation, the general form of which is the following:  $[_x \alpha \ x \ [_y \beta \ y \ \delta]]$ , where  $x$  and  $y$  are heads, and  $\alpha$ ,  $\beta$  and  $\delta$  are dependent features. Shells are part of the morpho-logical feature structure of categories, functional categories, including D and C, and lexical categories, N and V. I take aspect features to be functional features modifying the internal or the external properties of the event denoted by a verbal projection. I further assume that modificational adjuncts, including P and ADV, sit in the Spec of functional projections (Kayne 1994, 2003; Cinque 1999).

That Aspectual feature structure takes the form of a Shell follows from a basic property of grammatical relations: asymmetry. In a Shell every element is part of an asymmetric relation with another element of the same sort. In the Asp-Shell, see (2) and (3), External aspect (FE) and Internal aspect (FI) head their own minimal tree, and the aspectual affixes sit in the Spec positions, the iterative and the inverse affixes are located in  $\alpha$ , while directional affixes sit in  $\beta$ .

(2)  $[_{FE} \ E\text{-}Asp \ F_E \ [_{FI} \ I\text{-}Asp \ F_I \ \delta \ ]]$

(3)  $[_{FE} \ E\text{-}Asp \ F_E \ [_{FI} \ I\text{-}Asp \ F_I \ [_v \ \alpha \ v \ [_v \ \beta \ V \ \delta \ ]]]]$

The Asp-Shell hypothesis contrasts with the Abstract Clitic Hypothesis (Roeper and Keyser 1992, Hale and Keyser 2002, Roeper and Snyder 2003) where prefixes are Head-adjoined to a verb, see (4), and must move to a superior position in the verbal projection. I compare the Shell hypothesis to the Abstract Clitic Hypothesis on both empirical and theoretical grounds.

(4)  $[_v \ V \ CL]$

The following predictions emerge from the Asp Shell hypothesis. The configurational asymmetry between External and Internal prefixes determines their linear order and their effect on the verbal argument and aspect structure, e.g. *refermer*, *enfermer*, *réenfermer* (Fr.), *to close*, *to enclose*, *to reenclose*. The local dependency between the higher and the lower layers of the Asp-Shell receives empirical support from the fact that with denominal and deadjectival verbs, External prefixes must be

followed by internal prefixes, ex.: *reembouteiller*, *emrebouteiller* (Fr.), to *reencapsulate*, \**to enrecapsulate*. I show that the Shell hypothesis extends to languages such as German, English and Slavic, and that particles can be prefixed to verbal projections. This is typically not a property of Romance languages, though Italian, which nevertheless has a limited set of directional particles, such as *via* 'away' *su* 'up' and *giù* 'down' allows constructions in which the particle-V construct is substantivized.

I argue that Internal prefixes and particles are adjuncts to Chomsky's (2000) small vP structure, where small  $v$  is the locus of internal aspect features, and has access to the functional domain of the

verbal head, including the manner modification of the projection in which they are part of. External prefixes are adjuncts to the FI structure. Differences in adjunction yield differences in the argument structure and aspect modification of the verbal projection. It follows that only FI may affect the Aktionsart, and only FI may affect the sequence of Events. I also show that the possible adjunct relations are limited by the properties of the Asp-shell. It follows that while recursion is possible for FE, it is not for FI.

4. In Tsapki, Jarema and Di Sciullo (2002), the internal/external distinction for unambiguous prefixes (*re-* vs. *en-*) was prompted to the psychophysiological level. The research question in this experiment was whether the syntactic and semantic differences involved in the internal/external distinction reflected in differential electrophysiological activity of the brain found to be devoted to syntactic and semantic processing. Event-related brain potentials (ERPs) were recorded from a 64-channel device as 6 participants performed a lexical decision task with contiguous priming where priming effects for pairs of related verbs (e.g. *fermer-refermer*, or *fermer-enfermer*) were compared with the control unrelated condition (e.g. *parler-refermer*, or *parler-enfermer*). Results showed that for both verb categories there was a significant reduction in the N400 component for the primed condition in relation to the unprimed one, indicating that N400 effects may also be associated with semantic unrelatedness at the word-level. Secondly, an early negative component (N100) usually related to syntactic processing was obtained only for the internal prefix verb category which entailed an argument structure change from the base verb but it was not obtained in the verbs with the external prefix where there was no argument structure change from their base verb form. This result indicates that the argument structure is available very early in lexical access (Friederici et al., 1999) even when it is evoked by fine distinctions between different types of verbs. Overall, the results testify for the psychological and psychophysiological reality of the internal/external distinction in the Asymmetry Theory and provide an instantiation of the interface between linguistic theory, psycholinguistics and computation in the brain.

## References

- Bertram, R., Laine, M., Baayen, R. H., Schreuder, R., & Hyona, J. (2000). Affixal homonymy triggers full-form storage, even with inflected words, even in a morphologically rich language. *Cognition*, 74(2), B13-B25.
- Cinque, G. (1999) *Adverbs and Functional Projections. A Cross-Linguistic Perspective*. New York: Oxford University Press.
- Chomsky, N. (2001). Derivation by Phase. In M. Kenstowicz (Ed.) *Ken Hale: A Life in Language*. Cambridge, Mass: The MIT Press.
- Chomsky, N. (2000). Minimalist Inquiries. In R. Martin, D. Michaels and J. Uriagereka (Eds.) *Step by Step. Essays on Minimalist Syntax in Honor of Howard Lasnik*. Pp. 89-155. Cambridge, Mass.: The MIT Press. Pp. 89-155.
- Di Sciullo, A.M. (forthcoming). *Asymmetry in Morphology*. Cambridge, Mass.: The MIT Press.
- Di Sciullo, A.M. (2002) The Asymmetry of Morphology. In P. Boucher (ed.) *Many Morphologies*. Cascadia Press. Pp. 1-33.
- Di Sciullo, A.M. (1997) Prefixed Verbs and Adjunct Identification. In A.M. Di Sciullo, (ed.) *Projections and Interface Conditions*. New York: Oxford University Press. Pp. 52-73.
- Friederici, A.D., Steinhauer, K., & Frisch, S. (1999). Lexical integration: sequential effects of syntactic and semantic information. *Memory and Cognition*, 27, 438-53.
- Kayne, R. (2003) On the syntax of quantity in Japanese. Ms. CUNY.
- Kayne, R. (1994) *The Antisymmetry of Syntax*. Cambridge, Mass.: The MIT Press.
- Hale and Keyser (2002) *Prolegomena to a Theory of Argument Structure*. Cambridge, Mass.: The MIT Press.
- Roeper, T. and Keyser, J. (1992) The abstract clitic hypothesis. *Linguistic Inquiry*
- Roeper, T. and Snyder, W. (forthcoming). Language learnability and the forms of recursion. In A.M. Di Sciullo (ed.) *Language, Brain and Computation*. Amsterdam: John Benjamins.
- Taft, M., & Forster, K. I. (1975). Lexical storage and retrieval of prefixed words. *Journal of Verbal Learning and Verbal Behaviour*, 14, 638-647.
- Tsapkini, K., Jarema, G, and DiSciullo, A.M. (2002). From linguistic theory to psychophysiology: Electrophysiological and behavioral correlates. Eleventh World Congress of the International Organization of Psychophysiology (I.O.P.), Montréal, QC, Canada.