Productivity versus Structure: A Diachronic Approach to Constructional Patterns

Quentin Feltgen UCLouvain

Productivity is a key feature in the use of linguistic patterns, as it quantifies the propension for a pattern, be it syntactic or morphological, to sanction novel constructs (e.g. word formation). This measure is by essence cognitive, and can be accessed either through psycholinguistic experiments (Goldberg 2016, Van den Stock et al. 2024) or through the traces it leaves in recorded uses (De Smet 2020), especially through the attested diversity of these uses. Notably, there may be a continuum between a novel use and an infrequent one – a point implicitly made by Hoffmann (2018: 260); how do we know if we have ever encountered the construct about to disentangle as in 'After a pint, just as you are about to disentangle yourself, they mention your favourite book.'? As such, a large diversity of attested types seems a good proxy for the propensity of a pattern to recruit innovative types. This has led to a rich tradition of corpus-based measures (Baayen & Lieber 1991), some of them being sample-specific (the realized productivity and the potential productivity are specific to the contents of the sample in which they are measured), some of them aiming at underlying properties generative of that sample, such as HD-D (Malvern et al. 2004) or other resampling-based measures (Bestgen 2025). One underlying idea behind these measures is that they try to capture features of the frequency distribution over the types entering the pattern, the frequency distribution being the structural organization, cognitively entrenched, that governs the propensity for a type to be used in a construction (Ellis & Ferreira-Junior 2009). In this regard, another way to characterize productivity is to consider a mathematical model of that frequency distribution, one of these being the 2parameter Zipf-Mandelbrot model (Evert 2004).

In relation with this notion, the idea of a construction's structure has been widely discussed: Barðdal (2008) have hypothesized that the semantic coherence of a construction plays a large role in productivity and can drive the diachronic process (Barðdal & Gildea 2015). Perek (2016) has shown that new types do not appear anywhere in the semantic space, but rather in regions already densely populated by previously recruited types. Tria et al. (2017) have modelled how language-like productivity patterns may stem from a gradual expansion from an original core, reflecting processes evidenced in L2 learners (Wu & Wang 2022) or in diachrony (Uehara 2023).

This contribution is concerned with the role played by productivity in diachrony, and aims at answering the following question: how do structural changes relative to the frequency distribution interact with productivity dynamics and token frequency dynamics? First, I will present the Zipf-Mandelbrot model, its two parameters *a* and *b*, and how they interact with diversity-based measures of productivity. A crucial

feature of the model is the existence of iso-productivity clines in the parameter space, that is, there exist lines of equal productivity that correspond to very different values of parameters a and b, ranging from a region associated with poorly focused constructions (hence amenable to many types) structured around a central, dominant prototype, to a region with constructions that show an extended range of entrenched prototypes, yet remain very focused on them. I will finally illustrate the diachronic transition between both structures based on corpus data from the COHA (Davies 2010) with two opposite diachronic examples: far too ADJ and in case of N, the former associated with a rising token frequency over the period covered by the corpus, while the latter decreases in frequency over that time range, by plotting their diachronic trajectories in the (a, b) space (Figure 1), and by qualitatively assessing what this means in terms of their organization over their types. These findings illustrate the use of a quantitative model to better track the structural changes underwent by constructions in the course of their historical dynamics, beyond mere productivity.



Figure 1: Zipf-Mandelbrot parametric trajectories over time of two constructions, *far too ADJ* and *in case of N*, with data from the COHA (Davies 2010). Iso-productivity clines are shown in the parametric space as contour lines: crossing these lines indicate a change in productivity.

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