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Deverbal nouns, lexicalization and syntactic change

Øivin Andersen

Deverbal nouns are often referred to as hybrids, containing both verbal and nominal features. In many languages deverbal nouns tend to develop into what Vendler (1967) called perfect nouns. Various stages of this development in Norwegian are proposed, drawing on Grammaticalization Theory and Lexicalization Theory. Frequency data are provided from a large newspaper corpus. The deverbal nouns are analyzed as going through a process of lexicalization where reduction in compositionality, reduced token frequency and increased idiosyncrasy are central elements. This process is triggered by relevance to the root, language use, isomorphism and the maximal difference principle. The article shows that Norwegian deverbal nouns are in a state of flux and that even different members of the same morphological type may behave quite differently syntactically and semantically.

Keywords argument structure, deverbal nouns, diachronic change, grammaticalization, lexicalization

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1. INTRODUCTION

In this paper I will discuss the mechanisms involved in deverbal nominalization in Norwegian in a diachronic perspective. Similar types of mechanisms have been discussed both in a formal generative theoretical framework (van Kemenade & Vincent (1997) and in a cognitive functional framework (Kellermann & Morrissey 1992). In the latter type of theories much research has been carried out within Grammaticalization Theory (Hopper & Traugott 2003). Grammaticalization is an important part of the study of language change that is concerned with such questions as how lexical items and constructions in a specific set of linguistic contexts come to serve grammatical functions or how grammatical functions can take on new grammatical functions. However, the opposite process of grammaticalization, most frequently referred to as degrammaticalization (Norde 2002, Ziegeler 2003) has been given little attention until fairly recently. A reason for this is that grammaticalization as a diachronic process has been viewed as a unidirectional phenomenon, i.e. an irreversible process (Haspelmath 1999, Brinton & Traugott 2005:99ff.). Quite

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recently, however, degrammaticalization has been put into a more comprehensive research area of diachronic linguistics called lexicalization (Lehmann 2002).

In Brinton & Traugott (2005) the process of lexicalization is seen in the light of contemporary work on grammaticalization. Brinton & Traugott's model (inspired by Jackendoff 2002), illustrating the relationship between lexicon and grammar, allows for different types of constructions, gradience and degrees of productivity. The model also implies that different levels such as phonology, morphology, syntax and conceptual structures are closely linked. Gradience exists among lexical items (single word or multi-word constructions) that subcategorize syntactically more or less strictly for constituents and for constructions. Lexicon is given a wide definition, comprising all types of linguistic chunks or structures which involve storage in long-term memory (what they call 'the inventory') and thus have to be learned. Combinations of the type described as productive word formation are seen as operating outside of the lexicon. Crucially, as a productive synchronic phenomenon, word formation is seen as preceding, and being independent of lexicalization. Thus, lexicalization may (but does not necessarily) result in semi-productive forms, such as restricted derivational morphemes, while grammaticalization may (but does not necessarily) result in forms that serve as default affixes such as inflections. Brinton & Traugott's definition of lexicalization is as follows:

> Lexicalization is the change whereby in certain linguistic contexts speakers use a syntactic construction or word formation as a new contentful form with formal and semantic properties that are not completely derivable from the constituents of the construction or the word formation pattern. Over time there may be further loss of internal constituency and the item may become more lexical. (Brinton & Traugott 2005:96).

This definition has several implications. Firstly, it implies that lexicalization, although being a continuous diachronic process, is going through certain definable stages, or lexicalization paths (often referred to as 'clines'). Secondly, it implies that compositional syntactic constructions loose compositionality in the process. Thirdly, it implies that the internal constituent structure of the constructions become more idiosyncratic, i.e. semantically less transparent. This is also the basic view of Lehmann (1995 [1982]). He interprets lexicalization as a change from a regular, analytic structure to an idiosyncratic holistic structure (Lehmann 1995 [1982]:2f.). Fourthly, the definition implies that there is a continuum leading from the grammar to the lexicon. This also means that members of minor word classes such as adpositions may have both lexical and grammatical members (Lehmann (1995 [1982]:1). In particular, as I will illustrate, the Norwegian preposition *av* 'of' can function both as a lexical preposition with lexical meaning, and as a grammatical formative with pure relational meaning.

Polysemy plays an important role in both lexicalization and Grammaticalization Theory (cf. Hopper & Traugott 2003:77ff.). In generative lexical semantics, polysemy

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is shown to have quite far-reaching consequences. Specific core sets of word senses are seen as having great internal structure and are used to generate larger sets of word senses when individual lexical items are combined with others in phrases and clauses. This organization is called the generative lexicon (Pustejovsky 1998:2). Following Weinreich (1964), Pustejovsky makes a distinction between contrastive ambiguity (usually referred to as homonymy) and complementary polysemy. The latter type is category-preserving. Logical polysemy is defined as a systematic type of complementary polysemy where there is no change in lexical category, and the multiple senses of the word have overlapping, dependent and shared meanings (Pustejovsky 1998:28). These systematically related meanings tend to include large sets of nouns. A typical example is the figure/ground reversals discussed in Pustejovsky (1998:31f.). In Pustejovsky & Buguraev (1996) the analysis of logical polysemy is seen as a compositional process. The process/result polysemy of deverbal nouns focused on in this article is an example of the same type of polysemy.

An important generative mechanism operating in logical polysemy is co-composition (Pustejovsky 1998:122f.). Co-composition is a structure which allows more than one function application. In a deverbal noun with a dependent in the form of a postposed prepositional phrase, the dependent will carry information which acts on a verb or a corresponding deverbal noun in the sense that the verb or noun may shift its event type:[1]

(1) kjøre til hotellet for å dusje og spise **kveldsmat**
drive to the hotel for INF *shower and eat supper* DB060205

(2) Norges anbefaling om hva folk kan spise
Norway's recommendation about what people can eat
av norsk laks er ikke gal
of Norwegian salmon is not wrong DB060117

(3) som får musa til å **spise på alt mulig**
which causes the mouse to INF *eat on all possible (things)* FV051111

The participant *kveldsmat* in (1) shifts the event type of the verb *spise* from an activity to an accomplishment (in the sense of Vendler 1967:97ff.). The participants *av norsk laks* in (2) and *på alt mulig* in (3) both serve to focus the atelic aspect of the activity.

But the nominalizations of (1) and (2) will both have the same surface structure, *spising av* + NP:

(4) spis-ing av kveldsmat
*eat-*NMLZ *of supper*

(5) spis-ing av norsk laks
*eat-*NMLZ *of Norwegian salmon*

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(6) spis-ing på alt mulig
eat-NMLZ on all possible (*things*)

In (4), corresponding to (1), is a compositional semantic structure because the preposition *av* 'of' does not contribute to the semantic composition of the nominal and the dependent. Here, the preposition *av* is a grammatical preposition with relational meaning, i.e. a case marker coding that the direct object of the verb has been transferred and coded grammatically in the corresponding nominal. It has been inserted during the process of nominalization. In (5), in its interpretation corresponding to (2), however, the preposition *av* is a lexical preposition which has its own lexical contribution to make to the composition of the nominal and the dependent. This preposition has not been inserted in the nominalization process. In (6), the preposition *på*, introducing the participant *på alt mulig*, has a function similar to *av* – that of a lexical preposition.

One of the most discussed types of logical polysemy in deverbal nominals is the distinction between process and result meaning (Hopper & Thompson 1985, Grimshaw 1990, Koptjevskaja-Tamm 1993, Alexiadou 2001 and, with reference to Norwegian, Vinje 1973, Lødrup 1989, Kinn 1994, Faarlund, Lie & Vannebo 1997, Sakshaug 1999). To illustrate, consider *tegn-ing* 'drawing', which has process meaning in (7) and result meaning in (8).

(7) når vi får **tegn-ing** **av** kjøkkenrommet som viser vannuttak
when we get draw-NMLZ of kitchen room which shows water outlets
AA060201

(8) tegningene som nå fordømmes, er en **tegn-ing** **av** profeten
the drawings which now are condemned is a draw-NMLZ of the prophet
med en bombe i turbanen
with a bomb in the turban AP060203

(7) is ambiguous without further context, but the intended meaning is to refer to a future action of drawing which will include water outlets. The naked form of the deverbal noun points in the direction of process meaning (as will be shown in section 6).

One of the basic concepts of Grammaticalization Theory is reanalysis. Langacker defined reanalysis as 'change in the structure of an expression or class of expressions that does not involve any immediate or intrinsic modification of its surface manifestation' (Langacker 1977:58). But reanalysis involves a change in constituency, hierarchical structure, category labels, grammatical relations and reassignment of morphemes to different semantic-syntactic category labels. However, reanalysis is not restricted to grammaticalization, but is also central in lexicalization. When a grammatical way of coding a structure becomes less grammatical and comes to be reinterpreted, the frequency of the grammatical marking will decrease. In the

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Semantic selection	*Participants*		*Non-participants*	
Syntactic subcategorization	complements		non-complements	
	arguments: grammatical coding	non-arguments: lexical coding	adjuncts: lexical coding	modifiers: lexical coding
Level	S and N′	N′	S	N′

Table 1. Types of postnominal prepositional phrase dependents.

case of the deverbal nouns in Norwegian, the preposition of the postposed participant dependent of the deverbal noun is coded lexically (by the preposition *på*) and not grammatically (by the preposition *av*) in several cases. This coding is seen as a process of degrammaticalization paralleling the change of the deverbal noun from an imperfect noun to a perfect noun (in the sense of Vendler 1967:131).

2. USE OF GRAMMATICAL TERMS

Before proceeding further I would like to clarify some basic grammatical terms. Grammatical terms applied in the description of deverbal nouns are not always mean the same. This lack of consistency may sometimes be confusing. My use of these terms is based on various works from different frameworks, such as Grimshaw (1990), Alsina (1996), Manning & Sag (1998) and Wechsler (1997).

As Table 1 illustrates, deverbal nouns may have two types of postnominal prepositional phrase dependents. On the semantic level, these are known as participants and non-participants. Participants are selected by the meaning of the head noun or the main verb, whereas non-participants are outside the selectional frame of the head noun or the main verb. On the syntactic level these correspond to the distinction between complements and non-complements. Complements are subject to the subcategorization restrictions of the head noun or the main verb, whereas non-complements are not subcategorized by the head noun or the main verb.

I distinguish between two types of complements: arguments and non-arguments. Arguments are those complements which grammatically code (or license) functional elements as direct objects both on S level (i.e. sentence level) in the case of main verbs, e.g. *Læreren løste* ***problemet*** *i klasserommet* 'The teacher solved the problem in the classroom') and on N-bar level in the case of nouns, using the grammatical preposition *av* 'of', e.g. *Lærerens løsning* ***av problemet*** *tok lang tid* 'The teacher's solving of the problem took a long time' (using standard notation and concepts from X-bar Theory; Jackendoff 1977).

Within the N-bar nouns, there is a further distinction between those which code participants as arguments (i.e. *Lærerens løsning av problemet tok lang tid*), using

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grammatical coding (the preposition *av* 'of') and those which code participants as non-arguments (using a lexical preposition), e.g. *Lærerens løsning* ***på problemet*** *lå på bordet* 'The teacher's solution to the problem was on the table'). Inside the group of non-participants, I distinguish between adjuncts, which are sentence constituents on S level, e.g. *servere i restauranten* 'serve in the restaurant', and modifiers, which are subordinated constituents of a nominal phrase, e.g. *servering i restauranten* 'serving in the restaurant'.

3. NOMINALIZATION

Nominalization has been discussed by many authors. In this paper I draw on typological researchers such as Anderson (1985), Comrie & Thompson (1985), Grimshaw 1990, Koptjevskaja-Tamm (1993) and Alexiadou (2001). I also draw on the classic work of Vendler (1967) for aspect classes of deverbal nouns. In the area of pragmatics and text linguistics authors such as Halliday & Martin (1993), Cowie (2000) and Banks (2004) have described the historical development of deverbal nouns in scientific technical texts in English. For Norwegian, Lødrup (1989) has provided an analysis of non-verbal dependents, including deverbal noun dependents within Lexical-Functional Grammar (LFG). Sakshaug (1999) has given an autolexical analysis of Norwegian compound deverbal nouns and Vinje (1973) has provided numerous interesting and relevant data on deverbal nouns.

However, as these treatments of deverbal nouns in Norwegian have shown, the whole system of deverbal noun types is in a state of flux (cf. Alhaug 1971, Lødrup 1989, Kinn 1994, Faarlund et al. 1997, Sakshaug 1999). The Norwegian system of deverbal nouns is similar to the English system of action nouns. As Anderson (1985) points out for English, there are several formally distinct suffixes (including zero) which share the same or very similar functions in the same domain (i.e. the process of forming nouns corresponding to verbs). In the case of the Norwegian system, these processes partly apply to complementary forms and partly overlap, sometimes with a detectable difference in morphosyntactic and semantic properties, and sometimes without such a difference.

Very many Norwegian verbs have corresponding nominals in *-ing* (e.g. *bygge–bygg-ing,* 'build-building', *tegne–tegn-ing* 'draw–drawing'), but not all do; for example, in the case of *begynne* 'begin', there is no corresponding form **begynn-ing* 'beginning'. Instead, we use another domain-sharing suffix, *-else*: *begynn-else*. This does indeed constitute a limitation on the process of adding *-ing* but not a limitation of the possibility of forming nouns from verbs in general because, for those forms to which *-ing* cannot be added, some other nominalization process is available. In the case of *driv-e* 'run, produce', the corresponding form is *drif-t* 'running, production'.

Some of the other nominalization formations are more or less isolated (like *drift*), but together they provide a deverbal nominal for virtually every verb in the language.

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Thus, although the productivity of the individual suffixes is limited, the coverage of the domain of deverbal noun formation itself is almost complete in Norwegian (for exceptions, see Lødrup 1989:129ff.). This principle of blocking (Malchukov 2004:59f.) as associated with *begynn-else* vs. **begynn-ing*) is active in the sense that the absence of the form **begynn-ing* can be explained by the fact that an alternative form, like *begynn-else*, fulfills the same function.

It is a well-established fact that words tend to develop specialized, idiosyncratic meanings in addition to the regular and productive process and result meaning, the logical polysemy (in the sense of Pustejowsky 1998) which seems to run through the deverbal nominal system not only in Norwegian, English and Greek, but in most similar systems in the languages of the world (cf Comrie & Thompson 1985, Grimshaw 1990, Koptjevskaja-Tamm 1993, Alexiadou 2001). As we shall demonstrate, idiosyncratic meaning formation seems to be an important factor in the changes affecting the Norwegian nominals.

3.1 Morphological types

The Norwegian reference grammar distinguishes between derivations with suffixes and those without a suffix, called conversion (Faarlund et al. 1997:97ff., 124ff.). I will refer to the latter type as zero suffix nouns. In Norwegian bokmål (Danish–Norwegian) the most important suffixes are *-(n)ing* and *-else*. The former is very productive at both the type and the token levels, and may be added to most verb stems, e.g. *bake–bak-in*g 'bake–baking', '*bade–bad-ing*' 'bathe–bathing'. The latter suffix is restricted to bokmål and is not productive on type level. But the lexical members of the *-else* type are quite common words in Norwegian and may have a high token frequency. In the Norwegian newspaper corpus (containing at present about 430 million words, see section 5 below) *utdann-ing* 'education' has a token frequency of 15 442 and *utdann-else* 'education' has 9 826. Both types may in many cases have the process/result polysemy. In some cases, the same stem may have both suffixes, sometimes resulting in lexical differentiation, like *vekk-ing* 'the process of waking someone' vs. *vekk-else* 'the process of waking someone in a religious sense'. In other cases the *-ing* suffix is used to code the process meaning and the *-else* suffix is used to code the result meaning, like *hev-ing* 'the process of swelling' vs. *hev-else* 'the result of swelling'.

The suffix *-sjon* is also fairly productive, but is restricted to Latin loan words ending in *-ere*, like *emigrere–emigra-sjon* 'emigrate–emigration'.

Many deverbal nouns in Norwegian correspond to verbs without having a nominal suffix. Typical examples are *besøke–besøk* 'visit', *bruke–bruk* 'use'. As with *-ing* and *-else*, there is a lexical differentiation between the *-ing* variant and the zero suffix variant. Sometimes there is an aspectual distinction between imperfective, as in *spark-ing* 'the process of kicking' and perfective/semelfactive *spark* 'the kick'.

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Morphological type	*Number of occurences*
-(n)ing	88
[zero suffix]	31
-sjon	16
-asje	5
infinitive	4
-anse	2
-sel	2
-skap	1
-t	1
-else	4
Total	154

Table 2. Occurrences of morphological types (lexemes per type).

The suffix *-sel* is, like *-else*, unproductive on type level, but is associated with some words with high token-frequency, such as *fødsel* 'birth' and *ferdsel* 'traffic'. Another unproductive suffix is *-t*, as in *drive–drift* 'run' (as in 'run a business') – 'running', *kløve–kløft* 'cleave–cleavage'. There are a few other low or unproductive suffixes: *-asje*, as in *lekke–lekk-asje* 'leak–leakage', *-anse*, as in *levere–lever-anse* 'deliver–deliverance', and *-skap*, as *in kunne–kunn-skap* 'know–knowledge'.

Frequency data on type level (i.e. number of lexical items per suffix) from the technical manual *Dampsystemet* [Steam generation and distribution system] presented in Table 2 (for further details, see section 5, below) shows that *-ing* and zero suffix nouns are not only the most frequent types but also the most productive types in Norwegian.

Iconicity is one of the basic motivational factors in language in functional linguistics (Haiman 1985). The intuition behind iconicity is that the structure of language reflects in some way the structure of experience, i.e. the structure of the world including the perspective imposed on the world by the language user. Thus, language structure and experience structure are seen to match at a morphosyntactic level. The most common subtype of iconicity is isomorphism, the encoding principle that one meaning tends to correspond to one form. So iconicity motivates symmetry in grammatical expressions. As I will demonstrate, the diachronic path leading from imperfect to perfect nouns parallels the path leading from 'more verbal' to 'less verbal'.

Hopper & Thompson (1985) discuss the difference between the parts of speech noun and verb in terms of a prototypical approach inherited from the works of Rosch in cognitive psychology. Based on numerous experiments, Rosch and Lloyd (1978) concluded that human categorization is not arbitrary. The central Aristotelian notion that membership of a category is a discrete matter and that all members or instances of a category have the same membership status was rejected. Categorization proceeds from central to peripheral instances of the category with central instances as prototypical instances. Prototypical instances are more salient for speakers and

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are acquired earlier by children than non-prototypical features. Prototype analysis of grammatical terms such as 'cardinal' transitivity was discussed by Lakoff (1977) and Hopper & Thompson (1985). A prototypical verb denotes a concrete, kinetic, visibly effective action, carried out by and involving participants. A prototypical noun denotes a visible (tangible) object. As Rosch points out, two different prototypes tend to differ maximally from one another:

To increase the distinctiveness and flexibility of categories, categories tend to become defined in terms of prototypes or prototypical instances that contain the attributes most representative of items inside and least representative of items outside the category. (Rosch & Lloyd 1978:30)

This definition forms the point of departure for Hopper & Thompson's iconic theory of linguistic categoriality. Categoriality is seen as a gradient property. Thus, a high categorial verb is a prototypical verb and a high categorial noun is a prototypical noun. Further, a prototypical noun will be maximally distinct from a prototypical verb. This means that although the categories verb and noun are seen as discrete entities, the internal structure of the respective categories has gradience properties. Prototype effects from both the prototypical verb and the prototypical noun are seen as central in this context.

3.2 Event structure

Events are typically conceptualized as having internal structure (called complex events by Grimshaw 1990:25ff.). This means that a typical event like 'build a house' consists of several interrelated sub-events, such as constructing a foundation, erecting walls and roofs, using different machines and tools, etc. Events with internal structure are typically described by verbs. Typical entities (prototypically denoted by nouns) have no internal structure but complex events denoted by nouns will typically be seen as entities/objects which may be referred to. According to Lakoff & Johnson (1980: 25ff.), we often use objectification to structure our understanding of experience:

> Understanding our experiences in terms of objects and substances allows us to pick out parts of our experience and treat them as discrete entities or substances of a uniform kind. Once we can identify our experiences as entities or substances, we can refer to them, categorize them, group them, and quantify them and by this means, reason about them.

This event reference function must be carried out by nouns because verbs cannot refer to events.

As Lakoff & Johnson (1980:30f.) have pointed out, when experienced phenomena are continuous and unbounded, we seem to allocate discrete and bounded properties to them in order to understand them better and thus be able to manipulate them linguistically. Thus, actions are often conceptualized as objects, activities as substances and states as containers. Similarly, as we shall see, process-denoting

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deverbal nouns (including those referring to actions and activities) may be seen as denoting objects or as substances on the one hand, or as resulting states conceptualized as containers on the other hand.

Jackendoff (1992) makes a distinction in English between count nouns like *a banana*, *a car* (denoting individuals), collective nouns like *government* and *committee* (denoting groups), mass nouns like *water* and *oxygen* (denoting substances) and plural nouns like *bananas* and *cars* (denoting aggregates). From a denotational point of view, deverbal nouns denoting a process seem to be closest to the collective nouns like *committee* or *government*. Collective nouns are bounded entities with internal structure (unlike substances which are unbounded and lack internal structure). General events (or committies) may be DECOMPOSED, but not CUT UP or SLICED into smaller events (or subcommitties). When you decompose something it implies that you analyse the internal structure of what is seen as different, DISSIMILAR parts of the whole. If you cut up something this internal analysis is not implied. What you get when slicing something are elements which are seen as SIMILAR parts of the whole.

So a complex event (in the sense of Grimshaw 1990:25ff.) like *hus+bygg-ing* 'house building' can be decomposed into a definite number of participants in the event and thus be bounded. Further, these participants will have a definable structure, and the denotation of the noun will have an internal structure. But one cannot cut the event up into similar subevents, like elements in sets (as with aggregates). So both group-denoting collective nouns and complex-event-denoting process nouns have internal decomposable structure.

Collectives can be pluralized when seen as objects (like *committees*), but its internal structure cannot be cut up and quantified (i.e. the individual committee). Complex-event denoting process nouns may also be pluralized, but only when they are viewed 'from the outside' as holistic containers. If the internal structure is focused on, pluralization is not possible. Thus, nouns with event process meaning and with internal focus are closer to verbs, and those with external focus are closer to nouns. Mass nouns like *vann* 'water' will typically have no potential for the singular/plural distinction, and will have greater distance from perfect nouns such as *stein-er* 'stone.PL' and *stol-er* 'chair.PL'. Instead, they will share a property of the imperfect nouns. Likewise, nouns lacking specific reference will be like imperfect nouns (i.e. have lower noun categoriality than nouns having this property). Dynamic verbs have higher verb categoriality than static verbs, etc.

4. STAGES

The process of nominalization has been described as a process of decategorization (Malchukov 2004:9). Several researchers have listed various operations involved in the process (Lehmann 1988, Givón 1990, Croft 1991, Dik 1997). Givón, for example, mentions that when verbs acquire nominal form, verbal agreement, tense, aspect and mode marking are either absent or severely restricted, case marking of the subject

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and object is modified most commonly to the genitive, and various determiners may be added modifying the deverbal noun, among others. A crucial question is whether there is any ordering of features acquired and lost in nominalization; see the typological literature for some proposals (Comrie & Thompson 1985, Noonan 1985, Lehmann 1988, Mackenzie 1987, Croft 1991, Koptjevskaja-Tamm 1993, Dik 1997). Some studies (like Comrie & Thompson 1985) involve frequency considerations. In particular, aspect and voice may be retained in nominalization, tense rarely so, and mood and verbal agreement virtually never. Lehmann's Desententialization Scale of decategorization (Lehmann 1988, cited in Marchukov 2004:11) is quite elaborate (> represents a 'prior to' relation):

(a) Constraints on/loss of illocutionary elements > constraints on/loss of mood/modal elements > constraints on/loss of tense and aspect > dispensability of complements loss of personal conjugation/conversion of subject into oblique > no polarity > conversion of verbal into nominal government > dispensability of subject/constraints on complements
(b) Combinability with adposition/case affix

Loss of sentential properties on the part of the verb and the increasing nominality endow it with distributional properties of a noun, such as combinability with adpositions or case affixes. As Mackenzie (1987) has pointed out, nominalization involves valency reduction. This is also an important point in the development of the Norwegian deverbal nouns.

Some other suggestions could have been mentioned, but the problem is that they are to some extent incompatible, i.e. contradict each other on some points. However, Bybee's ordering hierarchy is mentioned in many contexts in the typological literature (Bybee 1985). Her ordering is based on the iconic principle of the semantic relevance of a given category to the verb stem, i.e. the extent to which the meaning of a verbal category or property directly affects or modifies the meaning of the stem. Verbal properties like valence and aspect are argued to be more relevant than tense and agreement. Bybee also points out that there is a correlation between the frequency of co-occurrence with which two or more words appear together in syntax on the one hand, and their semantic appropriateness for reanalysis on the other hand. This correlation reflects the degree of their mutual relevance.

It is important to note that stages are not seen as mutually exclusive time periods. In a comprehensive process like deverbal nominalization, involving several different morphological types, different types will represent different stages. Even lexical members of the same morphological type may represent different stages.

5. METHOD AND DATA

In most cases productivity, frequency and compositionality are closely correlated phenomena. In Grammaticalization Theory it has long been recognized that frequency

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data are important in showing the unidirectionality of how lexical forms move into grammatical roles. Two basic types of frequency are distinguished: type frequency and token frequency. Type frequency refers to the number of items that are available to a particular class of forms (Hopper & Traugott 2003:124ff.). For instance, the number of lexical items taking the deverbal nominal suffix *-ing* is very high (comprising most verbs in Norwegian), whereas the number of lexical items taking the deverbal nominal suffix *–t* is much is much lower.

But, as Hopper & Traugott (2003:125) have pointed out, most attention has been paid to token frequency, i.e. the number of times a particular form occurs in texts or the changes in frequency of forms or constructions over time. These frequency data are very characteristic of the grammaticalization of grammatical forms. Changes such as semantic fading, phonological reduction, positional fixing, increasing compositionality and erasure of word boundaries, are inseparable from the absolute frequency of the forms and the frequency with which they occur with other forms. In the opposite process, lexicalization, factors such as semantic enrichment and reduction of compositionality will be assumed to have a close connection to token frequency.

But the type frequency of the different morphological types is also an important indication of the status of the deverbal noun. Nouns with high type frequency, such as the *-ing* nominals in Norwegian, tend to retain many of their verbal characteristics (such as process meaning and grammatical argument structure), whereas nouns with low type frequency tend to take on noun characteristics (such as result meaning, loss of grammatically coded argument structure and development of specific reference and use with determiners).

Data on type frequency are very difficult to extract automatically from an electronic corpus. This is especially the case for zero suffix nouns and some low frequency types such as *-t* in Norwegian. In order to obtain some data on type level I have looked at different types of word formation in Norwegian technical writing. I have gathered my data from one of the system manuals from the Gullfaks A-platform system *Dampsystemet*, an instruction manual for Norwegian technical personnel at the platform. The manual is about 200 pages and 154 different types of deverbal nouns were found. The type frequency is given in Table 2 above.

As for token frequency, I have used the comprehensive Norwegian Newspaper Corpus, a monitor corpus administered by Knut Hofland at the Axis Centre, University of Bergen. The size of this corpus is at present about 430 million token words. The corpus allows automatic extraction of absolute token frequency and relative frequency per 100 million words. Most of the examples in this article are drawn from this corpus.

6. THE LEXICALIZATION PATH OF DEVERBAL NOUNS

The diachronic change which the Norwegian deverbal nouns are undergoing is described as a process of lexicalization because the change involves typical

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Non-lexical/less lexical	*More lexical*
transparent	holistic
regular	irregular
full inner structure	reduced inner structure
predictable	unpredictable
compositional	idiosyncratic

Table 3. Factors in the nominalization path, based on Hopper & Thompson 1985, Lehmann 2002, Malchukov 2004 and Brinton & Traugott 2005.

lexicalization processes such as reduction of transparency, reduction of compositionality, reduction of regularity, reduction and loss of inner structure, and loss of predictability. These factors are represented in Table 3. They are all seen as continua rather than discrete dichotomies.

Vendler (1967) makes a distinction between imperfect nouns and perfect nouns. An imperfect noun is a noun with a 'live and kicking' verb inside itself, whereas a 'perfect' noun lacks this inner verb. Thus, deverbal nouns are hybrid forms with properties from both parts of speech. The proposed nominalization path starts with imperfect nouns in the direction of perfect nouns. Each stage has one or more TRIGGERS, i.e. the factors causing the stage, and EFFECTS, observable results of the change. I distinguish five types of triggers: relevance to the root, reanalysis, language use, isomorphism and the Maximal Difference Principle of Prototype Theory. Several types of effects of the change are discussed: prototype effects, loss of regularity, reduction in compositionality, increased semantic and morphological idiosyncrasy, reduced frequency, valency reduction, use of determiners and pluralization.

6.1 Stage 1: Establishment of process event meaning and reference

Event process meaning is a prototypical property inherited from the corresponding verb. Whereas the corresponding verb describes an event, the deverbal noun can refer to the event, a property inherited from the noun category, of which the verbal noun is a non-prototypical (or 'imperfect') member. This type is quite productive in Norwegian. Examples are *bite–bit-ing* 'to bite–the biting', *spise–spis-ing* 'to eat–the eating'. But zero suffix nouns with event process meaning like *besøke–besøk* 'to visit–the visit' also have a fairly high type frequency.

These two types of nominalization tend to be especially highly frequent in technical texts (see Table 1 above). In many technical texts there is a need to refer to processes and results of experiments. The historical development of this nominalization process has been studied by Halliday & Martin (1993) and Banks (2004). For a detailed study of Newton's writing, cf. Halliday & Martin (1993). These events and processes are most typically referred to by deverbal nouns. In several cases

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Morphological type	*Naked form*	*Indefinite article singular*	*Indefinite article plural*	*Definite article singular*	*Definite article plural*	*Total*
-(n)ing	80	1	2	3	2	88
[zero suffix]	30	0	0	1	0	31
-sjon	7	0	3	5	1	16
-anse	0	0	0	2	0	2
-sel	2	0	0	0	0	2
-skap	1	0	0	0	0	1
-t	1	0	0	0	0	1
-else	4	0	1	0	0	4

Table 4. Form of deverbal noun (definite, indefinite article, singular, plural).

this nominalization results in the coining of neologisms, i.e. nominalization which has not been registered in the inventory of the language (Cowie 2000:182f.). In Norwegian, the typical form of this type of nominalization is the naked form of the head noun (i.e. without any preposed determiners or adjectives). In the system manual *Dampsystemet*, 88 types (the number of word types or lexemes per suffix) of *-ing* nominals were found, as Table 4 illustrates. Of these, 80, i.e. about 90%, occurred with the naked form of the deverbal head noun. Only three types occurred with the definite article singular, one with indefinite article singular, two with the indefinite form plural and two with the definite article plural. For the zero suffix nouns, 30 of 31 types occurred only in naked form. Typical examples are given in (9) and (10).

(9) standardprosedyre for **isoler-ing** av reguleringsventiler
standard procedure for insulate-NMLZ of control valves

(10) **Sjekk-Ø** av manuell-e ventiler må foregå etter kontortid
check-NMLZ of manual-PL valves must take place after office hours

The deverbal nouns *isolering* in (9) and *sjekk* in (10) refer to an unspecified, generic complex event closely corresponding to the event denoted by the corresponding verbs *isolere* 'isolate' and *sjekke* 'check'. All the eighty naked nominal constructions had generic, non-specific reference and only eight had specific reference. The latter type of reference is typical of perfect nouns.

As Cowie (2000:182) points out, these neologisms will always occur in technical texts as long as invention, discovery and exploration are carried out in society. Consequently, they are highly frequent, productive, regular and transparent. As a result they are on the non-lexical side of the continuum scale in Table 3.

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Morphological type	*Yes*	*No*
-(n)ing	69	19
[zero suffix]	29	2
-sjon	11	5
-asje	5	0
infinitive	0	4
-anse	2	0
-sel	2	0
-skap	0	1
-t	0	1
-else	2	2

Table 5. Presence of logical polysemy.

6.2 Stage 2: Development of result meaning, specific reference and development of logical polysemy by reanalysis and analogical spreading

As the examples (7) and (8) above show, process vs. result polysemy is very common with deverbal nouns. The development of result meaning in these constructions is the result of a reanalysis of the 'verbhood' of the construction. The development of specific reference is a step further on the way to a perfect noun and must be closely connected to the development of result meaning. But the verb inside the noun is still alive, so the tension between process event meaning and result meaning becomes generalized by analogical spreading (in the sense of Hopper & Traugott 2003:100ff.). The polysemy becomes systematic (logical) and becomes a typical feature of the hybrid class of deverbal nouns. The presence of specific reference is a prerequisite for the use of determiners and the use of plural. As Table 5 illustrates, the majority of cases in the technical manual had logical polysemy, especially the high productive *-ing* and zero suffix forms.

All the *-ing* nominalizations in phrase form with grammatically coded argument structure (preposition *av*) had dynamic process meaning and only one of the zero suffix nouns had a result meaning, as Table 6 illustrates. This is a fairly strong indication that the presence of argument structure and dynamic meaning tend to merge in showing the verbal side of deverbal nouns.

6.3 Stage 3: Development of idiosyncratic polysemy, semantic distance

This stage relates to the fact that deverbal nouns tend to develop new and idiosyncratic meanings over time. I will refer to this phenomenon as semantic distance between the verb and the corresponding noun. This development can be triggered by pragmatics of language use. It is a well established fact that words tend to develop specialized,

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Morphological type	*Process*	*Result*
-(n)ing	34	0
[zero suffix]	4	1
-sjon	1	0
-asje	0	0
infinitive	0	0
-anse	0	0
-sel	0	0
-skap	0	0
-t	0	0
-else	1	2

Table 6. Distribution of process–result polysemy in deverbal nouns with licensed arguments marked by the preposition *av*.

idiosyncratic meanings in addition to the regular and productive process and result meaning. This process usually increases the semantic distance between the verb and its corresponding noun.

In some cases it is possible to test whether a deverbal noun corresponds to one of the allosemes of the corresponding verb. According to Ore (2001) the zero suffix nominal *salg* has two meanings: 'the process of selling' and 'the process of selling at a price cheaper than usual':

(11) De har påtatt seg **salg-Ø** **av** prosjekterte leiligheter
they have taken on sale-NMLZ of projected apartments DB060117

(12) I januar hadde **vi** **salg-Ø** **på** varer som var billige fra før
in January had we sale-NMLZ on goods which were cheap from before
AP060211

The use of prepositions indicates that, unlike *salg* in (12), *salg* in (11) has argument structure.

The verb *selge* has, on the other hand, the meaning 'overdra mot betaling, avhende' ('hand over against payment'). This meaning corresponds to the process meaning of *salg* in (11). However, there is no meaning variant of the verb *selge* which means 'sell to a price which is cheaper than usual'. From this we can deduce that *salg* in (12) is not minimally derived semantically from the verb *selge*. In (12) an idiosyncratic additional meaning element has been added. This element cannot be semantically derived from the corresponding verb. The additional element is a specialization which has developed in the noun but not in the corresponding verb. The element has caused the loss of argument structure of *salg* in (12), even though it has process event meaning. Thus, *salg* in (12) has lower verb categoriality than *salg* in (11).

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Infinitive	*Deverbal noun*	*Infinitive*	*Deverbal noun*
1. bryte	brudd	4. slå	slag
break	*breach*	*beat*	*beat*
2. drepe	drap	5. selge	salg
kill	*killing*	*sell*	*sale*
3. skyte	skudd	6. kjøpe	kjøp
shoot	*shot*	*buy*	*buying*

Table 7. Infinitive–deverbal noun alternations.

In the Hofland Newspaper Corpus, the combination of *salg* and the preposition *av* had a relative token frequency of 3,828 per 100 million words, whereas the combination of *salg* and *på* had a relative frequency of 297 occurrences per 100 million words (see Table 8). A closer analysis of the first 200 occurrences showed that with all the occurrences of *salg*, the preposition *av* functioned as a theta transmitter. Combination with the preposition *på* revealed that only six occurrences with the idiosyncratic meaning of type (12) above were found in the first 200 occurrences. This is an indication that this meaning is more idiosyncratic, unpredictable, irregular and lexically more isolated.

6.4 Stage 4: Development of idiosyncratic morphophonological alternation. Form distance

Development of semantic idiosyncrasy in stage 3 has a tendency to correlate with an idiosyncrasy of form. This may be a reflection of the kind of iconicity referred to earlier as isomorphism. Isomorphism between a deverbal noun and its corresponding verb (parallel meaning and parallel form in both cases) tends to preserve the verbal properties of the nouns, such as retention of process meaning and argument structure. Some members of the zero suffix noun class show some idiosyncratic behavior in derivation, as Table 7 illustrates.

With reference to Table 7, the morphophonemic alternations between the deverbal noun on the one hand and one of the verbal forms on the other hand are all idiosyncratic in 1–5, i.e. the alternations are lexically governed in the sense that there is no regular way the noun form can be derived from the corresponding verb form. In 6, however, there is no alternation, i.e. the stem of the verb is identical to the stem of the deverbal noun. Thus, a verb like *kjøpe* 'buy' has the corresponding zero suffix noun *kjøp*. This noun had a very high absolute token frequency in combination with the preposition *av* in the newspaper corpus, 7747 (see Table 8). The relative frequency per 100 million words was 1817. The first 200 occurrences revealed that all the occurrences of the preposition *av* had the function of a theta transmitter. A typical example is in (13).

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Deverbal noun + preposition	*Absolute frequency*	*Relative frequency, per 100 million words*	*Function of preposition av for first 200 occurrences*	
			theta transmitter	lexical preposition
brudd av	30	7	16 (of 30)	14 (of 30)
kjøp av	7747	1817	200	0
salg av	16319	3828	200	0
skudd av	153	35	0	153
drap av	186	43	133 (of 186)	53 (of 186)
slag av	30	7	0	30

Table 8. Token frequency for deverbal zero suffix nouns plus preposition *av*.

(13) Det er ikke aktuelt å kriminalisere **kjøp-Ø av** sex
it is not relevant to criminalize buy-NMLZ of sex DA060116

Idiosyncratic formations like *brudd*, *skudd*, *drap* and *slag* have a significantly lower frequency, as Table 8 shows.

The only exception to this tendency is *salg*, which has an idiosyncratic relationship to the corresponding verb *selge*. The degree of idiosyncrasy is lower than with *brudd*, *skudd* and *slag*. With *salg* and *drap*, only the stem vowel differs. The very high frequency of *salg* and its tendency to occur with *av* as a theta transmitter can be explained by its antonymic and converse relation to *kjøp*. In texts, these two zero suffix nouns often occur together. The collocation *kjøp og salg* 'buying and selling', illustrated in (14), had a total frequency of 1647 and a relative frequency of 375 per 100 million words in the Hofland corpus.

(14) Min eiendomserfaring stammer fra **kjøp-Ø og salg-Ø av**
my property experience stems from buy-NMLZ and sell-NMLZ of
boliger
apartments FV060220

Table 9 shows the same nouns collocated with the preposition *på*. The nouns *brudd* and *drap* show high frequency, and most instances had *på* in the function of a participant structure marker. For those nouns where the preposition marks a non-participant phrase, the frequency is lower. This means that *på* as participant marker is regular with nouns like *brudd* and *drap*, but not with nouns like *skudd* and *slag*, where, in the great majority of instances, the preposition marks a non-participant. Table 10 summarises the information presented in Tables 7–9.

To summarise, different zero suffix nouns occupy different positions along the continuum between perfect and imperfect nouns. Nouns like *kjøp* and *salg* behave like imperfect nouns, *skudd* and *slag* behave more like perfect nouns, and *brudd* and *drap* occupy a mid-position, as Figure 1 illustrates. Thus, semantic distance seems

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Deverbal noun + preposition	*Absolute frequency*	*Relative frequency, per 100 million words*	*Function of preposition* på *for first 200 occurrences*	
			participant	non-participant
brudd på	13634	3252	200	0
kjøp på	206	48	44	106
salg på	1269	297	6	194
skudd på	1017	238	1	199
drap på	6285	1499	139	11
slag på	247	77	10	190

Table 9. Token frequency for deverbal zero suffix noun plus preposition *på*.

Infinitive	*Verbal noun*	*Predictability*	*Frequency*	*Argument strucure*	*Participant structure*
skyte	**skudd**	idiosyncratic	low frequency	no argument structure	no participant structure
slå	**slag**	idiosyncratic	low frequency	no argument structure	little participant structure
bryte	**brudd**	idiosyncratic	low frequency	some argument structure	full participant structure
drepe	**drap**	idiosyncratic	low frequency	some argument structure	almost full participant structure
selge	**salg**	idiosyncratic	high frequency	full argument structure	little participant structure
kjøpe	**kjøp**	predictable	high frequency	full argument structure	little participant structure

Table 10. Argument and participant structure with zero suffix nouns.

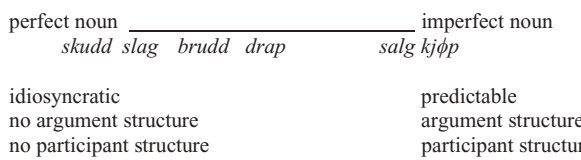


Figure 1. Different nounhood of zero suffix nouns.

to some extent to have a parallel in form distance: the greater the form resemblance between the verb and the noun, the less likely the presence of argument structure in the noun is.

Reduction of and loss of argument structure is highly relevant to the zero suffix in terms of Bybee's (1985) relevance hierarchy. In most typological hierarchies, like

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Malchukov (2004:57), valency is closer to the root than aspect. Thus, loss of argument structure should precede loss of aspect.

6.5 Stage 5: Loss of aspect distinctions by analogical spreading

Deverbal nouns may express aspectual distinctions which may be coded as different morphological types:

(15) Nå ser vi det samme skje i NRK med **spark-ing av** medarbeidere
now see we the same happen in NRK with kick-NMLZ of co-workers
som virkelig gjør noe
which really do something DB050808

(16) Nå blir det et drama helt til siste **spark-Ø på** ballen
now becomes it a drama quite to last kick-NMLZ on the ball
'Now it will be dramatic until the last kick on the ball' DB051024

The *-ing* noun in (15) has an imperfective, process meaning, and the zero suffix noun in (16) has perfective or semelfactive meaning. Perfective and semelfactive meanings are taken as types of result meaning. But this aspectual distinction may also be coded as polysemy within the same morphological type:

(17) Det blir en fantastisk **start-Ø på** vinterferien, med sol og gode
it will be a fantastic start-NMLZ on the winter holiday with sun and good
skiforhold
skiing conditions FV060224

(18) **Start-Ø av maskiner** må foregå om dagen
start-NMLZ of machines must occur in day
'The starting of machines must take place in daytime' *Dampsystemet*

But there is a second class of zero suffix nouns, where the aspectual distinction has been neutralized and only the imperfective process meaning is possible:

(19) Spør om råd til **stell-Ø av** de plantene du har investert i
ask about advice to care-*NMLZ* of the plants you have invested in
BT050427

(20) skyggejakting og alt for mye **stell-ing av** egen pels, melder *Daily*
shadow hunting and all too much care-NMLZ of own coat reports Daily
Telegraph
Telegraph VG050518

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Deverbal noun + preposition	*Absolute frequency*	*Relative frequency, per 100 million words*	*Function of preposition av for first 200 occurrences*	
			theta transmitter	lexical preposition
vask av	137	31	137	0
vasking av	74	16	74	0
spark av	22	5	6	16
sparking av	19	4	19	0

Table 11. Aspect and agrument structure with zero suffix nouns plus preposition *av*.

Deverbal noun + preposition	*Absolute frequency*	*Relative frequency, per 100 million words*	*Function of preposition på for first 200 occurrences*	
			participant	non-participant
vask på	23	5	0	23
vasking på	5	1	0	5
spark på	355	81	110	90
sparking på	2	0	0	2

Table 12. Aspect and argument structure with zero suffix nouns plus preposition *på*.

Deverbal noun + preposition	*Perfective (result)*	*Imperfective (process)*
vask av	0	137
vasking av	0	74
spark av	15	6
sparking av	0	19

Table 13. Distribution of perfective (result) and imperfective (process) with zero suffix and –ing nouns plus preposition *av*.

Both (19) and (20) have imperfective process meaning. Tables 11–14. give absolute and relative frequency for the deverbal nouns *vask* 'wash', *vasking* 'washing', *spark* 'kick' and *sparking* 'kicking' combined with the prepositions *av* 'of' and *på* 'on'.

Both the zero suffix noun and the *-ing* noun have an imperfective meaning and can be used interchangeably. The first type of zero suffix nominals will be called the imperfective type (as in (19) above) and the second type the perfective type (as in (16)). The imperfective type seems to be fairly productive, because it can alternate with the highly productive process *-ing* nominals. Thus, the imperfectives *vask* and *vasking* occur exclusively with *av* as a theta transmitter, as Table 11 shows. But *vask av* has an even higher frequency than *vasking av*. Neither of these two nouns occurs with *på* in participant function, as Table 12 shows. The perfective *spark*, on the other

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Deverbal noun + preposition	*Perfective (result)*	*Imperfective (process)*
vask på	9	14
vasking på	0	5
spark på	110	0
sparking på	0	2

Table 14. Distribution of perfective (result) and imperfective (process) with zero suffix and *-ing* nouns plus preposition *på*.

hand, tends to occur with *av* as a lexical preposition and with *på* as a participant. Table 13 shows that *vask av*, *vasking av* and *sparking av* never occur with a perfective meaning, whereas in the majority of cases *spark* occur with perfective meaning. Even in combination with the lexical preposition *på* as non-participant, *vask* tends to have imperfective process meaning, whereas all the occurrences of *spark på* has perfective result meaning and in the majority of cases the preposition has participant function.

The perfective type can be listed, although the list is fairly long. Only very few of the perfective zero suffix nouns correspond to transitive verbs (like *spark* in (16)). Moreover, they seem to be semantically restricted, referring to sounds (e.g. *brøl* 'roar' and *rap* 'burp') and movements (e.g. *spark* 'kick' and *skru*, *sving* 'swing'):

(21) Teknikken min er utsatt. Jeg får feil **skru-Ø** **på** ballen
technique my is exposed I get wrong turn-NMLZ on the ball VG030427

(22) Så fikk Mercedesen en kraftig **dytt-Ø**
then got the Mercedes a stong push-NMLZ FV99UH1O

In some cases these perfective nouns enter into idiomatic collocations, which may increase their token frequency:

(23) Så fikk Bjørnstad for alvor **sving-Ø** **på** sakene, og vartet opp med birdier
then got Bjørnstad for serious swing-NMLZ on things and served up with birdies DA060204

They seem to correspond roughly to Vendler's (1967) achievement class of verbs and Smith's (1991) semelfactives.

The imperfective type of zero suffix nouns is diachronically a much more recent type of deverbal nouns than the perfective type. Many of the newly-coined zero suffix forms are transitive and have a regular argument structure. They correspond closely to the *-ing* nominals and seem to have the same imperfective process meaning:

(24) a. i tradisjonen fra latinen, med mye **pugg-Ø** **av** bøyningsmønstre og deklinasjoner
in the tradition from Latin with much memorize-NMLZ of inflection patterns and declinations DB040814

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b. Han tenkte på 'Gift' og kritikk av **pugg-ing** **av** latinske
he thought of 'Poison' and critique of memorize-NMLZ of Latin
gloser og byer i Belgia
words and cities in Belgium SA990219

c. Siste skikkelige **rens-Ø** **av** kirka ble foretatt for 50 år
last proper clean-NMLZ of the church was undertaken for 50 years
siden
ago AA011115

d. Produktene brukes både til **rens-ing** **av** drikkevann og
the products are used both to clean-NMLZ of drinking water and
avløpsvann
drain water AP060304

e. Mange familier bestiller også **skift-Ø** **av** sengetøy og sølvpuss
many families order also shift-NMLZ of bed linen and silver polish
nå før jul.
now before Christmas AP051220

f. koster 570 kroner året for lagring og **skift-ing** **av** fire
costs 570 kroner each year for storing and shift-NMLZ of four
dekk
tyres SA011015

This type of zero suffix nouns seems to correspond to Vendler's accomplishment verbs.

The perfective type of zero suffix nouns seems to lack argument structure, as Tables 11–14 indicate. With *spark,* like in (14) the preposition *på* is the normal choice, not *av*. Moreover, this type of zero suffix nominals tends to have result reading. They can be quantified:

(25) er litt for tilfeldige, det blir for mange **spark-Ø** **på** ballen sier
are a little too accidental it becomes too many kick-NMLZ on the ball says
Ferguson.
Ferguson VG060212

Moreover, they can be pluralized:

(26) Et av **spark-ene** treffer meg i låret
one of kick-PL hits me in the thigh DB991210

In a number of cases the imperfective zero suffix nouns have spread analogically and substituted for other suffixes, especially *-else* and *-ing*. In these cases the zero suffix form seems to be more common than the corresponding *-ing* forms. In other cases, however, the *-ing* forms seem to have spread at the expense of the zero suffix forms and other low productive (or unproductive) forms, especially those

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Semantic type	*Simple event*	*Complex event*	*Complex event*
Morphological type	zero suffix	*-ing*	zero suffix
Aspectual type	perfective	imperfective	imperfective
Examples	*grøss* 'shudder'	*grøss-ing* 'shuddering'	*pass* 'caretaking'
Plural	*grøss-ene* 'the shudder-s'	**grøssing-ene* 'the shudder-ing-s'	**pass-ene* 'the caretaking-s'
Individuating quantification	*mange grøss-Ø* 'many shudder-s'	**mange grøssing-er* 'many shuddering-s'	**mange pass-er* 'many caretaking-s'
Mass quantification	**mye grøss* 'much shudder'	*mye grøssing* 'much shuddering'	*mye pass* 'much caretaking'
Indefinite article	*et grøss* 'a shudder'	**en grøss-ing* 'a shuddering'	**en pass* 'a caretaking'

Table 15. The relationship between aspectual types and quantification.

with complex event meaning. The *-en* suffix is unproductive in modern Norwegian (possibly resticted to a few words like *viten* 'knowledge' and the archaic *kunnen* 'knowledge'. *Viten* is still found with process complex event denotation, but it never occurs with the preposition *av* as a theta transmitter, or *på* as a participant:

(27) Hartz (40) vil gjerne bidra til mer **vit-en** **om** tidligere
Hartz (40) will rather contribute to more know-NMLZ about former
toppidrettskvinners liv etter
female top athletes' life after AP060216

This would imply that the extent of analogical spreading is unpredictable. In many cases spreading seems to be supported by highly productive formations, like the process *-ing* forms, but in other cases a less productive form (like the imperfective, process zero suffix nouns) can become more productive and compete with other highly productive forms in the same domain.

So, the perfective zero suffix nominals in Norwegian seem to correspond to Grimshaw's simple event nouns, and the imperfective zero suffix nouns (and the synonymous *-ing* nominals) seem to correspond to the complex event nouns. This semantic distinction also corresponds to other prototypical noun properties, in harmony with the Maximal Difference Principle of Prototype Theory, i.e. the principle that categories tend to be defined in terms of prototypes that contain the attributes that are most representative of items inside and least representative of items outside the category. Thus, when imperfect nouns become perfect nouns, they tend to take on more attributes representative of the prototype noun category. Thus, various expressions of quantification are typical of perfect nouns. Table 15 shows the relation

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between different semantic types, morphological types and aspect on the one hand, and various types of quantification coding on the other hand.

As we can see from this table, the simple event nouns are countable and can be pluralized. This implies that they can be individuated and quantified. This also accounts for the fact that they can occur with the indefinite article, in contrast to the complex event nouns, which cannot be pluralized, only have mass quantification and do not occur with the indefinite article. They are uncountable.

The correlation between countability, associated with the noun, and aspect, associated with the verb, is also a prominent feature in Greek. Alexiadou (2001:54) points out that the mass/count-distinction in the individual domain corresponds to the process/state- vs. accomplishment/achievement-distinction in the event domain.

Finally, in Norwegian, there seems to be a correlation between reference and nominal aspect: non-specific reference tends to occur with the imperfective nouns and specific reference tends to occur with the perfective nouns. Thus, in (28), the noun phrase *sparking av Drillo* has non-specific reference, as opposed to the specific reference of *hans siste spark på ballen* in (29):

(28) Han avviser imidlertid at **spark-ing av** Drillo er tema
he rejects however that kick-NMLZ of Drillo is topic VG050927

(29) Hans siste **spark-Ø på** ballen i finalen var straffesparket
his final kick-NMLZ on the ball in the final was the penalty kick
som
that DB051218

Specific reference can be regarded as a typical property of perfect (high categorial) nouns.

6.6 Stage 6: Loss of dependent and lexical differentiation

As mentioned earlier, deverbal nouns tend to develop idiosyncratic polysemy. A zero suffix noun like *vask* may develop a concrete entity meaning from a result meaning:

(30) ikke har problemer med å spise over **vask-Ø-en** og drikke fra
not have problems with to eat over wash-NMLZ-DEF and drink from
kartongen
the container SA051219

In such cases the dependent participant structure has been lost and the noun has become a prototypical noun with concrete specific entity reference. Some of these nouns are quite old, like the zero suffix noun *skjær* 'reef, rock' (cf. Ango-Saxon *scorian* 'to stick out from') and the *-t* type *kløft* 'crevice, cleft' (from *klufta* 'to split'; Torp 1963).

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In some cases idiosyncratic polysemy may result in lexical differentiation, i.e. the idiosyncratic variant is singled out as a separate lexeme. In Norwegian, there are a closed group of lexemes where there is a clear distinction between an *-ing* form with process meaning and a *-ning* form with a different idiosyncratic meaning (Faarlund et al. 1997:99): *bygg-ing* 'the process of building' vs. *byg-ning* 'the building', *stig-ing* 'the process of increasing' vs. *stig-ning* 'the part of a road with goes upwards', *rett-ing* 'the process of making something straight' vs. *ret-ning* 'direction', *skap-ing* 'the process of creating' vs. *skap-ning* 'a creature (created by God)'. The idiosyncratic *-ning* variants have all lost their postposed dependents.

These six stages illustrate the path of lexicalization from transparent to holistic structures with reduction of compositionality resulting in idiosyncratic and unpredictable structures. Eventually reduction and loss of dependents follow.

7. FREQUENCY AND PRODUCTIVITY

According to Hopper & Traugott (2003:124ff.) there is a relation between frequency and productivity. As Vinje (1973:140) has pointed out, if there exists an established zero noun with result meaning, it seems that, if the need arises, a corresponding *-ing* nominal with process meaning may be coined, or even in cases where the zero suffix noun is clearly entity referring:

(31) men vi er foreløpig usikker på om **røyk-Ø-en** kan være
but we are so far uncertain on whether smoke-NMLZ-DEF can be
giftig
poisonous AP060223

(32) Elevene mener **røyk-ing** ikke er kult
the pupils says smoke-NMLZ not is cool FV060217

This should indicate that *-ing* nominalization is a process which is highly productive. *-Ing* nominalization seems to be applicable to all or most of its potential domains and applicable to new items when these are introduced into the language.

This kind of productivity is probably related to what Anderson (1985:19ff.) calls the 'active' vs. 'passive' character of word formation processes. This is the extent to which the process in question functions as a living part of the language and determines the shape of new words, or simply allows for the recognition of the structure of existing lexical items. It appears, that is, that some processes of word formation are more or less actively involved in creating forms (including those that have been created before), while others have more of the passive character of patterns, providing keys to the analysis of forms, but not serving as the basis for the creation of others. *-Ing* formation belongs to the active word formation process.

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As we have seen, the domain of *-ing* is very wide. And the domain covers not only the process domain but, because *-ing* may apply to virtually any verb stem, it may also be involved in the coining of new formations when the need arises.

It is important to point out that *-ing* and *-else* do not have process or result meaning in themselves (Vinje 1973:145). The decisive factor seems to be whether the subdomain is occupied by the one or the other suffix in one or both meanings. If one of the types is established in the subdomain, the other type may emerge with the other meaning. In some cases, additional, more idiosyncratic (i.e. non-predictable) meanings beyond the process–result meaning distinction may emerge, sometimes giving rise to lexical differentiation, as in *led-else* 'administration' vs. *led-ning* 'cable'. None of the bordering areas between the subdomains are barriers, and of course, the *-ing* forms often cross the borders of other subdomains. Vinje concludes that the deverbal nouns in *-else* and *-ing* do not follow any consistent and predictable principle of word formation.

The functional distribution of the suffixes depends to some extent on a principle of contrast. The choice between *-else* or *-ing* depends on which suffix is the current or dominating one in each case. Since neither *-else* nor *-ing* unambiguously carries process or result meaning, both suffixes are candidates in specific contexts when the need for a specific meaning arises.

The same applies to the zero suffix formations (both with and without vowel alternation). *Vedtak* 'enaction, formal decision' is the most common deverbal noun associated with the verb å *vedta* 'to decide' (historically a subtraction formation from *vedtak-else*). *Vedtak* had only result meaning back in the 1970s, so there was an empty slot available for the corresponding process meaning, which was for some time occupied by the *-else* form:

(33) Ved **vedtak-else-n** **av** de nye satsene er det regnet med at
by enact-NMLZ-DEF of the new levels is it estimated with that
omlag halvparten av skatteyterne vil bli fritatt for
approximately the half of the taxpayers will become exempted from
statsskatt
state taxation

'By enacting the new tax levels, it is estimated that approximately half of the taxpayers will be exempted from state taxation' AA700301

Later, the *-else* variant lost its place as the only coder of process meaning and the process meaning has 'retracted' into the zero suffix noun with a resulting logical polysemy inside the zero suffix nominal *vedtak*:

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(34) stortingets **vedtak-Ø av** stortingsproposisjon nr 1 om
Parliamens' enact-NMLZ of Parliament proposition no. 1 concerning
tollavgif-ter
customs duty-PL
'the Norwegian Parliament's enacting of proposition no. 1 concerning customs duty' SA870104

But the *-else* variant with process meaning still exists in official judicial texts:

(35) I så fall vil utarbeidelse og **vedtak-else av** skolereglement måtte
in that case will layout and enact-NMLZ of school regulation must
følge regl-ene i . . .
follow the rules in
'In that case, the design and the enactment of the school regulations must be in accordance with the rules laid down in . . . '
NOU (Norwegian Government publications) 18, 1995

Since the *-else* type belongs to a closed class, the ability of these nouns to participate in the process–result dichotomy is limited. Thus, from the verb *å tolke* 'to interpret' we cannot form the deverbal noun **tolk-else* 'interpretation', neither in the process nor in the result meaning. In this case the productive *-ing* form *tolk-ing* will occupy the process slot and the variant *-ning*, i.e. *tolk-ning*, will specify the result meaning. However, as mentioned above, the *-ning* suffix as a lexical differentiating suffix indicating the result meaning is unproductive and limited to very few *-ing* forms.

Norwegian lacks a productive suffix for the coding of process meaning like the English gerund construction, the Danish *-en* (so called 'centaur nominal construction', cf. Hansen & Heltoft (1994) or Swedish *-ande*. On the other hand, there are tendencies of a lexical differentiation of a type which is not present in Danish and Swedish.

In some derivations of the same stem, the *-ing* variant denotes the process meaning whereas the *-ning* variant is used with the result meaning. The classical example is *bygg-ing* 'the process of building' vs. *byg-ning* 'the resulting building construction'. In addition, we have the zero suffix formation *bygg*, meaning 'the construction site before it has been completed'. But since this morphological process is unproductive, there is a strong tendency towards lexical differentiation. This means that further, idiosyncratic meanings are added to the two different forms, often overriding the process–result dichotomy, as can be seen in *pakk-ing av klær* 'packing of clothes' vs. *pak-ning* 'gasket', *strekk-ing* 'the process of stretching' vs. *strek-ning*'distance' and *dekk-ing av bordet* 'the laying of the table' vs. *dek-ning av utgifter* 'the coverage of expenses'.

Although, as we have seen, there is no necessary connection between result meaning and the absence of grammatically-coded argument structure, there are

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TENDENCIES towards the combination of process meaning and the presence of argument structure on the one hand, and the absence of argument structure and result meaning on the other.

The dichotomic distinction between the process and result meaning seems to manifest itself as an overall principle in the system, coded in different ways in different contexts. Sometimes it is contained as polysemy inside the nominal and sometimes it is coded lexically by contrasting morphological types of nouns. In other cases the process member of the dichotomy is absent or lost.

8. CONCLUSION

This article shows that Norwegian deverbal nouns are in a state of flux. By applying theories and methods from Grammaticalization Theory and Lexicalization Theory I have presented data, especially frequency data, which suggest that deverbal nouns tend to become more like perfect nouns. This process can be described in terms of stages, based on triggers like relevance to the root, reanalysis, language use, isomorphism and the Maximal Difference Principle of Prototype Theory. In the process, deverbal nouns show reduction in compositionality, increased semantic and morphological idiosyncrasy, reduced inner structure and more irregularity in accordance with Lexicalization Theory.

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NOTES

1. All examples in this article are taken from text corpora, especially the Norwegian Newspaper Corpus at the Axis Centre at the University of Bergen, cf. <http://avis.uib.no>. The examples are taken from the following newspapers:
   - Adresseavisen (AA), Trondheim
   - Aftenposten (AP), Oslo
   - Bergens Tidende (BT), Bergen
   - Dagsavisen (DA), Oslo
   - Dagbladet (DB), Oslo
   - Dagens Næringsliv (DN), Oslo
   - Fedrelandsvennen (FV), Kristiansand
   - Nordlys (NL), Tromsø

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- Stavanger Aftenblad (SA), Stavanger
- Verdens Gang (VG), Oslo

A references to the name of the newspaper and the exact date are given for each relevant example. Thus, for example, DB060205 means '*Dagbladet* from 5 February 2006'.

A few examples are taken from the Oslo Corpus of Tagged Norwegian Texts, cf. <http://www.tekstlab.uio.no/norsk/bokmaal/english.html>, and the technical manual *Dampsystemet* [Steam generation and distribution system], an instruction manual for operating the system on the Gullfaks A Platform in the North Sea.

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