The mutualistic organization of sister constructions: an ecological network approach to the structure of the constructicon

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The network of constructions (or constructicon) is hierarchically organized in a way such that sister constructions can be related under an over-arching construction, a higher node of abstraction and schematization (Sommerer & Smirnova, 2020; Sommerer & Baumann, 2021; Sommerer, 2022). This is for instance the case with the 'obstruction' construction [*BE* {*prevented*/*kept*/etc.}] *from* {V_{ing}}], where each form of the first paradigmatic schema defines a sub-construction, e.g. [*BE prevented from* {V_{ing}}]. These sister constructions can be highly synonymic, so much that the question of their co-existence arises, since these constructions compete against each other for the same set of fillers (Aronoff & Lindsay, 2016; Rainer, 2018). This creates a bipartite network between the sister constructions and their fillers, characteristic of a situation where two different sets of forms engage in filler/host mutualistic interactions (Chen, 2022). Such filler-slot relations are also deemed central for the understanding of the emergence of grammatical classes (Diessel, 2019).

This mutualistic bipartite structure is typical of many systems – e.g. relationships with users and web pages, pollinators species and flowers, companies and traded goods, etc. (Jordano et al., 2006; Brintrup et al., 2015; Mariani et al., 2019). All these systems do not follow a niche-based structure, but a nested one (the most obscure web pages are only visited by the most prolific web users, while the occasional surfers only visit commonplace pages). This nested structure actually derives from a Zipfian distribution over the nodes' degree (Payrató-Borras et al., 2019). The Zipfian distribution is a mathematical law that can be invoked to describe a constructional schema structure (Ellis & Ferreira-Junior, 2009; Ellis, 2012; Ellis et al., 2014): it relates, in logarithmic scale, the collocational frequency of a construction's fillers, and their rank (once ordered by their collocational frequency), such that a few fillers account for most of a construction's use (Goldberg et al., 2004). Therefore, we should expect the sister constructions to obey nestedness as well (Petré, 2014, p. 49-50). This nested structure would be associated with mostly hyperonymic relationships between sister constructions, frequent generalist constructions being semantically more versatile, rare constructions being specific to a chosen subset of the semantic domain covered by a more generalist construction.

I empirically show that two-slot constructions obey a nested structure from three datasets obtained from the COCA (Davies, 2008-): the obstruction construction mentioned above, the mental stative verb + V_{ing} construction ([{*love*, *consider*, *remember*, etc.} + {V_{ing}}], and the [*it is* {*crucial/misleading*, etc.} *to* {V_{inf}}] construction (Desagulier, 2021) Crucially, although the structure is robustly nested, I also show that these systems are significantly not as nested as they could be (if, for instance, one were to reallocate randomly all tokens while keeping the construction's frequencies constant), hinting at some allotment of distinct semantic domains among the most prominent fillers.

Finally, I discuss the interpretation of this finding. The lack of rare sister construction/rare filler interactions seems crucial for the construction to be recognized as such in actual use. Second, as shown in the ecological literature (Bastolla et al., 2009), the nestedness structure provides stability to the system (i.e. to the over-arching node), despite the competition between sisters. Furthermore, the hyperonymic relationships may lead to bleaching the meaning of the most dominant filler, favoring a more abstract and schematic meaning to emerge. As such, nestedness may be one of the very tools for grammatical structures to arise out of language use.

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