



A usage-based theory of the neurocognitive basis of grammar

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The precise nature of the distinction between lexical and grammatical elements is a key issue in the debate between formal and functional-cognitive linguistics. The neural grounding of grammar has played an important role in this debate. On one side, Chomskyan linguistics maintains that grammar is autonomous from lexical knowledge and based on a specific genetic endowment that arose before actual human languages were around (see Berwick & Chomsky 2016 for a recent statement). Chomskyan linguistics thus subscribes to a dual mechanism with distinct components for words and rules. On the other side, functional-cognitive linguistics has pointed out that the Chomskyan theory has gradually lost ground in the face of empirical evidence in favour of a usage-based theory (e.g. Ibbotson & Tomasello 2016).

There is general agreement among functional-cognitive linguists that there is no hard-and-fast distinction between lexicon and grammar; it is less clear what exactly the remaining difference is. Some versions of construction grammar come close to denying the existence of a meaningful distinction altogether (cf. Trousdale 2014). This is in harmony with the format of description where all expressions are listed as stored items in a 'constructicon', and it goes naturally with the idea of a single processing mechanism based on a form of parallel distributed processing (e.g. McClelland & Patterson 2002). However, empirical neurolinguistic evidence does not support this extreme position taken by construction grammar, but rather suggests that there is a significant difference between lexical and grammatical processing (Pulvermüller et al. 2013). There is thus a need for a more well-developed usage-based theory of the special neurocognitive properties of grammar vis-a-vis the lexicon.

In this paper we present such a theory. The theory integrates three recent theories: 1. a usage-based linguistic theory of the grammar-lexicon distinction (Boye & Harder 2012), 2. a theory of the distinction between declarative and procedural memory (Ullman 2001, 2004), and 3. a theory of brain organization (Mogensen 2011). A centrepiece of the unified theory is that grammar has special functional and structural properties that make it dependent on procedural memory (cf. Ullman et al. 1997), conceived of not as an autonomous, modular system, but as a pre-existing multi-purpose system that language draws on (motor ability is a salient area in which procedural memory is involved), and which is built rather than innate (cf. Bates 1999). The theory rejects the 'single mechanism' as an exhaustive account of the human language ability and replaces it with a model with two mechanisms: declarative memory for lexicon; procedural memory for grammar. However, it emphasizes that the two mechanisms both overlap and collaborate (just as grammatical and lexical items in language both overlap and collaborate). Hence, this is not a new 'dualist' model where words and rules are poles apart, but suggests a more in-depth account of the way in which language is based upon pre-existing cognitive resources.

References

- Bates, E. 1999. Plasticity, localization and language development. In S. Broman & J.M. Fletcher (Eds.), *The changing nervous system: Neurobehavioral consequences of early brain disorders*. New York: Oxford University Press, 214–253.
- Berwick, R.C. & N. Chomsky. 2016. *Why Only Us. Language and Evolution*. Cambridge: MIT Press.
- Boye, K. & P. Harder. 2012. A usage-based theory of grammatical status and grammaticalization. *Language* 88 (1), 1–44.
- Ibbotson, P. & M. Tomasello. 2016. Evidence Rebuts Chomsky's Theory of Language Learning. *Scientific American*. Sept 7 2016, <http://www.scientificamerican.com/article/evidence-rebuts-chomsky-s-theory-of-language-learning/>

- McClelland J.L. & K. Patterson. 2002. Rules or connections in past-tense inflections: what does the evidence rule out? *Trends in Cognitive Sciences*. Nov 1; 6 (11), 465–472.
- Mogensen, J. 2011. Almost unlimited potentials of a limited neural plasticity: levels of plasticity in development and reorganization of the injured brain. *Journal of Consciousness Studies* 18, 13-45.
- Pulvermüller, F., B. Capelle & Y. Shtyrov (2013). Brain basis of Meaning, Words, Constructions, and Grammar. *The Oxford Handbook of Construction Grammar* (ed. by Thomas Hoffmann and Graeme Trousdale).
- Trousdale, G. 2014. On the relationship between grammaticalization and constructionalization. *Folia Linguistica* 48, 557–577.
- Ullman, M., S. Corkin, M. Coppola, G. Hickok, J. H. Growdon, W. J. Koroshetz & S. Pinker. 1997. A neural dissociation within language: Evidence that the mental dictionary is part of declarative memory, and that grammatical rules are processed by the procedural system. *Journal of Cognitive Neuroscience* 9, 289–299.