Morphology-prosody interaction in Modern Danish:
challenging the foundations of Word-structure in Hans Basbøll's Non-Stød Model (2008)

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Hjelmslev (1951) claimed that stød (a laryngeal syllable rhyme prosody) is the most challenging phenomenon in Danish language structure, and it continues to fascinate linguists internationally (examples can be seen in the bibliographical list). According to Hans Basbøll's Non-Stød Model (2008), bimoraic (heavy) syllables have stød as default (ie. syllables with long sonority rhyme, presupposing they have no less than secondary stress). The cases where bimoraic syllables do not have stød, are then to be be accounted for, viz. by principles of Lexical Non-Stød and Word-structure Non-Stød (my concern here).

In the native-like part of the vocabulary in Modern Danish (roughly: native words plus loans from German, Latin and Greek), Word-structure Non-Stød predicts the set of very complicated morphological stød-alternations (departing from suffixes with different degrees of integration with the preceding stem), leading to three different suffix positions within the word (and a fourth, enclitic, position after it). Basbøll proposes (eg. 2005: 354-357, 2014) a general scale with five degrees of integration, and he claims that Danish has grammaticalised three of those. While Basbøll's Non-Stød Model has given a coherent account (however idiosyncratic, according to Czarnecki 2007, but cf. Liberman 2007) of the complete picture of morphologically and lexically conditioned stød-alternations, the very foundation of his proposed scales of degrees of integration of suffixes into word-structure will be challenged here (The examples below are orthographic, plus '?' for stød and ':' for vowel length.)

Basbøll derives the five-point general scale by means of three criteria:
Primary criterion 1: is the suffix added to new words?
Possible answers to 1: yes, by default; yes, but only to a subset of new words; no, it is not.
Supplementary criterion 2A: is the suffix added to a word rather than just to a(n abstract) stem?
Possible answers to 2A: yes, always; no, not always.
Supplementary criterion 2B: is the suffix signalled phonotactically as an ending?
Possible answers to 2B: yes, it is (sometimes); no, it is not (never).
   This procedure results in a total of five different possible degrees of integration of a suffix into the word-structure (integration with a stem, based upon a principle of iconicity), viz.:
   Least integration of a suffix with what precedes in the word: default ending for new words, and always added to a word (not just to a stem), Da. ex. PL -er (bi:?l-er)
   Maximal integration of a suffix with what precedes in the word: not added to new words, and not phonotactically signalled as an ending, Da. ex.: PL -e (dreng-e).
   And, furthermore, three intermediate degrees: default but not always added to a word, Da. ex. INF -e (hamstr-e); added to some new words (only), Da. ex. PL -Ø (mu:?s); not added to new words, but (sometimes) phonotactically signalled as an ending, Da. ex. PAST me:n-te.

This result depends on the exact formulation of the questions (1, 2A, 2B) and of their possible answers. The aim of this abstract is to scrutinize Basbøll's proposals of suffix integration and the resulting word-structure, to discuss alternatives to it, and to examine whether such alternatives will have consequences for the analysis of the most difficult complex words, viz. those that represent mixtures of compounding and derivation (ie. those with both more than one root and with

derivational morphemes). It will be illustrated how such complex words in Danish raise difficult questions on the morphology-phonology interaction. The relation between compounding, derivation and inflection can also be illuminated by the complex words in Danish: According to the Non-Stød Model, derivational and inflectional suffixes follow the same basic principles, but there are a number of differences with respect to possibilities for lexicalisation, the phonological content of the suffixes, and positional restrictions.

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Metonymy in word-formation
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The presentation will deal with the role of metonymy in word-formation, specifically with its role in the dynamic process of the creation of lexemes. The creation of lexemes is thus approached from an onomasiological perspective, in which processing the extra-linguistic reality in the mind of the speaker subsequently leads to a resulting morphological form. The aim of the presentation is to offer a view on the way metonymic (as well as metaphorical) conceptualisation precedes the actual morphological formation of lexemes, to show that metonymy is always instrumental in the naming process irrespective of the resulting morphological form, and to advocate the fact that the existing lexicon influences the way new concepts are mentally processed.

My conception is based on Dokulil's onomasiological theory of word-formation (1962). Dokulil, because of the time when the theory was published, does not develop the question of mental processing of the extra-linguistic reality in much detail but rather elaborates on the ways the resulting conceptualisation leads to linguistic expression. Nevertheless, the perspective of cognitive linguistics dealing with the categorisation and conceptualisation appears to be fully compatible with Dokulil's theory.

The actual process of naming can be divided into two basic parts, those of conceptualisation and linguistic coding. The process of conceptualisation is based on mental processing of the extralinguistic reality. The naming process also occurs on the background knowledge of the existing mental lexicon of the speaker, which means that the existing lexemes and constructional schemas not only provide models for the morphological forms of the coined lexemes, an approach taken by both Dokulil (1962) and Booij (2010), but may also provide models for conceptualisation of the concept named.

The naming process starts with the perception of the extra-linguistic reality. Its salient features become reflected in the concept's ICM (as defined by Lakoff, 1987, p. 147). The parts of the concept's ICM which the given concept shares with other members of an already existing category lead to the classification of the concept to the existing category (the process of categorization). Other parts of the concept's ICM which are specific for the concept within the selected category serve as a source for the actual naming. This part (or parts) of the ICM thus provides a mental access to the whole concept by the PART OF ICM FOR WHOLE ICM metonymy (see Radden & Panther 2004: 8). This initial metonymy either leads directly to the onomasiological structure (i.e., the result of conceptualization in Dokulil's approach) or leads to further conceptualization by subsequent metonymy or metaphor. The resulting onomasiological structure then serves as a basis for the actual linguistic expression by the existing linguistic means of a given language.

An example of the initial PART OF ICM FOR WHOLE ICM metonymy leading directly to the onomasiological structure can be found in terms for the concept APPLE TREE. The most salient part of the tree's ICM, its fruit, is typically chosen as the motivation for naming the tree, in other words, the fruit provides a mental access to the whole tree. The resulting morphological form then depends on the existing constructional schemas (as defined by Booij 2010) in individual languages based on the series of words with the related structural meaning, as in, for instance, the English compound *apple tree* (cf. *cherry tree, plum tree, pear tree*, etc.), the German compound *Apfelbaum* (cf. *Kirschbaum, Phlaumenbaum, Birnbaum*, etc.), the Spanish *manzano* based on the change of gender from the feminine fruit (*manzana*) to the

masculine fruit tree (cf. the pairs *ciruela – ciruelo, cereza – cerezo, aceituna – aceituno*, etc.), or the Czech suffixal derivative *jabl-oň* (cf. *třeš-eň, hruš-eň, broskv-oň*, etc.).

Further conceptualisation via metonymy may be illustrated on the example of *loudmouth* (a person who is annoying because they talk too loudly or too much in an offensive or stupid way, see OALD). The salient parts of the ICM that are used for the naming process are LOUD, TALK, and ANNOYING. It is the feature TALK that undergoes further conceptualisation via the PART OF BODY FOR ACTIVITY metonymy, more specifically MOUTH FOR TALKING. This metonymy is motivated by an existing series of lexemes denoting humans, known as bahuvrihi compounds, in which the right-hand constituent expresses a salient body part and which prototypically express a characteristic (physical) property of the entity (cf. Barcelona, 2008, p. 212), as in *bignose, redneck*, and *redhead*. When denoting humans, such terms are perceived as derogatory. In order to match the conceptualisation with the naming means of the language (i.e., with a constructional schema abstracted from a paradigmatic series of lexemes), the typical activity of the concept (talking loudly) is thus conceptualized as a (physical) characteristic property. The effect of this metonymy is that the dynamic feature TALK is conceptualized as static, MOUTH, in order to match the typical feature of bahuvrihi compounds (expressing a characteristic physical property of the concept). The choice of this constructional schema is prompted by the feature ANNOYING as it matches the derogatory nature of bahuvrihi compounds denoting humans which have a body part as the right-hand constituent.

The presentation will thus put forward the hypotheses, firstly, that metonymy is always operational in the process of naming concepts, as it provides mental access to the named entity, and secondly, that not only the choice of the morphological form but also the very conceptualisation is guided by existing constructional schemas in a language, as shown on the example of bahuvrihi compounds expressing human referents in English, or another example being the terms used for human occupations "[s]ince people are likely to conceptualize professions and occupations as involving actions and activities" (Panther & Thornburg, 2002, p. 6), following the existing constructional schema based on the series of lexemes, such as *teacher, trainer, manager, driver*, etc. However, despite such a strong tendency, we still have to be aware of the fact that this choice of the part of the ICM is but one of several.

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The prefix *anti-* in Romance languages: a diachronic and comparative analysis

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Diachronic and comparative studies concerning word-formation in Romance languages are not much developed. This partly depends on the learned nature of formative processes, while diachronic studies mainly focus on single languages or the current use (Lüdtke 2011).

My contribution aims at providing a framework of the diachronic developments of the nominal and adjectival prefix *anti-* from the 16th to the 20th century, showing its formal and semantic events in the standard Romance languages, thus trying to address the shortcomings due to the apparent scarce documentation of the lexicon formed with this prefix, as well as to stress the important role that learned languages played in the development of productivity of nominal and adjectival prefixation in modern Romance languages.

Despite many studies on the prefix *anti-* emerged in the last decades (also due to its remarkable productivity), the only diachronic information available concern two different stages: the one preceeding the 19th century, where the prefix exclusively appear in greek-derived words like IT. *antipodi*, SP. *antilogía*, FR. *antinomie*, where it is not morphologically nor semantically transparent; the other corresponding and subsequent to the 19th century, when the prefix starts to be productively employed for the coining of new words in different lexical fields and with different semantic values -the most important being "opposition" (IT. *anti-guerra*; SP. *antitabaco*, FR. *antigouvernemental*) and "prevention/cure" (It. *anti-cancro*; SP. *antidiarreico*; FR. *anti-sida*)-.

No detailed investigation has been conducted on previous centuries and, as a result, no empirical data showing the origin of the current use of the prefix *anti-* have been traced and compared yet.

My contribution aims at showing that the the prefix *anti-* is already found in French starting from the 16th century, in words translated from Modern Ecclesiastic Latin (some of these are *antichristianicus, antilutheranus, antiphilosophiae, anticapucinicus, antibarbarus, antibellarminianus, antitriniarius*).

These and other words represented an analogical model and initially promoted the formation of new indigenous (French) words in the field of religion (*anticatholique*) and politics (*antipolitique, antimonarchique, antidémocratique*) in the 17th century. The formative pattern *anti-* + agg+ *-ique* common to these indigenous words is then applied for the formation of medical lexicon in French, where it acquires a new semantic value for the first time (the first words attested are *antiscorbutique, antipéristaltique* in the last 17th century).

The same words (both the latin and the French ones) are, in turn, attested in the following centuries (17th, 18th and 19th) also in Italian, Spanish and Portuguese, where they enabled the re-analysis and the consecutive independent use of the prefix *anti-* with each language's native bases.

In the 18th century, the continuing diffusion of Neolatin words, together with the diffusion of English loanwords and native formation prefixed with *anti-*, contributes to a ever greater expansion of the prefix, which culminates, in the 19th and 20th century, in the identification of the prefix in the common language, mainly thanks to the role that the press and the mass-media played in this period.

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Assessing affix polyfunctionality and lexeme ambiguity through BERT-derived representations

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Derivational affixes frequently show a many-to-many relation between form and meaning. A single affix may express multiple meanings, then manifesting polyfunctionality (e.g. in English, *-er* can be used to form nouns denoting agents, instruments, experiencers, patients, stimuli, locations, etc.), whereas one meaning can be expressed by multiple affixes, then causing morphological competition (e.g. *-er*, *-ant*, *-an, -ist* can all be used to form agent nouns in English according to Lieber 2016). In this study, we focus on the polyfunctionality-side of the coin, investigating its gradient nature and assessing a corpus-based quantitative measure of polyfunctionality.

Affix polyfunctionality is a continuous property that varies along three dimensions: (i) the number of semantic functions associated with an affix; (ii) the frequency with which these functions are realized in types and tokens of the affix derivatives; (iii) the distribution of functions among affix derivatives in relation to lexical ambiguity. It can be quantitatively assessed using word meaning representations from distributional semantic models (DSMs), which (Miller and Charles 1991; Lenci 2018; Boleda 2020) are based on the assumption that words with similar linguistic distribution have similar meanings, i.e. that semantically related words are used in similar contexts (Harris 1954). These models thus represent the meaning of a word as a function of its context in large corpora.

Our study relies on BERT (Devlin et al 2018), a recent vector model that generates a representation for each occurrence of a word in context, rather than a unified embedding for each word (see e.g., count models, word2vec, GloVe). It offers the possibility to represent the different meanings of tokens and to use them as a base for computation.

Using these contextualized representations, we test a corpus-based measure called SelfSim, previously used with success in the evaluation of polysemy (Garí Soler and Apidianaki 2021). SelfSim computes the cosine similarity between each pair of occurrences of a class, then takes the average of these pairwise similarities as a self-similarity score. We compute this measure by considering both lexemes and affixes. We expect this value to be inversely correlated with polyfunctionality and ambiguity: higher values will be associated with lexemes and affixes with fewer functions; lower values with more polyfunctional affixes and ambiguous lexemes. We operationalize lexeme ambiguity as the number of semantic functions observed in our manually annotated sample (Varvara et al. 2022). Semantic functions are defined using two classifications (Salvadori et al. 2021): ontological types, which depend on the nature of the referent, and relational types, which depend on the relation with the morphological base. Both typologies allow for different levels of granularity: fine, medium, and coarse. Suffix polyfunctionality corresponds to the number of different functions associated with a suffix. For this study, we consider a sample of 6 French deverbal suffixes (*-oir, -ure, -is, -ment, -aire, -ade*), selecting 15 nouns per suffix and extracting 50 occurrences for each noun from the French web corpus FrCOW16A (Schäfer and Bildhauer 2012; Schäfer 2015). For each token, we extract a vector representation using the FlauBert base uncased model (Le et al. 2019). We then compute a self-similarity value for each lexeme and for each suffix.

Our results show that the relation between the level of ambiguity and the SelfSim value of a lexeme is suffix-specific. A linear regression model fitted with the number of coarse functions as response, and SelfSim values and the suffix type as predictors (F=3.689, df_1=11, df_2=78, p-value < 0.001) reveals that our hypothesis is supported in the case of *-ure* and *-ment*: for every 1-unit increase in the number of functions, the selfsim value decreases by 6.81 and 8.36, respectively. The same is not observed for *-oir, -aire, -is,* and *-ade*. At the suffix level, we observe a negative correlation between the number of different coarse ontological types and the SelfSim measure (kendall τ = -0.775, z = -2.029, p-value = 0.021). As expected, more polyfunctional suffixes show lower selfsim values.

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Sequential derivation in Catalan Sign Language (LSC): Agentive, qualitative and sense affixes

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MOTIVATION: Affixes in sign languages (SL) can be attached to a base in two different ways. On the one hand, they can be attached simultaneously, that is, by adding or modifying phonological features. On the other, they can be attached sequentially, by adding the affix directly after or before the base. It has been demonstrated that simultaneous derivation is more productive than sequential derivation in SL (Ribera-Llonc 2015). Sequential derivation comprises infrequent cases, namely pointing signs, for Al-Sayyid Bedouin Sign Language (ABSL), sense prefixes, for Israeli Sign Language (ISL), the agentive affix, for American Sign Language (ASL), and the negative suffix, for ASL and ISL (Meir 2012, Aronoff *et al.* 2008, Aronoff *et al.* 2005 and Meir 2004). Note that, to date, sequential affixes are rarely found across SLs and are described as very rare and of limited productivity (Meir *et al.* 2010).

There has also been a historical tendency in SL research to group sequential signs within the morphological process of compounding (Göksel and Pfau 2017). In this sense, the boundaries of derivation and compounding is still noticeable in SL and Spoken Languages (SpL) research. For example, there is an ongoing discussion with the Mandarin Chinese morpheme 人 *rén* 'person', which can be analyzed as a sequential affix or as the unit of a compound (Arcodia 2012). Indeed, some authors suggested that SL affixes proposed by previous studies should be reviewed as possible cases of compounding (Göksel and Pfau 2017).

In our Catalan Sign Language (LSC) database, we have detected several signs, namely the signs PERSON, NATURE and the pointing sign that behave as sequential affixes. We aim to describe sequential derivation in LSC, distinguishing this process from compounding.

DATA AND METHODOLOGY: The data for this research is a corpus of signs manually collected. The total amount of signs is 450, from which 261 were extracted in context and 189 were isolated signs from lexicographic sources without context. On the one hand, the signs in context are collected from several LSC videos of natural discourse or formal speech. The videos are performed by signers and have a great dissemination among the Catalan Deaf community. There are news recordings, conferences, the LSC Reference Corpus and teaching materials of Sign Language, linguistics, and interpreting. On the other hand, the signs without context are collected from general or specialized dictionaries and glossaries.

PROPOSAL: According to our observation, we found that the signs PERSON, NATURE and the pointing sign work as affixes when attached to certain words. The sequential structure of the complex word differs from compounding due to its productivity, usage, and the change of the grammar category. We detected three different types of affixes, namely an agentive affix, PERSON, a qualitative affix, NATURE, and sense affixes, featured by the pointing sign.

First, PERSON (Fig. 1) is used attached to words related to a work position. In those cases, both signs are used to denominate the job of someone, as an agentive prefix (like the agentive *-er* in English), such as PERSON_{AGENTIVE}+FOOTBALL 'football player' (Fig. 2), PERSON_{AGENTIVE}+COOK 'cook' and PERSON_{AGENTIVE}+MUSIC 'musician'.
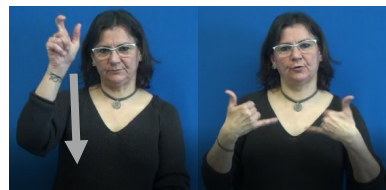

Fig. 1. Affix PERSON (LSC)   Fig. 2. Affixed sign PERSON_{AGENTIVE}+FOOTBALL 'football player'

Second, for NATURE (Fig. 3), we noticed that this sign has two different significances. On the one hand, it tends to be attached before qualifying signs, such as NATURE_{QUALITATIVE}+HAPPY, NATURE_{QUALITATIVE}+DRAMA and NATURE_{QUALITATIVE}+NERVOUS. It behaves as a prefix that constitute a qualifying sign or an adjective, like the suffix *-ish* in English. On the other hand, NATURE_{QUALITATIVE} is also used before names that designate a country. It may work as a morpheme for indicating precedence. It creates the word that refers to the natives or inhabitants of a particular place, for instance, NATURE_{QUALITATIVE}+CATALONIA 'Catalan' (Fig. 4) and NATURE_{QUALITATIVE}+ITALY 'Italian'.
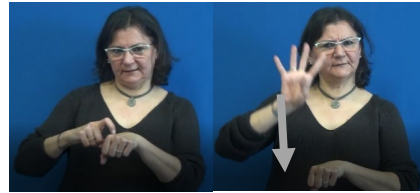

Fig. 3. Affix NATURE (LSC)

Fig. 4. Affixed sign NATURE_{QUALITATIVE}+CATALONIA 'Catalan' (LSC)

Third, the pointing sign is also used in LSC similarly to the sense prefixes of ISL (Meir 2012 and Aronoff *et al*. 2005). We observed that it refers to the sense organs —eyes, nose, ears, and mouth— as well as the mind —the head—. The pointing sign (IX) is always used followed by a base. For example, IX_{EYE}+CATCH 'diagnosis' (Fig. 5), IX_{NOSE}+ATMOSPHERE 'suspect' and IX_{HEAD}+NORMAL 'naive'.

Fig. 5. Affixed sign IX_{EYE}+CATCH 'diagnosis' (LSC)

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