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Patterns of coining and constructions: the role of productivity

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We develop the notion of *pattern of coining* found in some complete-inheritance models of Construction Grammar (Fillmore 1997, Kay 2013), which are processes used to coin new units based on analogy with an existing one. Unlike constructions, they cannot be considered systematically productive in synchrony. After providing measurement methods, we assess the productivity of three patterns (*·whelm*, *·licious* and *·holic*). To do so, we carried out a statistical analysis using two web corpora. Unlike Kay, we show that the difference between constructions and patterns of coining is not so clear-cut, since patterns of coining may undergo constructionalization, and that qualitative aspects should be taken into account along with quantitative data when trying to assess the status of a word-formation pattern.

Keywords: pattern of coining, productivity, constructionalization, *·whelm*, *·licious*, *·holic*

1. Introduction

The notion of **pattern of coining** was first introduced by Fillmore during his lectures at the University of California, Berkeley (Fillmore 1997), and later developed by Kay at the Second International Conference on Construction Grammar (Kay 2002). The draft for the conference is the basis for Kay (2013).

The notion of pattern of coining is closely related to that of construction. The latter is typically defined as a learned pairing of form and function (Goldberg 2019, 2); it is also entrenched (Bybee 2006, 715) and productive (Fillmore et al. 1988). Patterns of coining, on the other hand, lack full productivity (Kay 2013, 38) and should therefore not be considered constructions.

Indeed, while redundant models of Construction Grammar posit that even partially productive patterns can be considered constructions, complete-inheritance models (of which Kay is a proponent) claim that constructions are necessarily fully productive. Such approaches assume that a grammar (which is made up of a set of constructions) should only contain what is needed “to produce and understand all possible utterances of a given language *and no more*” (Kay 2013, 32, emphasis in the original).

Patterns of coining, on the other hand, “are neither necessary nor sufficient to produce or interpret any set of expressions of the language” (Kay 2013, 33). In other words, such patterns do license a certain number of expressions, but not systematically; it is therefore impossible to predict the grammaticality of an expression derived from a pattern of coining. In complete-inheritance models, full-fledged constructions and patterns of coining are both unpredictable form-meaning pairings, but they differ with

regard to productivity. This notion, however, remains problematic because productivity is a matter of degree (Baayen 2009).

In this squib, we seek to propose a detailed analysis of the notion of pattern of coining, and, more specifically, to see how it ties in with the notion of productivity. To do so, we first deal with productivity and how it can be measured. We then present the examples of patterns of coining given by Kay (2013), as well as two other patterns that potentially qualify for this categorization (the *·licious* pattern and the *·holic* pattern). Measures of productivity will be given for each of them. Finally, we discuss the results by raising some questions about the relationship between patterns of coining and constructions in light of their degree of productivity.

2. Defining productivity

Linguistic productivity has received numerous definitions, mainly involving morphology. Schultink (1961, 113), for instance, defines productivity as “the possibility for language users to coin unintentionally and in principle unlimited number of new formations, by using the morphological procedure that lies behind the form-meaning correspondence of some known words”. If such a procedure can readily be used to coin new words, then it can be deemed “available” to speakers (Plag 1999, 34), and it will be productive, in the sense that it will allow for the creation of new forms.

Productivity was thus first defined and measured for morphological patterns, but it was then expanded to encompass syntactic constructions (e.g. Perek 2018). To measure productivity, several methods have been proposed.

Token and type frequency measure the number of instances of the pattern attested and number of different lexemes attested in a given corpus, respectively. Since this paper focuses on word-formation patterns, we will only take into account type frequency. Indeed, Bybee (2001) notes that the productivity of a morphological process is determined first and foremost by its type frequency. According to Pfänder & Behrens (2016), token frequency can help account for entrenchment only, when type frequency may provide the basis for possible schema formation and generalization. Token frequency is of lesser importance here because what is at stake is not the number of times a type is used by speakers (i.e. its entrenchment), but the number of types that a given word-formation process may yield (i.e. schema formation). We will therefore favor type frequency (or “realized productivity”, Baayen 2009, 6).

These two measures are sometimes used to calculate **type–token ratio (TTR)**, where a higher TTR indicates greater lexical diversity, and indirectly productivity. However, TTR can be problematic for comparisons, because its precision depends on corpus size.

Two measures specifically take into account hapax legomena (tokens that occur only once with some type):

- **Expanding productivity** (Baayen 2009, 7) is the proportion of hapax legomena of the pattern under study among the number of hapax legomena in the corpus.
- **Potential productivity** (Baayen 2009, 7-8) is the proportion of hapax legomena of the pattern among the total number of tokens of the pattern in the corpus.

Using expanding productivity implies having access to the total number of hapax legomena in the corpus, which is hard to obtain for very large corpora. For this reason, we will favor potential productivity.

For the rest of this squib, when measuring productivity, we will therefore use both type frequency and potential productivity, which both shed light on the availability of a word-formation process, but in different ways, as we will see.

3. Kay's patterns of coining

Kay (2013) only gives two examples of patterns of coining. The first one is the verb *underwhelm*, which is the result of a process of reanalysis and analogy based on the pre-existing verb *overwhelm* $\Leftrightarrow$ 'X has a strong emotional effect on Y'.

The latter verb was first reanalyzed: its form was recognized as having two components (*over* + *whelm*) and one of these components was assigned part of the meaning of the verb. In that case, the part *over* was associated to the 'strong' part of the meaning in accordance with the conventional metaphor MORE IS UP (Lakoff & Johnson 1980, 15). This part was then replaced with another semantically close element, in this case its direct antonym *under*, thus yielding the new verb *underwhelm* $\Leftrightarrow$ 'X has a weak emotional effect on Y'.

So far this pattern of coining has not been very productive. We carried out a statistical analysis on the English Web Corpus 2015 (enTenTen15) to measure the type frequency and the potential productivity of the pattern. After sorting the results manually, we found 15 types and 229,782 tokens. Among these occurrences, 8 of them are hapax

legomena. The potential productivity is therefore 0.003%, indicating very low productivity. We note that *under* is the only prepositional element¹ that has been largely attested in the prefix slot (6,668 tokens in the enTenTen15). Two other prepositions can exceptionally be encountered, but they do not appear in the enTenTen15:

- (1) a. Are you **abovewhelmed** at work? Dutifully doing the day-to-day but stressed by the systematic strain of your routine?
- b. I was ready to be **belowwhelmed** by this book since so many publications on language disappointed me in the past.

Since the four prepositions *above*, *over*, *under* and *below* form a contrast set (Tyler & Evans 2003, 109), it is not surprising that the expressions *abovewhelmed* and *belowwhelmed* can be readily formed and understood in contrast with *overwhelmed* and *underwhelmed*. In that case, because of their semantic contrast, one would very probably interpret *abovewhelmed* as being more intense than *overwhelmed*, and *belowwhelmed* as more intense than *underwhelmed*.

The pattern [PREPOSITION·*whelm*]_v is clearly a pattern of coining, because the first slot could not be instantiated by just any preposition (**asidewhelmed*, **inwhelmed*); besides, if someone actually coined such an expression, it would not be instantly understandable and would probably require a definition. On the other hand, the occasional expressions *abovewhelm* and *belowwhelm* are instantly understandable because they are based on an analogy with two semantically close units.

¹ We use the term *preposition* with the extended meaning given by Pullum & Huddleston (2002, 598–601). Under this terminology, preposition may head nominal elements, but also clausal elements (whereas traditional grammar would call them *subordinating conjunctions*); they may also have no complement (in which case they correspond to a number of traditional adverbs).

The second example of pattern of coining given by Kay is the sequence < ADJECTIVE *as* NOUN > (e.g. *cold as ice*), which has mostly lost its comparative meaning to become non-compositional and acquire an intensive meaning ('very X'). From established instances of the sequence, speakers will generalize the pattern as < ADJ_X *as* N_Y > ⇔ 'very X', where the noun is chosen because it denotes a class of entities that typically manifest the quality denoted by the adjective. The pattern is then opened to other adjectives, which in turn select nouns typically associated with the quality the adjective denotes.

According to Kay (2013, 38), < ADJECTIVE *as* NOUN > is not a construction because its slots cannot be instantiated by any adjective or noun (**heavy as a truck*); it therefore has limited productivity. Although this vision is somehow shared by Desagulier (2016), he shows that the < ADJECTIVE *as* NOUN > pattern actually has several productive subschemas (*white as NOUN*, *ADJECTIVE as hell*).

From the description of these two patterns of coining by Kay, we provide a tentative a generalization on how patterns of coining work:

- (i) The basis of analogy is an established construction which is already part of the construct-i-con of a given language community.
- (ii) This construction is reanalyzed: a speaker recognizes a link between part of the form of the construction and part of its meaning.

(iii) Through a process of analogy, one of the components of the reanalyzed construction can be replaced by another element which is formally or semantically close.

(iv) The pattern can be used in a limited way (low type or token frequency) insofar as the linguistic community does not recognize the validity of every potential production.

The different steps of the process can be summed up as follows:

Basis → Reanalysis → Analogy → Limited applicability

If one accepts the notion of *pattern of coining*, one still has to bear in mind that constructions and patterns of coining are different in nature: the former is a unit while the latter is a completely dynamic process.

4. Productivity of other potential patterns of coining

Although Kay only gave two examples of patterns of coining, their characteristics can be applied to other patterns that enable speakers to coin new words through reanalysis and analogy. Two of these potential patterns are [X·*licious*]_A and [NOUN·*holic*]_N, which are illustrated in (2):

- (2) a. Cocoa powder and semi-sweet chocolate give this **chocolicious** ice cream extra flavor [...]. (enTenTen15)
- b. Jorge is an avid golfer and **travelholic** who enjoys reading, problem solving, and history. (enTenTen15)

The unit *·licious* has been analyzed as a libfix by Norde & Sippach (2019). Libfixes are “‘liberated’ elements that originate from the reanalysis of existing words” according to Hamans (2020). Based on this definition, the unit *·holic* could be analyzed as a libfix as well.

The *·licious* pattern can be found in words such as *curvalicious* or *yummalicious*. The use of *·licious* as a libfix became popular in the 2000s with the use of the newly-coined adjective *bootylicious*, in which *·licious* has been “liberated” from *delicious* and acquired the status of libfix. The unit *·licious* is added to a noun or an adjective to create a new adjective denoting a quality that is very pleasing to the senses (with the analogy *delicious* $\Leftrightarrow$ ‘very pleasant to the taste’). The pleasing experience stems directly from the referent of the base, which can denote inanimate entities (*bookilicious*), people (*hubbylicious*) or body parts (*bootylicious*).

The *·holic* pattern is based on an analogy with the noun *alcoholic* $\Leftrightarrow$ ‘person addicted to alcohol’. Although it is morphologically complex (*alcohol* + *·ic*), in this sense it is non-compositional: the addiction component cannot be predicted from the affixation of an adjectivizing suffix to a given nominal base. The word was then probably reanalyzed, giving rise to the expression *workaholic*, whose appearance was traced back to 1947 by the Oxford English Dictionary. Nowadays, the slot in the pattern can be filled by any noun which denotes either a physical entity (e.g. *cookieholic*, *dogaholic*) or an activity (e.g. *golfaholic*, *yogaholic*); the coined noun serves to denote a person who is addicted to the referent of the first element of the pattern.

The libfix status of *·licious* and *·holic* (Hamans 2020) does not indicate whether $[X\cdot\textit{licious}]_A$ and $[\text{NOUN}\cdot\textit{holic}]_N$ are full-fledged constructions or patterns of coining, although libfixes and patterns of coining both rely on reanalysis. To determine this, one has to measure their productivity, since it is the basis of Kay’s definition. We therefore calculated the type frequency and the potential productivity of these patterns from a diachronic point of view by relying on data from the COHA (Corpus of Historical American English). Two other patterns were used as reference points:

- $[\text{PREPOSITION}\cdot\textit{whelm}]_v$, which is a good candidate to the status of pattern of coining;
- $[\text{NOUN}\cdot\textit{hood}]_N$, which intuitively seems highly productive and which would certainly be deemed a construction.

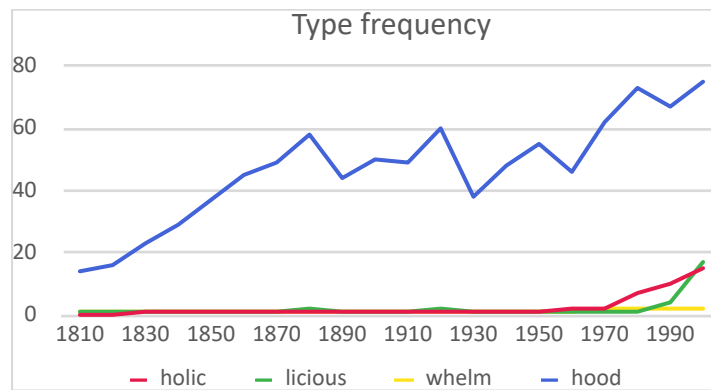


Figure 1. Type frequency of several morphological pattern based on data from the COHA.

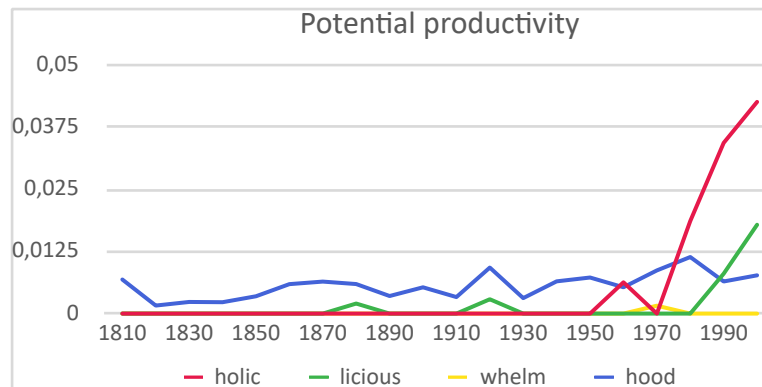


Figure 2. Type frequency of several morphological pattern based on data from the COHA.

Diachronic type frequency (Figure 1) shows that the *·hood* pattern is clearly above the other three, while the *·whelm* pattern is always very low. This would indicate that type frequency is indeed a good indicator for productivity. The *·holic* pattern and the *·licious* pattern saw their type frequency increase from the 1970s and the 1990s on, respectively. Their type frequency is still nowhere near that of the *·hood* pattern, however.

Diachronic potential productivity (Figure 2) shows different results: the *·hood* pattern and the *·whelm* pattern are very stable over time, while the other two patterns end up being higher than the *·hood* pattern. This shows that the suffix *·hood* is used to coin words very regularly, while the *·whelm* pattern is regular in its unproductivity. On the other hand, there was a surge of interest for the other two patterns, indicated by the larger proportion of hapax legomena among all the tokens of these patterns.

A more synchronic analysis was carried out based on the data from the enTenTen15. After sorting the results manually, we found 333,575 tokens and 2,519 types of *·licious* words. The potential productivity is 0.5%. As for *·holic*, there are 88,236 tokens and 1822 types, and its potential productivity is 0,01%. These scores can be considered as

indicating high productivity, especially when comparing them to the scores for the *·whelm* pattern, whose potential productivity is only 0.003%.

5. Discussion

The quantitative results shown in the previous section show that type frequency and potential productivity are two good indicators for productivity, but yield different results:

- Type frequency reflects to what extent a given pattern can be used to coin a large number of units;
- Potential productivity, used diachronically, indicates tendencies, i.e. whether a pattern is stable in coining new words (or not), or whether it shows significant variation, indicating a sudden (dis)interest for this pattern.

Although the *·holic* and the *·licious* patterns seem to behave similarly from a quantitative point of view, they differ in the way their meaning combines with the meaning of other units. The *·holic* pattern yields transparent combinations: given a noun with denotation *X* and the $[\text{NOUN}\cdot\text{holic}]_N$ pattern, the resulting unit *X·holic* can be interpreted directly as ‘person addicted to *X*’. The *·licious* pattern, on the other hand, is slightly more complex, as there appears to be several meanings attached to it. We singled out three main senses to the pattern.

- It can refer to a nice feeling stemming from the referent of the base, which is present in the situation. For example, *bagelicious* refers to the pleasant feeling

one experiences as they eat a bagel (whose taste properties are the origin of the pleasurable sensation).

- It may denote a pleasant feeling that is related to the referent of the base, but not originating from an actualized experience. Someone can experience a *summerlicious* moment without it necessarily being summer when they speak: the situation will just have properties usually associated with summer.
- Finally, the [ADJECTIVE·*licious*] subpattern may yield lexemes in which the libfix denotes high degree (e.g. *fabilicious* ‘absolutely fabulous’) or a conjunction of two qualities (e.g. *frugalicious* ‘both frugal and delicious’).

The status of a given linguistic unit (construction or pattern of coining) should therefore not be based solely on quantitative measures of productivity. Qualitative features like semantics must also be considered.

Indeed, in enTenTen15, the ·*licious* patterns yields a greater number of types than the ·*holic* pattern (2,519 vs 1,822) and its potential productivity is higher (0.5% vs 0.01%).

However, from a qualitative point of view, the ·*holic* pattern seems to coin units in a more stable, systematic way. The ·*licious* pattern, on the other hand, yields lexemes which may not be as easily understandable: *terriblicious* could mean ‘both terrible and delicious’ or ‘absolutely terrible’. Therefore, from a qualitative perspective, ·*holic* appears to be a better candidate to constructional status. The fact that ·*licious* has a higher potential productivity than ·*holic* may be accounted for from a diachronic

perspective: the former is more recent than the latter. It thus seems logical that it should yield a greater number of new, one-off formations in 2015².

Moreover, even if *·licious* has a greater number of tokens, among the 333,275 results, 322,993 of them are *delicious* (96.8%), while there are only 75,117 *alcoholic* tokens (85,1%) for the *·holic* pattern. If we study token frequency numbers without *delicious* on the one hand and *alcoholic* on the other, *·holic* has a higher token frequency (13,119 vs 10,582). Therefore, the *·holic* pattern without its original lexeme is quantitatively more entrenched than the *·licious* pattern without its original lexeme.

To sum up, even though *·licious* does show higher productivity figures, it does not appear as diachronically stable and semantically coherent as *·holic*. In this regard, in spite of the purely quantitative data, the *·holic* pattern appears to be more likely to be categorized not as a pattern of coining, but as construction.

According to Kay, patterns that are not fully productive do not qualify as constructions. Since productivity is a matter of degree and can change over time, something that was considered a mere pattern of coining can, as time goes by, come to be thought of as a construction. This may therefore be the case of the *·holic* pattern. This would mean that patterns of coining may have an optional final step consisting in the emergence of an independent construction. This step can thus be added to those already given in section 3:

² This analysis also accounts for the fact that *·licious* has a higher potential productivity than *·hood*, which is older and more stable over time.

- (v) If the pattern used to coin new expressions is used more frequently and with more elements, it may become a full-fledged construction which speakers can use independently, without relying on another existing construction to interpret it.

If we add this potential final step, the full evolution of a pattern of coining can be summed up as follows:

Basis → Reanalysis → Analogy → Limited applicability → Construction
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This means, conversely, that a given construction may be the end product of the evolution of a pattern of coining. In that case patterns of coining could constitute a kind of lexical constructionalization, where innovation through analogy may lead to the creation of a new form–meaning pairing. Therefore, a one-off utterance that was first assembled “on the fly” (Cappelle 2014) may well become part of the lexicon and even yield a fully productive morphological word formation process.

6. Conclusion

Within complete-inheritance models, the only relevant criterion to distinguish constructions from patterns of coining is productivity. If the slots of a given pattern can be filled systematically, then the pattern is a construction; if not, it is merely a pattern of coining. Productivity, however, is a matter of degree: some patterns (e.g. [NOUN·*holic*]_N) lie somewhere between established construction ([NOUN·*hood*]_N) and patterns of coining ([PREPOSITION·*whelm*]_V).

More qualitative criteria should also be considered. Some patterns yield transparent combinations (e.g. [NOUN·*holic*]_N) while others are semantically more complex (e.g. [X·*licious*]_A). Because of this, the ·*holic* pattern seems closer to constructional status than the ·*licious* pattern, despite higher productivity indicators in the recent years for the latter.

Consequently, there seems to be a gradient between clearly unproductive patterns of coining, patterns of coining under constructionalization and fully constructionalized patterns of coining. Precisely because of the dynamic nature of language, complete-inheritance models should take into account the fact that patterns of coining, in some cases, are transitions between nonce expressions and full-fledged constructions.

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