

Chomskyan Minimalism as a vehicle for embodied models of language

Submission type: oral

Embodied models of language posit that language supervenes to some extent on the sensorimotor system. Since all humans have the same sensorimotor system, these models make quite strong predictions about the existence of linguistic universals. The syntactic models which make the strongest claims about linguistic universals are those of Chomsky. While embodied linguists are often skeptical of Chomsky's nativism, it is interesting to reassess Chomskyan models of syntax, attempting to interpret the universals they posit as reflections of the sensorimotor system, rather than of specialised language-processing machinery.

In this talk I will outline an attempt to provide a sensorimotor interpretation of the syntactic universals proposed within Chomsky's Minimalist model (Chomsky, 1995). This interpretation is described in a book which will appear around the time of the conference (____, 2012), which I would like to introduce to conference participants.

The book focusses on a single concrete episode: a man grabbing a cup. It presents a detailed model of the sensorimotor mechanisms involved in apprehending this episode, as well as the Minimalist model of a transitive cup-grabbing sentence. It argues that there are far-reaching formal similarities between these two models.

The sensorimotor model of cup-grasping is based on Ballard *et al.*'s (1997) account of 'deictic routines'. In this account, there is a particular timescale at which cognitive routines interface with the world, called the 'embodiment level'. This is the timescale at which saccades and simple motor actions are programmed. At this timescale, Ballard *et al.* suggest that cognitive processing has a strong serial structure: there is a primitive unit of organisation called a **deictic operation**, involving execution of a **SM action** (a simple attentional or motor action) in an **initial context**, bringing about a **new context**, and producing a **reafferent sensory state**. The new context of one deictic operation can be the initial context of another, so interaction with the world happens through a sequence of deictic operations called a **deictic routine**. I argue that the process of apprehending a cup-grabbing episode has the form of a deictic routine.

Chomsky's Minimalist model requires sentences to be analysed at multiple syntactic levels. 'Logical form' (LF) is the level at which generalisations across languages are expressed, so this is where we would expect to find

reflexes of sensorimotor processing. The LF of a transitive cup-grabbing sentence is shown in Figure 1.

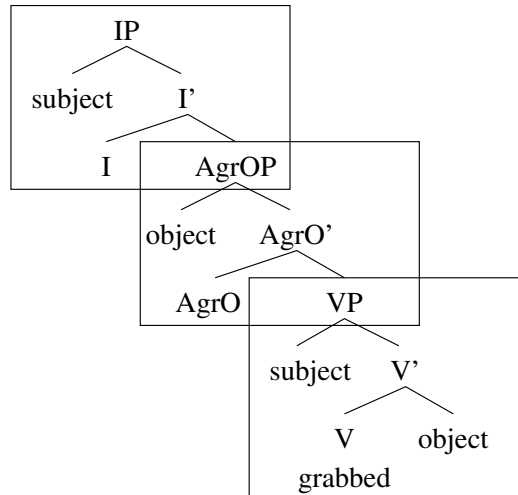


Figure 1: LF structure of *[Subject] grabbed [object]*

While LF structures seem complex, their building blocks are actually very simple: they are made up of copies of a single basic template (an XP schema), chained together in a right-branching manner. My main proposal is that XP schemas can be given a direct sensorimotor interpretation: namely, *each XP schema represents a single deictic operation*. I argue that each element of the XP corresponds to one element of a deictic operation, as shown in Figure 2. As a corollary of this interpretation, a right-branching chain of XPs represents

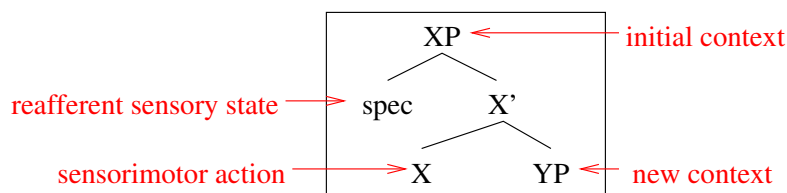


Figure 2: Sensorimotor interpretation of an XP schema

a sequence of deictic operations. The specific deictic routine which I argue is involved in apprehending a cup-grasping episode maps neatly onto the LF of a cup-grabbing sentence, as shown in Figure 3. There are also interesting sensorimotor interpretations of the syntactic relationships within LF posited in the Minimalist model.

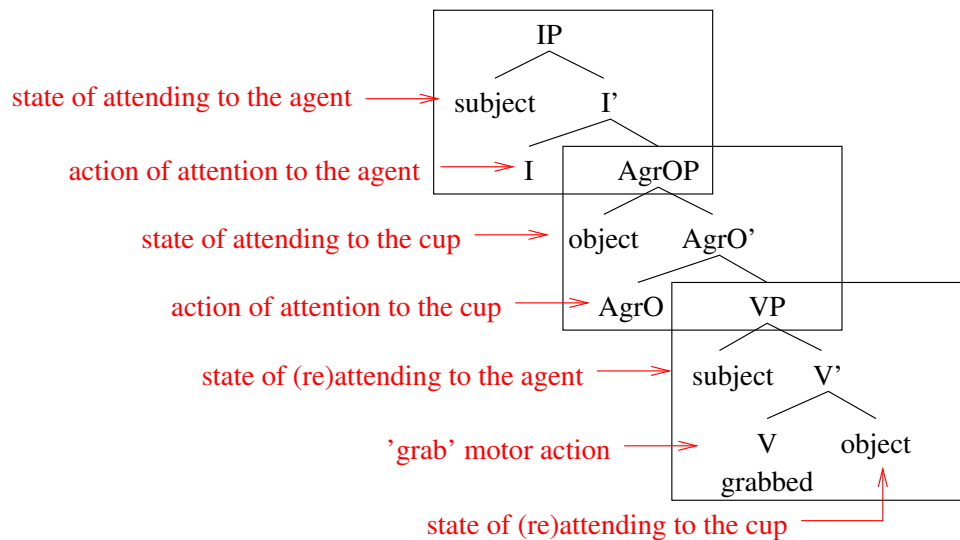


Figure 3: Sensorimotor interpretation of the LF of a cup-grabbing sentence

Proposing a sensorimotor interpretation of an existing syntactic theory is a large project, and I have only taken some preliminary steps. However, initial results are encouraging. I argue that they warrant a reassessment of Chomsky’s Minimalism as a vehicle for stating strong claims about the dependence of language on the sensorimotor system.

References

- Ballard, D. *et al.* (1997). Deictic codes for the embodiment of cognition. *BBS*, **20**, 723–767.
- Chomsky, N. (1995). *The Minimalist Program*. MIT Press.
- (2012). *Sensorimotor Cognition and Natural Language Syntax*. MIT Press.