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ANIMACY AND OTHER DETERMINANTS OF GENITIVE VARIATION IN SWEDISH: S-GENITIVE VS. PREPOSITIONAL CONSTRUCTION[1]

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Abstract: In this paper, the author explores the variation between the s-genitive and the prepositional construction in Swedish. The study is based on a newly-compiled corpus of contemporary texts. A multivariate analysis based on a binary logistic regression model is conducted to determine, which factors influence the selection of the given construction. The results indicate that animacy has the strongest influence on the genitive variation, and is prior to definiteness and length of the phrase.

Key words: possessive expression, genitive variation, Swedish, animacy, s-genitive, prepositional construction.

1. Introduction

When a language has more than one way of expressing possession, the selection of a particular construction is often governed by various semantic, syntactic, and pragmatic factors. In this study, I focus on the factors behind the variation between adnominal possession in Swedish expressed by the s-genitive construction, on the one hand, and the prepositional constructions, on the other. Examples of the relevant constructions are given below (see 1-4).

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(1) *kung-en* *av* *Sverige-s* *fru*
king-DEF of Sweden-POSS wife
'the king of Sweden's wife' (translations of all examples made by the author)

(2) *fru-n* *till* *kung-en* *av* *Sverige*
wife-DEF to king-DEF of Sweden
'the wife of the king of Sweden'

(3) *tak-et* *på* *hus-et*
roof-DEF on house-DEF
'the roof of the house'

(4) *hus-et-s* *tak*
house-DEF-POSS roof
'the house's roof'

Swedish, as well as all the other Germanic languages, was once a synthetic language with an extensive nominal and verbal inflection system (see Delsing 2014). The basic means of expressing possession at that stage was the genitive case and possessive pronouns. In the gradual development from Old Swedish to present-day Swedish the language has become much more analytical in nature and lost its case inflection. As a result, the genitive case was superseded by a number of different possessive expressions. The adnominal possessive constructions used in present-day Swedish include, but are not limited to, the following constructions:

1. the s-genitive construction (*Jans hus* 'Jan's house')
2. the prepositional construction (*taket på huset* 'the roof of the house')
3. pronominal constructions: with regular pronouns (*min hand* 'my hand') or with reflexive possessive pronouns (*han hade sin cykel* 'he had his bicycle')

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4. compounding constructions (*Palmemordet* 'the murder of Palme'; cf. Koptjevskaja-Tamm 2013).

Since there are at least four adnominal possessive constructions in Swedish, the choice between the s-genitive and prepositional constructions, which this study is concerned with, is only part of the choice that speakers make. Possessive pronouns are not directly interchangeable with the s-genitive or PPs (= prepositional phrases) as they often occur in contexts, in which the possessor has been introduced earlier, and is referred back to in the form of pronouns (for a detailed discussion on regular and reflexive possessive pronouns in Swedish see Kiparsky 2002). Compounds with a possessive reading are quite common and widespread. However, they may entail so many different relations between nouns that the delimitation between possession and e.g., location or simple classification would be highly problematic. For instance, the Swedish compound *bilmotorn* 'car engine' is not always identical to *bilens motor* 'the car's engine', which is also reflected in the English translations, as the compound is classifying but non-referential, whereas the genitive construction is identifying and referential at the same time (cf. Koptjevskaja-Tamm 2002a: 154). Possessive compounds occur also in fairly limited contexts with proper names, as in e.g., *en Mozartsonat* 'a Mozart sonata' (Koptjevskaja-Tamm 2013: 254). For these reasons only two constructions are studied in this paper, namely the s-genitive and prepositional phrases.[1]

The s-genitive construction stems from one of the inflectional endings of the genitive case, namely the ending -s. The ending, which was first used solely for masculine and neuter nouns, spread to other noun classes and eventually took over the whole paradigm (Börjars 2003; Delsing 1999; 2001; Norde 1997; 2001; 2006; Piotrowska 2017; 2018). In contrast to the s-genitive construction, possession expressed by means of prepositional phrases in Swedish has not yet been studied in detail, as opposed to English (Fischer 1992; Hinrichs & Szmrecsanyi 2007; Mustanoja 1960), therefore calling for an in-depth analysis of this construction. Furthermore, the Swedish preposition, which is similar to English 'of' or Dutch 'van' and is used in possessive

 ISSN 2453-8035

expressions has not grammaticalised. Therefore, the choice of the preposition used in a Swedish possessive prepositional construction depends on the semantic relation it expresses; compare the following examples (for more examples see also Hammarberg & Koptjevskaja-Tamm (2003: 139-140) and Perridon (1989: 74).

(5) *pris-et* *på* *vara-n*
price-DEF on product-DEF
'the price of the product' (Teleman et al. 2010: 712)

(6) *invånar-na* *i* *Stockholm*
inhabitant-DEF.PL in Stockholm
'Stockholm's inhabitants' (Norde 1997: 52)

There are two sets of prepositions used in these constructions, namely various spatial prepositions (such as *i* 'in', *på* 'on', *hos* 'at', *med* 'with', *över* 'over', *till* 'to') that indicate 'location at/on/in' or 'direction to', and non-spatial prepositions indicating an underlying sense of 'direction from' (such as *av* 'of', *från* 'from', *efter* 'after') (Hammarberg & Koptjevskaja-Tamm 2003: 140). The fact that there are no grammaticalised possessive prepositions in Swedish predetermines the type of possessive relations expressed with them. The underlying meaning of location or direction in PPs prevents their interchangeability with the s-genitive construction, for example, the notion of LEGAL OWNERSHIP is usually expressed only through the s-genitive (see Example 7). In Section 2.2 I return to this issue.

(7) a. *Anna-s* *hus*
Anna-POSS house

b. **hus-et* *av* *Anna*
house-DEF of Anna
'Anna's house'

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As mentioned, the semantics of the possessive relation may determine the construction used for expressing possession. In the same way, certain semantic constraints, such as animacy, may also prove important. Dahl & Fraurud (1996), with regard to their previous research into constraints on genitive variation in Scandinavian languages, consider the influence of animacy on the syntactic function of Swedish nominal phrases. On the basis of corpus analysis they observe a general tendency for the s-genitive to involve the use of animate possessors. Along with that, most of the animate nominal phrases in the corpus are definite, which leads the authors to the conclusion that animacy and definiteness tend to go together in Swedish (ibid., 53). The scholars do not consider any other factors, as the study is focused not solely on genitive constructions, nevertheless, their observations about animacy and definiteness merit further studying.

Animacy has also been shown to be an important factor in various studies on Scandinavian languages, for example, in the grammaticalisation of the definite article (Skrzypek et al. 2021) or the periphrastic passive (Skrzypek 2020). Nesset and Enger (2002: 273) note that in the Nynorsk variety of Norwegian the s-genitive is by and large restricted to human possessors, whereas other possessors are expressed by prepositional phrases (see Example 8). It is nonetheless important to note that the distribution and use of the s-genitive in Norwegian is much more complex than in Swedish (see e.g., Dialektsyntaktiska... 2003; Fiva 1987).

(8) a. *Jon-s* *hund*
Jon-POSS dog
'Jon's dog' (Nesset & Enger 2002: 273)

b. *halsband-et* *til* *hund-en*
collar-DEF to dog-DEF
'the collar of the dog' (ibid., 273)

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The authors state that the variation between the possessives illustrated in Example 8 is an example of a distinction between the so-called core and peripheral categories, which in this case are coded by means of respectively the s-genitive and prepositional phrases. They note that the s-genitive is diachronically an older construction and that it is chosen for conceptually prototypical possessive expressions, particularly involving human possessors who own something. The possessive prepositional phrase is the newer marker in Norwegian and it is used for peripheral possessive relations, e.g., with non-human or inanimate possessors.

Further, Gunleifsen (2011) studies the differences in the use of prototypical adnominal possessive expressions in two spoken dialects from two cities in Norway. Only human possessors are taken into account in the study. The author's findings show that the category of the possessor (whether it is a common noun, proper name or pronoun), which varies in referentiality, is an important factor in the choice of a possessive. Phonological factors and morphosyntactic complexity of the possessor phrase are also shown to be of relevance.

Overall, to my knowledge, there are no comprehensive studies about genitive variation and constraints that govern the choice of the possessive construction in Swedish or in the other Scandinavian languages (with the exception of Gunleifsen 2011 and Piotrowska 2020). The aim of this study is to investigate the variation between the s-genitive and prepositional constructions in Swedish with the focus on three constraints: animacy, definiteness, and length of the phrase, and to see how these constraints interplay with each other. In the next section I specify why these constraints have been selected (2.1) and what material and methods are used (2.2). Section 3 presents a distributional analysis for each factor considered. In Section 4 I present a multivariate analysis using binary logistic regression and Classification and Regression Tree Analysis (CART) to demonstrate the probabilistic model of the joint contributions of each factor in explaining the choice of genitive constructions. Section 5 concludes the paper.

 ISSN 2453-8035

2. Material, methods, and hypotheses

In this section, I outline the constraints on genitive variation explored in this study, as well as substantiate the choice of the corpus and the tool used for annotation purposes. At the end of the section I also point out the annotation principles followed throughout the study.

2.1 Constraints in genitive variation: Definitions and predictions

Firstly, as indicated in Section 1, there is little previous research on constraints that have an influence on selecting the s-genitive versus the prepositional construction in Swedish. For this reason, research on English genitive variation is taken here as an inspiration for drawing hypotheses about Swedish. The two languages are closely related in genetic terms, as well as in terms of typological development. Further, the grammaticalization paths of the respective s-genitive constructions show corresponding patterns (Allen 2003; Norde 1997; Perridon 2013). While I take studies on English as a point of departure, I do not wish to claim that the genitive variation in Swedish is characterized by the same constraints, or influenced by certain constraints to the same degree as the English genitive variation does. The two languages obviously differ in the morphological and syntactic principles of their possessive constructions, as it will be pointed out in discussing particular constraints.

It is well known from previous studies on English that animacy of the referent plays a vital role in the choice of the genitive construction (Altenberg 1982; Jucker 1993; Kreyer 2003; Rosenbach 2005; 2008; 2017). Animate possessors (most often human) are more likely to resort to the s-genitive (e.g., *Tom's house* rather than *the house of Tom*), whereas inanimate possessors show a preference for prepositional possessive constructions (e.g., *the roof of the house* rather than *the house's roof*) (Hinrichs & Szmrecsanyi 2007: 449; Rosenbach 2005: 614). Animacy as feature of a lexical class of the referent, or more accurately a biological dimension, is an inherent property of a referent; either something is a living creature (animate) or not (inanimate). This simplified binary opposition (± animate) is not very felicitous when one considers

ISSN 2453-8035

animacy as a linguistic factor. Speakers often differentiate linguistically various animate referents through, for example, different morphological coding for human and for animal referents. The fact that we perceive human beings more animate than animals is due to the anthropocentric character of language and human cognition, which accounts for the graduated animacy values or, in other words, the hierarchy of animacy (Comrie 1981; Silverstein 1976). Comrie (1981: 185) defines animacy as a three-staged hierarchy with human, animal, and inanimate referents. In this study, I follow a more detailed scale of animacy adapted after Rosenbach (2008), which also features collective referents as well as spatial and temporal referents. The scale of animacy used in this study is presented in Table 1.

Table 1. The scale of animacy

1. Human	**2. Animal**	**3. Collective**	**4. Spatial**	**5. Temporal**	**6. Inanimate**
talarens intention	*hästens kropp*	*regeringens plan*	*Sveriges statsminister*	*tre veckors betald semester*	*språkets betydelse*
'the speaker's intention'	'the horse's body'	'the government's plan'	'Sweden's Prime minister'	'three weeks' paid vacation'	'the language's meaning'

As regards collective referents, it is known that they can waver between animate and inanimate interpretation (Rosenbach 2005: 615). Nouns such as *company* or *party* may be conceptualized as an institution (the inanimate reading) or as the body or group of people that make up a certain *company* or *party* (the animate reading). This accounts for the collective referents' position on the animacy scale between the animal and inanimate referents. Temporal and spatial referents constitute separate categories as they are often used with the s-genitive in Swedish (Koptjevskaja-Tamm 2002a: 150-152). While temporal possessives may be restricted lexically to just a handful of referents, the spatial possessives often constitute a subgroup of the PART-WHOLE concept, which is one of the basic notions of possession. This underpins the frequent use of spatial referents as possessors. In accordance with the scale of animacy and its application to genitive variation, the following prediction can be made about Swedish:

(i) The more animate the possessor, the more likely it is to take the s-genitive.

 ISSN 2453-8035

Another constraint to be explored is the length of the phrase (in other words, The Principle of End Weight, see Hinrichs & Szmrecsanyi (2007: 438)). The factor of length, related to processing and parsing, stands on the premise that a longer constituent follows a shorter one. It has been argued that speakers prefer the genitive construction in which the longer of the two (either the possessor or the possessum phrase) occurs second. Compare the following examples.

(9) ***världs-histori-en-s*** *störst-a icke-vålds-revolution*[2]
world-history-DEF-POSS biggest-WK non-violent-revolution
'the biggest non-violent revolution in **the world's history**' (Boëthius 2017)

(10) *en bild* *av* ***det*** ***kyrklig-a*** ***språk-bruk-et***
INDF picture of DEF ecclesiastical-WK language-use-DEF
'a picture of **the ecclesiastical language use**' (Holmberg 2017a)

As the order of the possessor and the possessum phrases is converse in the two possessive expressions studied here, it is expected that the length will have some effect on the genitive variation. Two predictions can be made for the Swedish genitive variation concerning the factor of weight (following Rosenbach (2005: 616)):

> (ii) Within a possessive NP a shorter constituent should precede the longer one.
> (iii) The longer the possessor, the more likely it is to occur with a prepositional phrase.

According to (ii), the s-genitive should be more common with the combination short possessor/long possessum (Example 9), and prepositional phrases should be preferable with the combination short possessum/long possessor (Example 10). In the statistical model employed in the study I include two factors, namely the possessor length and the possessum length measured by syllable count (see Section 2.2 for discussion). The constraint of length is taken here in purely prosodic terms, not in terms of structural

ISSN 2453-8035

complexity (for more on pre- and postmodification of the possessor phrase see Börjars et al. 2013).

Another factor to be taken into consideration is definiteness of the possessor phrase. The selection of this constraint is not informed by the previous studies on English genitive variation, but rather on the attested tendency for Swedish possessors in the s-genitive to have an overt definite form, even though no formal restrictions are placed on indefinite possessors (Teleman et al. 2010: 25). In studies on English, a related factor is at times invoked, namely givenness or discourse status of the referent (found to be insignificant by Hinrichs & Szmrecsanyi 2007, but highly significant in the study by O'Connor et al. 2013). An important difference between English and Swedish is that the Swedish definite article is a suffix that attaches to the noun, and not a separate orthographic word (compare *kvinna-n* – woman-DEF – 'the woman'). A possible consequence of this is that Swedish genitival possessors might be predominantly definite and short (often one-word possessors), which cannot be claimed for English. This also shows that the factor of length might be connected with definiteness in Swedish. To add, definiteness is intrinsically connected with discourse status of the referent (or in other words accessibility of the referent, see Ariel 1988; 1994; 2016), in that definiteness is necessarily related to the conceptual notions of familiarity and identifiability (Hawkins 1978; Lyons 1999: 2-13). It has been argued that if the possessor is easily accessible and thus known to the reader, the s-genitive will be preferred (Hinrichs & Szmrecsanyi 2007). In this study, in line with O'Connor et al. (2013: 98), I use definiteness as a correlate of discourse status through a five-step distinction: proper names as the most accessible and familiar, definite common nouns and possessed common nouns as slightly less accessible and zero-marked and indefinite common nouns as the least accessible. With the term 'possessed common nouns' I refer to the so-called nested genitives. An instance of such a construction is presented in Example 11. In this case the possessor *systers* 'sister's' is not marked with a definite article, because it is a possessum in the preceding phrase, such a possessor

 ISSN 2453-8035

will then be annotated as 'possessed', i.e. semantically definite but not explicitly marked.

(11) *Martin-s syster-s älskare*
Martin-POSS sister-POSS lover
'Martin's sister's lover' (Nesser 2013)

I also distinguish a category that I call 'zero-marked' where I include bare NPs that are semantically indefinite but bear no indefinite article. These are not very frequent in Swedish, but they do occur, for example, in a predicative position or in lexicalized phrases.

Based on the accessibility scale, the following prediction can be made for Swedish:

> (iv) Proper name and definite possessor phrases are more likely to take the s-genitive than indefinite possessor phrases.

If the possessor is a proper name or explicitly marked with a definite article, it is more likely to take the s-genitive, as this construction places the familiar element first.

To sum up, the primary aim of this study is to investigate the possessive variation in Swedish with the focus on three constraints: animacy, definiteness, and length of the phrase. The hypothesis is that the Swedish s-genitive will favour human, definite, and shorter possessors. Given the fact that these factors correlate and influence each other, it is important to question the independence of each factor. The secondary aim of the study is to examine if the variables have an independent effect on genitive choice in Swedish or if any of them is only epiphenomenal. For that reason, a method of multivariate analysis using the statistical model of binary logistic regression has been chosen.

 ISSN 2453-8035

2.2 The corpus and the annotation principles

The study is based on a self-made newly compiled corpus of present-day Swedish texts. The texts represent three different registers, namely literary texts, press texts, and blog texts. These different registers have been chosen to ensure the diversity of language use. The fragments of texts have been chosen randomly from bigger samples. The empirical material is categorized under two time periods, i.e. November 2017 to January 2018 and November to December 2018. The corpus consists of 56 texts comprising 76 428 words, divided into three groups in the following way:

Literary texts:	26 038 words
Press texts:	25 086 words
Blog texts:	25 304 words

The literary texts in the corpus include fragments from 11 novels written between 2004 and 2014 by Swedish authors. All of the novels were retrieved in an e-book format. The fragments that were on average 2 367 words long were chosen randomly. The newspaper texts include 22 texts that comprise both short news reports and longer reportage pieces and essays. The texts were retrieved from Open Access articles published in the Swedish newspapers: *Aftonbladet*, *Expressen*, and *Dagens Nyheter*, as well as Open Access articles published in popular science magazines: *Forskning & Framsteg* and *Språkbruk*. All of the articles were published on-line between November 2015 and November 2017. The average length of the fragments is 1 140 words, however, it is important to note that news reports are much shorter, ca. 700 words, whereas essays and reportage pieces are represented by longer fragments of ca. 1 700 words. The blog texts chosen for the corpus include 23 fragments. The blogs written by Swedish native speakers were chosen randomly through Google searches. The length of the blog posts functioned as the main criterion for choosing a given blog. The fragments of texts are on average 1 100 words long. Multiple texts were at times chosen from the same blog, with the restriction that not more than three blog posts in the corpus were written by the same author. All of the blog texts were published on-line between June 2014 and November 2017.

The corpus texts were processed with the help of a computer programme called *DiaPoss* (for a similar tool see Skrzypek et al. 2021), which was tailor-made for the corpus analysis in this particular project. The programme facilitates text analysis, as it shows one sentence from the text at a time and each word may be annotated on previously defined levels of information, such as e.g., possessive construction, animacy, definiteness, and so on. Based on the entered information and different combinations of tags, the programme provides simple statistics. The texts were hand searched in order to ensure that all of the instances of possessive constructions were included. The constructions with the interchangeable s-genitives and prepositional phrases were then tagged manually. It is perhaps important to note, that there is an available large corpus of Swedish texts *Språkbanken* developed by a research team at University of Gothenburg. The annotated corpus is an invaluable research tool; however, the present study is a small part of a larger project where historical texts (dated from 12th to 15th century) are compared to present-day texts in Swedish and Danish. For this reason, the corpora selected and the methods of annotating and analysing the texts had to be comparable. The corpus used in the present study is thus relatively small, but the results are nonetheless worth to be reported.

As the main criterion for data selection was the interchangeability of the s-genitive construction and PP construction, every example was carefully analysed as to whether the use of the alternative construction would be possible. In case of any doubt, the corpus of *Språkbanken* was thoroughly searched for the corresponding construction. For instance, to check if *regeringens plan* 'the government's plan' is interchangeable with a PP construction, I searched for the phrase *planen hos* 'the plan of' and checked if such a phrase shows up with human or collective possessors. If the search of *Språkbanken* resulted in more than 100 uses of the phrase, I accepted it into the corpus as an instance of an interchangeable possessive construction. Following the same logic, some instances of the s-genitive were excluded from the study, mainly possessives indicating the notion of legal OWNERSHIP and DISPOSAL which are not regularly expressed through prepositional phrases (Hammarberg & Koptjevskaja-Tamm 2003),

 ISSN 2453-8035

lexicalized phrases with nouns *sort* or *slag* 'kind' (*en sorts grön bil* 'some sort of a green car'), and lexicalized or idiomatic phrases (*dagens rätt* 'meal of the day'). Some of the examples in the data include non-determiner genitives, specifically those indicating measure or time (Koptjevskaja-Tamm 2002b), as they are representative examples of the interchangeability of the s-genitive and prepositional phrases (see Example 12).

(12) a. *s-genitive*

en ***två*** ***timmar-s*** *resa*
INDF two hour-POSS travel
'A **two hours** travel'

b. *prepositional phrase*

en resa på ***två*** ***timmar***
INDF travel on two hours
'A travel of **two hours**'

Further, the so-called 'type' phrases (e.g., *den typen av forskning* 'this type of research') were excluded from the study. Similarly, possessives with an elliptic possessor or possessum phrases (see e.g., Menzel 2016) were excluded from the study. Note that only possessive constructions containing NPs with proper names or common nouns are included in the study, no pronominal possessors are thus included.

The remaining occurrences of possessor and possessum phrases were annotated in the DiaPoss programme according to the following information:

- possessive expression (S-GENITIVE or PP)
- definiteness of the possessor (PROPER NAME, DEFINITE, POSSESSIVE, ZERO, INDEFINITE)
- animacy of the possessor (HUMAN, ANIMAL, COLLECTIVE, TEMPORAL, SPATIAL, INANIMATE)

 ISSN 2453-8035

– animacy of the possessum (HUMAN, ANIMAL, COLLECTIVE, TEMPORAL, SPATIAL, INANIMATE)
– length of the possessor (in syllable count)
– length of the possessum (in syllable count)

With respect to the length of possessor/possessum phrases, I use syllable count as means of measuring length. The syllables are defined as components that include one vowel, namely components of type CV, VC or CVC, in which the number of consonants is not restricted, e.g., the composition CCVCC still makes up only one syllable, as in the word *snabbt* 'quick'. Numerous studies on linguistic variation that take into account the length of the phrase make use of word counts (Berlage 2014: 33; Kreyer 2003) as the easiest and most convenient means to operationalize phrase length. There are also numerous studies that make use of the syllable count instead of the word count, taking into consideration the phonological complexity of the constituents in a phrase and its prosodic properties (Benor & Levy 2006; Pinker & Birdsong 1979). In Swedish, in which compounding is a very productive means to coin words, the number of words and the number of syllables is bound to show some differences. Below two one-word possessors are presented, the first one (Example 13), however, is clearly longer (6 syllables) than the second one (Example 14). Note also the discrepancy between Swedish and English here, where Swedish uses one word, English might use two or three words. Furthermore, note that the Swedish definite article is a suffix, but the indefinite article is a separate graphemic word, compare: *mannen* 'the man' (one word, two syllables), *en man* 'a man' (two words, two syllables). For these reasons, syllable counts are the best suited means to measure the length for Swedish.

(13) *snuttifieringen av* ***kommunikationen*** (Holmberg 2017a)
'the fragmentation of **the communication**.'

(14) *[...] åsikterna som kommer från* ***mäns*** *mun tas på större allvar.* (crobinlarsson 2017)
'[...] the opinions that come from **men's** mouths are taken more seriously.'

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The methods of data analysis are largely quantitative. I use an array of statistical tools, such as the chi-square test of independence, binary logistic regression, and classification tree analysis (see Elliott & Woodward 2007) to measure the correlations between particular constraints and to check which constraints are significant (and if so, to what degree) for the selection of the s-genitive vs. the prepositional construction. All statistical tests were conducted with the IBM SPSS Statistics programme.

3. The overall distribution of s-genitive and prepositional phrases

In this section I present the overall distribution of the s-genitive and prepositional phrases in the corpus with regard to three factors: animacy, length, and definiteness. To see if there is any correlation between these variables and the selection of the possessive construction (s-genitive or PPs), contingency tables are presented for each variable along with the results of the chi-square test of independence.

The annotation process described in Section 2.2 rendered 1 270 exchangeable possessive expressions in total. The s-genitive construction occurs more often in the material. The overall frequencies are presented in Table 2.

Table 2. The overall frequency of the s-genitive and the prepositional phrases

Possessive construction	Frequency	Percentage
s-genitive	698	55.0%
prepositional phrases	572	45.0%
Total	**1 270**	**100.0%**

3.1 Animacy

Table 3 illustrates the distribution of the values of possessor animacy within the use of s-genitive and prepositional phrases. With respect to the total values, inanimate possessors are the most frequent in the material (they constitute nearly half of all the possessors), followed by human, spatial, and collective possessors. The dominating frequency of inanimate possessors is not surprising, since some of the most typical

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possessive notions involving human possessors (LEGAL OWNERSHIP and DISPOSAL) had to be excluded from the study, as they cannot be expressed with prepositional phrases in Swedish.

Table 3. Distribution of animacy values within s-genitive and prepositional phrases

Animacy of the possessor	Count & percentage	s-gen	PP	Total
HUMAN	Count	260	59	319
	% within Animacy	81.5%	18.5%	100.0%
	% within Possessive construction	37.2%	10.3%	25.1%
ANIMAL	Count	4	3	7
	% within Animacy	57.1%	42.9%	100.0%
	% within Possessive construction	0.6%	0.5%	0.6%
COLLECTIVE	Count	87	35	122
	% within Animacy	71.3%	28.7%	100.0%
	% within Possessive construction	12.5%	6.1%	9.6%
SPATIAL	Count	63	70	133
	% within Animacy	47.4%	52.6%	100.0%
	% within Possessive construction	9.0%	12.2%	10.5%
TEMPORAL	Count	61	14	75
	% within Animacy	81.3%	18.7%	100.0%
	% within Possessive construction	8.7%	2.4%	5.9%
INANIMATE	Count	223	391	614
	% within Animacy	36.3%	63.7%	100.0%
	% within Possessive construction	31.9%	68.4%	48.3%
Total	Count	698	572	1 270
	% within Animacy	55.0%	45.0%	100.0%
	% within Possessive construction	100.0%	100.0%	100.0%

$\chi^2 = 214.354$, $df = 5$, $p < 0.001$

A Chi-square test of independence was performed to test the association between the animacy of the possessor, on the one hand, and the possessive construction (s-genitive or PPs), on the other. The null hypothesis is the following: the animacy of the possessor is not associated with the possessive construction. Since the p-value reported under Table 3 is lower than 0.001,[3] and thus the probability of Type I error is very small, I decide to reject the null hypothesis and state that there is, in fact, a significant association between the possessor animacy and the possessive construction. The

ISSN 2453-8035

second row of results for each animacy value (% within Animacy) in Table 3 shows how many of all human/collective/spatial, and so on, possessors occur with the s-genitive and how many with PPs. It is clear that the majority of human, collective, and temporal possessors strongly prefer the s-genitive construction. Spatial possessors are split nearly evenly, with a slight preference for PPs, while inanimate possessors strongly prefer prepositional constructions. I disregard the animal possessors here, since there is not enough data in the material to draw any conclusions for this category.

Overall, looking at the proportions of particular animacy values within all the examples of a given construction (row *% within Possessive construction* in Table 3), we observe that the s-genitive occurs most often with human possessors (37.2%), but inanimate possessors are also quite frequent (31.9%). Prepositional constructions, on the other hand, occur most frequently with inanimate possessors (68.4% of all PPs), followed by spatial possessors (12.2%). Only 10.2% of all prepositional constructions occur with human possessors. The association of the two variables is then clear: while the s-genitive occurs with human and inanimate possessors in almost equal proportions, prepositional phrases strongly prefer inanimate possessors. This confirms hypothesis (i) stated in Section 2.1, namely, that the more animate the possessor is, the more likely it is to occur with the s-genitive.

Further, it is worthwhile to look into the frequencies of particular combinations of possessor and possessum phrases with regard to their animacy. It is widely accepted that the animacy scale is discernible in noun-noun relations in that the referent higher on the animacy scale will precede the referent lower on the same scale (Dahl & Fraurud 1996; Rosenbach 2005). Dahl and Fraurud (1996: 53) note that in Swedish a human referent will usually precede an inanimate referent (in their terminology: person and non-person referent respectively) both in nominal phrases and clauses. In their study of subject and object positions in transitive sentences, more than 97% of sentences in the studied corpus follow the constraint that the subject should not be lower than the object as regards animacy (ibid., 53-54). They also analyse preposed NP modifiers,

ISSN 2453-8035

namely the possessive constructions with the s-genitive or pronouns, their results are given in Table 4.

Table 4. Distribution of genitive NPs according to animacy of possessor and possessum phrases in Dahl & Fraurud (1996: 55)

Possessor	Possessum	Frequency	Percent
human	inanimate	608	43.1%
inanimate	inanimate	674	47.8%
human	human	93	6.6%
inanimate	human	36	2.5%
Total		1 411	100.0%

In their study, only 2.5% of possessive phrases do not follow the constraint that the 'more animate' referent should precede the 'less animate' referent. In comparing these results with the results of the present study it is important to recall that the number of instances of possessive NPs is over twice as large in Dahl & Fraurud (1996), but the data also includes possessive determiners other than the s-genitive, which is not the case for the present study. Furthermore, the authors do not mention excluding certain possessive expressions, so I assume that such relationships as OWNERSHIP or DISPOSAL (which occur almost exclusively with human referents) are included in the data. The distribution of the s-genitive NPs according to animacy of the possessor and possessum phrases in the present dataset is given in Table 5. Note that in this study the scale of animacy is more detailed and includes collective, spatial, and temporal referents.

Table 5. Distribution of s-genitive NPs according to animacy of possessor and possessum phrases in the present study

	Animacy of the possessum			
Animacy of the possessor	HUMAN	COLLECTIVE	INANIMATE	Total
HUMAN	1.9% (13)	0.6% (4)	35.0% (242)	37.4% (259)
COLLECTIVE	1.1% (8)	1.6% (11)	9.8% (68)	12.6% (87)
SPATIAL	2.0% (14)	0.4% (3)	6.5% (45)	8.9% (62)
TEMPORAL	1.3% (9)	0.9% (6)	6.6% (46)	8.8% (61)

ISSN 2453-8035

INANIMATE	2.0% (14)	1.0% (7)	29.2% (202)	32.2% (223)
Total	8.4% (58)	4.5% (31)	86.4% (598)	100.0% (692)

Since there are only six instances of animal referents in the corpus, they are excluded from the results. What is more, temporal and spatial possessum phrases are not listed in Table 5 as there were no examples of such referents. Overall, the vast majority of possessum phrases include inanimate referents, which confirms Dahl and Fraurud's findings. Combinations of human and collective referents in the s-genitive constructions (Examples 15-16) are quite rare (together they make up 5.2% of all examples).

(15) *[...] hade han förvissat sig om att* ***Stefan Löfvens*** *statssekreterare nåtts av informationen.* (Bjereld 2017)
'[...] he had made sure that the information reached **Stefan Löfven's** state secretary.'

(16) *[...] med hjälp av bundsförvanten Hjalmar Branting,* ***Socialdemokraternas*** *partiordförande.* (Ohlsson 2017)
'with the help of the ally Hjalmar Branting, **The Social Democrats'** chairman.'

Further, Examples 17 and 18 illustrate that spatial and temporal possessor referents are most frequently combined with inanimate possessum referents.

(17) *Expressen på 1970-talet var* ***Sveriges*** *största tidning [...]* (Boëthius 2017)
'In the 1970s, Expressen was **Sweden's** largest newspaper [...]'

(18) *[...] och antog en resolution som bland annat krävde rösträtt för kvinnor och* ***åtta timmars*** *arbetsdag.* (Ohlsson 2017)
'[...] and adopted a resolution demanding, among other things, voting rights for women and an **eight-hour** working day.'

 ISSN 2453-8035

As regards inanimate possessors, there are few examples of the combination inanimate possessor + human/collective possessum (Example 19). However, if one counts the three inanimate categories together (spatial, temporal, and inanimate), the s-genitive examples that do not follow the animacy scale (animate before inanimate) constitute 7.7% of all examples (see Example 20).

(19) *Beslutet hälsades med jubel från* ***skolidrottens*** *främjare.* (Sörlin 2016)
'The decision was greeted with cheers from **school sports'** promoters.'

(20) *Trots att tjänsten är relativt nylanserad är redan tiotusentals av* ***Sveriges*** *högstadieelever anslutna till Albert.* (Kickstarta läsåret… 2017)
'Despite the fact that the service is relatively newly launched, tens of thousands of **Sweden's** high school students are already connected to Albert.'

The overall results confirm that animate referents tend to precede inanimate referents in the s-genitive constructions. This is, however, not dependable on the relative order of the phrases (the pre- or postposition of the possessor phrase), but rather on the internal hierarchy in a possessive construction in which one referent is a modifier of another referent. This is also discernible in the prepositional constructions in the study, where the least frequent combinations are: human/collective possessor + human/collective possessum (4.4% of all PPs), and inanimate possessor + human/collective possessum (6.6% of all PPs). Examples 21 and 22 below illustrate these types of constructions.

(21) *Föräldrarna till* ***intersex-barn*** *måste dock samråda med läkare och noggrann psykologisk undersökning genomförs.* (Rönnberg 2017b)
'However, the parents of **intersex children** must consult a doctor and a thorough psychological examination is undertaken.'

 ISSN 2453-8035

(22) *För det är dessa påverkansarbetare som är de skickligaste aktörerna i* ***samhällsdebatten***. (RetorikKalle 2015)
'Because it is these influential workers who are the most skilled actors in **the public debate**.'

As Example 22 illustrates, the decision whether the PP can function as a possessor or just as an adverbial in the clause was not always straightforward. As long as it could be reformulated into the s-genitive, which is the case here, it was accepted into the dataset.

In conclusion, it seems that there are simply not many contexts or relationships in which human referents will be acceptable as head nouns in possessive constructions, with the exception of KINSHIP and SOCIAL ROLE relations.

3.2 Length

With regard to length of the phrase, the descriptive statistics (including the mean, median, and range) for the possessor phrases in both constructions are given in Table 6.

Table 6. Length of possessor phrases (syllable count) in s-genitive and PPs

Possessor length	s-gen	PP
N	698	572
Mean	**3.69**	**5.05**
Median	3.00	4.00
Std. Deviation	1.987	3.049
Range	20	19
Minimum	1	1
Maximum	21	20

Additionally, Figure 1 shows the boxplots for respective constructions. In a boxplot graph, the box constitutes 50% of the data, while each of the so-called inner fences constitutes 25% of the data. The dots and asterisks indicate outliers, namely the

 ISSN 2453-8035

singular high values that are abnormally far from the central values (the box) and thus tend to make the mean higher.

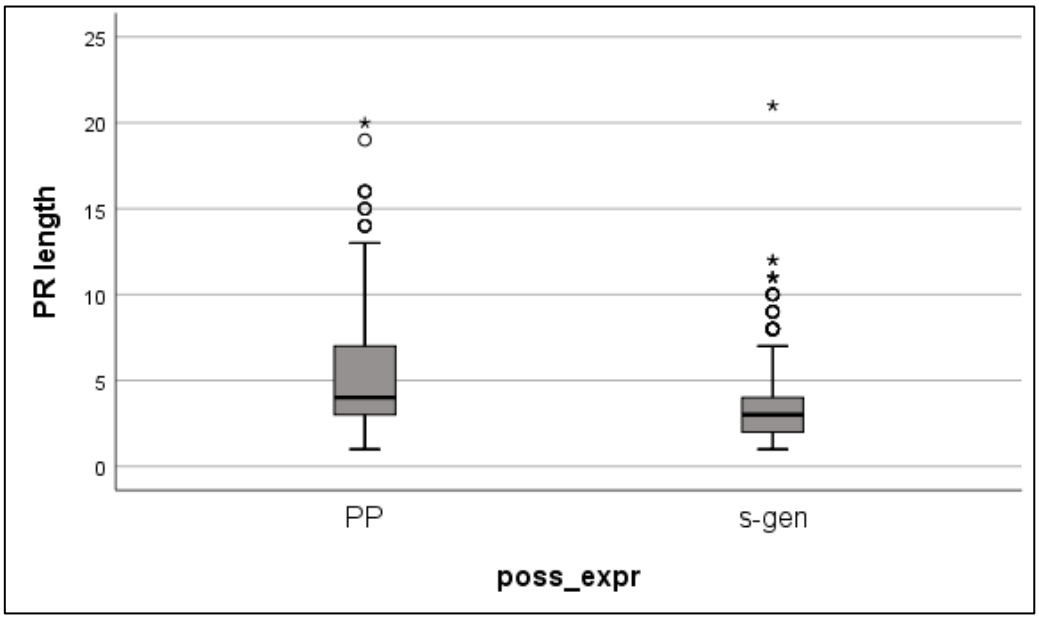

Figure 1. Boxplots illustrating possessor length in s-genitive and PPs

The length of the possessor is on average longer in prepositional constructions than in the s-genitive in the dataset, which confirms hypothesis (iii) stated in Section 2.1, namely, the longer the possessor is the more likely it is to occur with prepositional phrases. The median of the possessor length is also higher in prepositional phrases, albeit only by one syllable. The boxplots clearly illustrate that possessor length in PP constructions is more dispersed as there are more data points with higher values. The range of possessor length is nearly identical for both constructions, as examples with extremely long possessor phrases can be found with both the s-genitive and PPs. Some examples with the shortest and longest possessor phrases in the dataset are presented below (23-26).

(23) s-genitive, 1 syllable possessor:

Klart är i vart fall ***barns*** *spontansång och fysiska rörlighet är viktiga inslag: [...]*. (Rönnberg 2017a)

 ISSN 2453-8035

'It is clear in which cases **children's** spontaneous singing and physical activity are important elements: [...].'

(24) s-genitive, 21 syllable possessor

Närmare bestämt ***den norske professorn i musikvetenskap och barnkultur Jon-Roar Bjørkvolds*** *bok från 1989.* (Rönnberg 2017a)

'More specifically, **the Norwegian professor of musicology and children's culture Jon-Roar Bjørkvold's** book from 1989.'

(25) prepositional phrase, 1 syllable possessor

Jag motsätter mig dock starkt att vuxna medvetet ska sätta griller i huvudet på ***barn****, mer än de redan gör.* (Rönnberg 2017b)

'However, I strongly oppose adults deliberately putting fads in the heads of **children**, more than they already do.'

(26) prepositional phrase, 20 syllable possessor

Med inslag av ***både spel, humor och situationer hämtade från verkliga livet*** *[...]*. (Kickstarta läsåret… 2017)

'With elements of **both games, humour and situations taken from real life** [...].'

Table 7 illustrates the length of the possessum phrase for both the s-genitive and PP constructions.

Table 7. Length of possessum phrases (syllable count) in s-genitive and PPs

Possessum length	**s-gen**	**PP**
N	698	572
Mean	**4.33**	**4.17**
Median	4.00	4.00
Std. Deviation	2.823	2.260
Range	24	15
Minimum	1	1
Maximum	25	16

 ISSN 2453-8035

In Figure 2, the boxplots for possessum length in both constructions are displayed. The box and fences corresponding to the s-genitive construction are visibly longer than those corresponding to the PP construction.

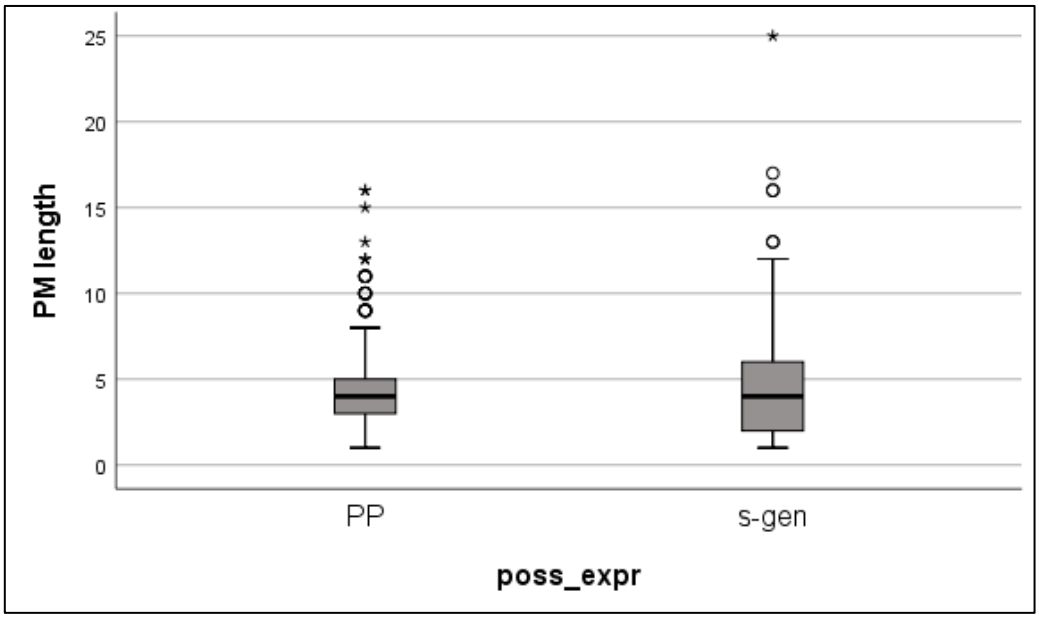

Figure 2. Boxplots illustrating possessum length in s-genitive and PPs

Possessum phrases are on average longer in the s-genitive construction than in the PP construction, which is expected and it confirms the hypothesis that the longer of the two phrases occurs second in a possessive construction. The difference in means is admittedly not very large and the median is the same for both constructions, but the boxplot clearly illustrates that possessum length in the s-genitive construction is more dispersed and varied. Half of the possessum phrases in s-genitive have between 2 and 6 syllables (the grey box illustrates 50% of the data), while the same range for PPs is between 3 and 5 syllables. Further, at least 25% of the possessum phrases in s-genitive are between 6 and 12 syllables long, while for PPs it is only a range of 5 to 8 syllables. The overall range for possessum length is also much larger for the s-genitive than for the PPs. Some examples with the shortest and longest possessum phrases in the dataset are presented in Examples 27-30.

(27) s-genitive, 1 syllable possessum

 ISSN 2453-8035

*Bara under oktober hade denna pandemi släckt nästan **10 000 svenskars** liv.* (Ohlsson 2017)

'In October alone, this pandemic had extinguished almost **10 000 Swedes'** lives.'

(28) s-genitive, 25 syllable possessum

*I den står bland annat om den digitala miljöns betydelse för **10-17-åringars** sätt att utforska och utforma sin individuella och kollektiva identitet*. (Rönnberg 2017c)

'It states, among other things, the importance of the digital environment for **10-17-year-olds'** way of exploring and shaping their individual and collective identity.'

(29) prepositional phrase, 1 syllable possessum

*Självklart måste man ha stöd i **riksdagen** och de får ytterst ta ställning.* (Silverberg 2017)

'Of course, you must have support of **the Riksdag** and they must ultimately take a stand.'

(30) prepositional phrase, 16 syllable possessum

*Brittiska Tories lämnade den stora kristdemokartiska/konservativa gruppen i **Europaparlamentet** och bildade en egen grupp.* (Andersson 2014)

'The British Tories left the large Christian Democratic/Conservative group in **the European Parliament** and formed their own group.'

Comparing the lengths of the possessor and possessum phrases we observe that, indeed, in both constructions the phrases that are on average longer occur second (possessum phrase for the s-genitive construction, but possessor phrase for the PP construction). As mentioned, however, the difference between the lengths of possessum phrases in the two studied constructions is not very large. In short, analysing the variable of weight separately shows that it is the possessor length factor that is of potential

 ISSN 2453-8035

importance for the choice of the possessive construction in the studied material. The results confirm the prediction that the prepositional phrase construction tends to have longer possessor phrases.

3.3 Definiteness

Table 8 illustrates the distribution of definiteness of the possessor phrase both for s-genitive and prepositional phrases. As regards the total number of different categories of definiteness, explicitly definite possessor phrases are the most common in the dataset as they constitute nearly half of all of the possessors. Proper name possessors are the second most common followed by indefinite possessors and quite infrequent zero-marked and possessed phrases.

Table 8. Distribution of definiteness values across s-genitive and prepositional phrases

Definiteness of the possessor	Count & Percentage	s-gen	PP	Raw total
PROPER NAME	Count	245	122	367
	% within Definiteness	66.8%	33.2%	100.0%
	% within Possessive construction	35.1%	21.3%	28.9%
DEFINITE	Count	355	257	612
	% within Definiteness	58.0%	42.0%	100.0%
	% within Possessive construction	50.9%	44.9%	48.2%
POSSESSIVE	Count	19	17	36
	% within Definiteness	52.8%	47.2%	100.0%
	% within Possessive construction	2.7%	3.0%	2.8%
ZERO-MARKED	Count	2	37	39
	% within Definiteness	5.1%	94.9%	100.0%
	% within Possessive construction	0.3%	6.5%	3.1%
INDEFINITE	Count	77	139	216
	% within Definiteness	35.6%	64.4%	100.0%
	% within Possessive construction	11.0%	24.3%	17.0%
Total	Count	698	572	1 270
	% within Definiteness	55.0%	45.0%	100.0%
	% within Possessive construction	100.0%	100.0%	100.0%

$\chi^2 = 94.665$, $df = 4$, $p < 0.001$

ISSN 2453-8035

A Chi-square test of independence was performed to test the association between the definiteness of the possessor and the possessive construction. The null hypothesis can be stated as follows: there is no significant association between the possessor's definiteness and the possessive construction. With the very small p-value there is very little probability for Type I error, so we can reject the null hypothesis and state that there is a statistically significant association between the two.

Analysing the second row of the results for each value in Table 8 (row *% within Definiteness*), we observe that proper names and definite possessors strongly favour the s-genitive construction, while indefinite possessor phrases strongly favour prepositional constructions. This is in line with the hierarchy of accessibility as operationalized in O'Connor et al. (2013: 98), namely proper name referents as the most accessible and familiar in the context of the discourse occur much more often in s-genitive than in PP constructions, as the former construction places that referent first. The same goes for definite possessor phrases, although the distribution of the proper name possessors across the two constructions clearly illustrates that they are most commonly used with the s-genitive. The two last categories, zero-marked and indefinite possessors, are marginal in the data as each of them accounts for ca. 3% of possessors. Possessors that are themselves head nouns in possessive constructions (and thus semantically definite and accessible) are evenly distributed between the two constructions, while zero-marked possessors, which are semantically indefinite, are overwhelmingly frequent with prepositional constructions rather than the s-genitive. Examples of these less frequently encountered constructions are presented below (31-32).

(31) *Jag vill till och med hävda att detta rör sig om* ***min identitets*** *kärna [...].* (Rönnberg 2017c)
'I even want to claim that this is about **my identity's** core [...].'

 ISSN 2453-8035

(32) *Johanna har alltid haft ett gott omdöme. Sett och förstått hans potential, också i stunder av* ***motgång och nederlag***. (Eriksson 2014)
'Johanna has always had a good judgement. Seen and understood his potential, even in moments of **adversity and defeat**.'

The hypothesis set forward in Section 2.2, namely that proper name and definite possessor phrases will favour the s-genitive construction is confirmed. The tendency for the s-genitive to 'dislike' indefinite possessor phrases is also verified by the data, as only 11% of all possessors in s-genitive are indefinite. Since the s-genitive possessors are expected to be largely explicitly definite, it is worthwhile to explore the indefinite possessor phrases in the dataset. Out of 77 indefinite possessors in s-genitive 60 (77.9%) possessors are plural (see Examples 33-34).

(33) *Grunden i det rasistiska tänkandet är därmed att* ***människors*** *egenskaper och plats i världen bestäms och kan förklaras av deras hudfärg, religion eller härkomst.* (Hagren Idevall 2017)
'The basis of racist thinking is thus that **people's** characteristics and place in the world are determined and can be explained by their skin colour, religion or origin.'

(34) *[...] men den stora skillnaden mellan* ***barns och vuxnas*** *förmåga att lära sig språk ligger i att lära sig uttala och uppfatta främmande språkliga ljud.* (Holmberg 2017b)
'[...] but the big difference between **children's and adults'** ability to learn languages lies in learning pronunciation and discerning foreign linguistic sounds.'

There is no plural indefinite article in Swedish. Thus, these results indicate that, firstly, the s-genitive in general disfavours indefinite possessors, and secondly, it particularly disfavours indefinite possessors in singular (those that are overtly marked with an indefinite article). There are only 17 examples of singular indefinite possessors in the

 ISSN 2453-8035

s-genitive; they constitute 2.4% of all possessors in s-genitive. In comparison, half of all indefinite possessors in prepositional constructions are singular (69 out of 139); they constitute 12.1% of all possessors in PPs. The few examples of singular indefinite possessors in s-genitive include 4 temporal possessors (35), and 13 common nouns denoting non-specific individuals (36) or generic referents (37-38).

(35) *[...] efter mindre än en kvart hade jag skrivit under kontraktet, betalat det överenskomna priset för **ett halvårs** hyra, 3 000 pund kontant.* (Nesser 2013)
'[...] after less than a quarter of an hour I had signed the contract, paid the agreed price for **a half-year's** rent, 3 000 pounds in cash.'

(36) *Tankegångarna om **en enskild individs** många (!) "flytande" identiteter är förstås ett symptom på globala förändringar [...]* (Rönnberg 2017c)
'The idea of **a single individual's** many (!) "fluid" identities is of course a symptom of global change […]'

(37) *Hon begrep inte ens det allra mest elementära med **en Gryffindorhalsduks** symbolik.* (Backman 2013)
'She didn't even understand what was the most elementary with **a Gryffindor scarf's** symbolism.'

(38) *Det ingår i **en advokats** dna att larma och göra sig till och deras retorik bör inte alltid tas på alltför stort allvar.* (Cantwell 2017)
'It is part of **a lawyer's** DNA to alert and pretend, and their rhetoric should not always be taken too seriously.'

Overall, the results clearly show that the possibility of using a singular, indefinite common noun as a possessor with the s-genitive is very limited in Swedish and the tendency for selecting proper name and definite possessors in the s-genitive construction is very strong.

 ISSN 2453-8035

The definiteness of the possessum phrase cannot be taken as a variable in the multivariate analysis presented in the next section, since the possessum in the s-genitive construction is never overtly marked with neither definite nor indefinite article (because of article-possessor complementarity in Swedish). What is more, there seems to be a general consensus that the s-genitive possessor renders the head noun definite (e.g., Lyons 1999; Rosenbach 2005), even though there is ample research stating that possessum phrases in s-genitive constructions need not be definite (e.g., Willemse et al. 2009). It is, thus, interesting to analyse the results of the possessum definiteness in prepositional phrases, as the logical assumption is that if the possessum is explicitly indefinite, the prepositional construction will be selected over the s-genitive. Figure 3 shows the distribution of 572 possessum phrases in prepositional constructions as regards their definiteness.

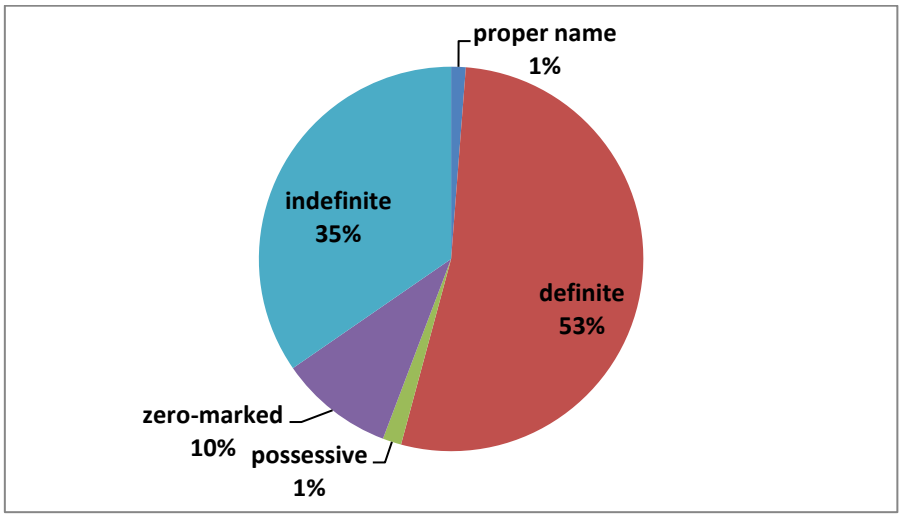

Figure 3. Distribution of possessum definiteness values in prepositional phrases

While most of the possessum phrases are definite in PP constructions, there is also a large proportion of indefinite possessum phrases (see Examples 39-40).

(39) *Att kategorisera är en grundläggande funktion i* ***språket***. (Hagren Idevall 2017)
'Categorizing is a fundamental function of **language**.'

 ISSN 2453-8035

(40) *"Strangers in their own land" Om en bok av **Arlie Russell Hochschild**.*
(Demker 2017)
' "Strangers in their own land" About a book by **Arlie Russell Hochschild**.'

Even though definiteness of the possessum phrase is not a comparable constraint in the s-genitive and the PP construction, there are good grounds to claim that if the possessum phrase is indefinite, it will probably occur in the prepositional construction rather than in the s-genitive.

4. Multivariate analysis

To outline the influence of multiple conditioning factors on the choice of possessive constructions, the results of a binary logistic regression are reported in this section. This statistical tool allows for building a predictive model that will show how great the probability of the s-genitive occurring is, given the three variables: animacy, length, and definiteness. Additionally, the fourth factor is added here that accounts for the differences in register of the corpus texts (namely literary, press, and blog texts). The model will also provide information on which of the variables is the most prominent, while simultaneously controlling for all of the other variables in the model.

Binary logistic regression fits a model for one dependent variable that can only take one of two values (for introduction see Elliott & Woodward 2007). In this study the dependent variable is the presence of the s-genitive. The two values that our dependent variable adopts are thus *yes* meaning *presence of the s-genitive* and *no* meaning *absence of the s-genitive* (or in other words *no* means *presence of the PP construction* since this is the only remaining choice). The regression model is used to predict the probability of the s-genitive occurring given the list of the independent variables (i.e. predictor factors). Logistic regression measures the effect size of each variable and specifies the direction of the effect of each variable. Overall, the model allows one to rank the relative importance of the predictor variables in explaining the genitive choice by calculating the log-odds ratios, which measure the importance of each factor.

 ISSN 2453-8035

The results of the binary logistic regression are presented in Table 9. The first four variables in Table 9 are categorical variables. For each categorical variable one category is selected as a baseline category, to which the other categories within the same variable are compared. For example, within the REGISTER variable, 'blog' is the baseline category so the other two registers are compared to 'blog'. As already mentioned, definiteness of the possessum is not included in the model, as it could not be annotated for the s-genitive and thus cannot be compared across the two constructions. Animacy of the possessum is entered into the model, but as we will see it is not significant. Length of possessor and possessum are continuous variables measured in number of syllables.

Table 9. Binary logistic regression model for the s-genitive vs. PPs

	Independent variables	Estimate (B Coefficient)	Std. Error	Significance	Odds ratios
	Intercept	-0.403	0.344	0.242	0.668
REGISTER	**blog**	-	-	0.371	-
	literary vs. blog	0.227	0.191	0.234	1.255
	press vs. blog	-0.003	0.162	0.985	0.997
PR_ANIMACY	**inanimate**	-	-	**0.000**	**-**
	human vs. inanimate	**2.338**	**0.208**	**0.000**	**10.362**
	animal vs. inanimate	0.981	0.878	0.264	2.668
	collective vs. inanimate	**1.734**	**0.300**	**0.000**	**5.664**
	spatial vs. inanimate	-0.367	0.253	0.146	0.693
	temporal vs. inanimate	**1.885**	**0.355**	**0.000**	**6.586**
PM_ANIMACY	**inanimate**	-	-	0.813	-
	human vs. inanimate	-0.244	0.359	0.497	0.783
	animal vs. inanimate	21.091	40192.9	1.000	1444632163
	collective vs. inanimate	0.332	0.582	0.568	1.394
	spatial vs. inanimate	1.253	1.267	0.323	3.499
	temporal vs. inanimate	0.966	1.478	0.513	2.628
PR_DEFINITENESS	**indefinite**	-	-	**0.000**	-
	proper name vs. indefinite	**1.522**	**0.238**	**0.000**	**4.583**
	definite vs. indefinite	**1.207**	**0.209**	**0.000**	**3.345**
	possessive vs. indefinite	**1.131**	**0.436**	**0.010**	**3.098**
	zero-marked vs. indefinite	**-1.884**	**0.783**	**0.016**	**0.152**
PR_LENGTH		**-0.310**	**0.055**	**0.000**	**0.734**
PM_LENGTH		-0.028	0.052	0.583	0.972

ISSN 2453-8035

The numbers in bold indicate the results that are statistically significant, with the p-value lower than 0.05. The variables that are not significant are: REGISTER, PM_ANIMACY, and PM_LENGTH, thus, they do not have a significant influence on the selection of the s-genitive vs. prepositional construction in the dataset. In the PR_ANIMACY variable (animacy of the possessor), inanimate is the baseline category. The odds ratios indicate that, in comparison with inanimate possessors, human possessors are over 10 times more likely to occur with the s-genitive rather than with a prepositional construction. Collective possessors, in comparison with inanimate possessors, are 5.6 times more likely to occur with the s-genitive rather than prepositional phrases. Similarly, temporal possessors are 6.5 times more likely to occur with the s-genitive. Animal and spatial possessors are not significant in the model, either due to insufficient data (very few animal referents in the texts), or due to the lack of preference for either construction (spatial possessors, see Table 3 in Section 3.1). In sum, within animacy of the possessor human, collective, and temporal referents are shown to strongly favour the s-genitive construction in comparison with inanimate possessors. As mentioned, animacy of the possessum phrase is not significant, as was expected.

For the PR_DEFINITENESS variable, all categories are statistically significant. Indefinite is the baseline category. Compared to indefinite possessors, proper names are 4.5 times more likely to occur with the s-genitive than PPs in the dataset. Definite possessors are 3.3 times more likely than indefinite possessors to take the s-genitive. Possessors that are modified by other possessives are also more likely to take the s-genitive than indefinite possessors. The only category here that is less likely than indefinite possessors to take the s-genitive is zero-marked possessors. These results confirm once again the hierarchy of accessibility, namely that proper names as the most accessible and familiar will most likely occur with the s-genitive, followed by definite possessors and finally by indefinite possessors.

As regards length, only the possessor length is significantly influencing the selection of the s-genitive. The odds ratios for possessor length are lower than 1 (0.734 to be exact) which indicates a negative correlation with the s-genitive. The longer the possessor phrase is, the less likely the occurrence of the s-genitive is. In other words, when the possessor length increases by one syllable, the log-odds for the s-genitive occurring decrease by ca. 26.6%.

It is important to note that the odds ratios measures for each variable control at the same time for all of the other variables in the model. If I only included the animacy variable into the model, the odds ratios would be different since they would not take into consideration the contribution of definiteness and length. To sum up, the human possessor is the single most powerful categorical predictor in the dataset, followed by temporal, collective, and proper name possessors. The hypothesis that the Swedish s-genitive has a strong preference for animate, definite and shorter possessors finds strong support in the empirical statistically significant results.

As regards the accuracy of the regression model, its overall predictive capacity is 73.2%. The accuracy of the baseline model (before any of the predictive variables were included) is 55.0%, so the improvement of the predictive capacity is impressive and statistically significant ($\chi^2 = 436.703$, $df = 30$, $p < 0.001$). This means that, thanks to the predictive variables, the statistical model is able to predict the occurrence of either the s-genitive or the prepositional construction correctly in 73.2% of cases.

To test which variable is the most decisive with regard to the genitive variation in the dataset, I use the Classification and Regression Tree analysis. This is a type of regression analysis that presents the data graphically in the form of a decision tree. The algorithm tests each independent variable separately and chooses the one that has the greatest impact on the selection of the s-genitive as opposed to the prepositional construction. The algorithm then repeats this process and splits the data into subsets

 ISSN 2453-8035

that can be visualised in the form of 'trees' with several 'branches' (or nodes). The decision tree for the selection of the s-genitive in the dataset is presented in Figure 4.

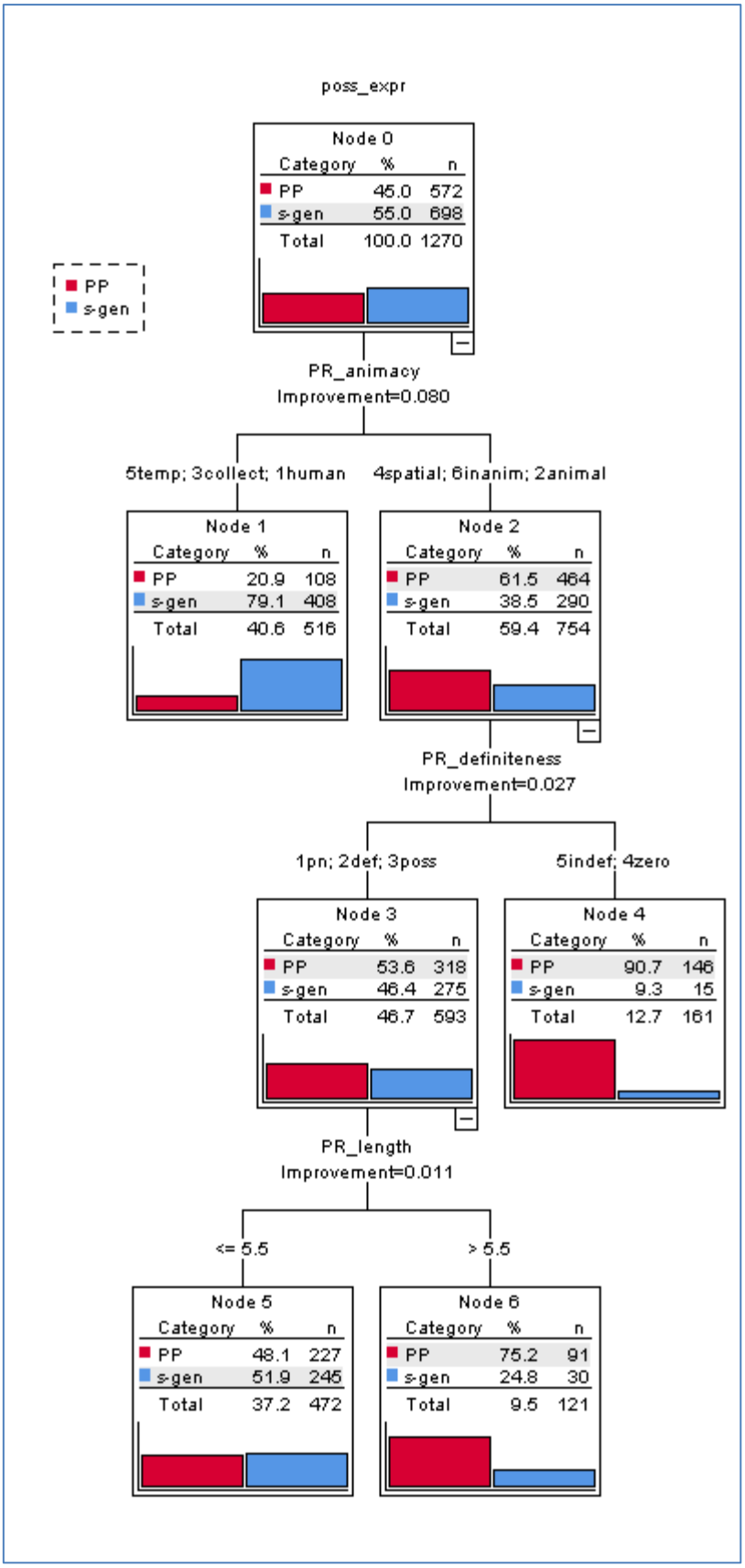

Figure 4. Classification and Regression Tree Analysis for the selection of the s-genitive

ISSN 2453-8035

The tables and graphs in each node in Figure 4 show the exact distribution of the data. The first split in the data is determined by the animacy of the possessor: the s-genitive is strongly associated with human, collective, and temporal possessors (Node 1), while spatial and inanimate possessors are associated with the PP construction (Node 2). In the second split, out of the spatial and inanimate possessors, it is the proper name, definite and possessed possessor phrases that favour the s-genitive (Node 3). Indefinite and zero-marked possessors, on the other hand, strongly favour prepositional constructions. All this repeats the results of the binary logistic regression, but the decision tree further confirms that animacy of the possessor is the category that has the biggest impact on the selection of the possessive construction. The last split in Figure 4 is determined by possessor length. If the possessor is shorter or equal to 5.5 syllables, the s-genitive is nearly as frequent as the PPs (Node 5), but if the possessor is longer than 5.5 syllables the prepositional construction is strongly favoured (Node 6). Note that the last split concerns only spatial and inanimate possessors that are additionally proper names or definites (following the Nodes and splits from the top of the graph).

Table 10. The relative importance of the independent variables in the regression model

Independent variable	Importance	Normalized importance
PR_ANIMACY	0.080	100.0%
PR_DEFINITENESS	0.027	34.4%
PR_LENGTH	0.022	28.2%

Table 10 illustrates the importance of each significant variable as calculated based on the Classification and Regression Tree in Figure 4. Animacy of the possessor is the most important predictor in the dataset, much more impactful than definiteness and possessor length, whose contributions are very similar.

5. Conclusions

The analysis has shown that the choice of the possessive construction in present-day Swedish is determined by a number of interlinked linguistic factors. Animacy has the

ISSN 2453-8035

greatest influence on the choice of the possessive construction in the dataset. Definiteness and possessor length account for a fair proportion of variation in the choice of the s-genitive, whereas possessum length, animacy of the possessum, and register of the corpus texts do not make any significant contribution to the model. The Swedish s-genitive, as reflected in the dataset, exhibits a strong preference for human and proper names or definite, and short possessor phrases. Further, it is important to note that the results for Swedish genitive variation are very similar to those for English genitive variation, with the exception of definiteness having a bigger impact on Swedish s-genitive phrases than on the English ones.

As regards the reasons for the influence of these particular predictor factors, it is clear that the preference for human possessors being realised with the s-genitive stems from the nature of possession itself. If we take a closer look at different semantic notions of possession, such as AUTHOR or ORIGINATOR (*my paper*), or KINSHIP and SOCIAL RELATIONS (*John's brother*, *John's neighbour*), we note that they almost exclusively involve a human possessor. Not to mention, other very common types of possession that also often include human possessor referents, for example, ATTRIBUTIVE possession (*John's fear*, *my mother's perseverance*) or ABSTRACT possession (*John's arrival*, *John's decision*). It has been often suggested that possessors in a possessive NP function as anchors or "reference point entities" that allow one to identify the referent in the possessum phrase.[4] The referent in the possessor phrase needs to be salient and easily identifiable in the context of discourse. Human referents are thus the best candidates as they are very frequent, often topical, and easily accessible in discourse. A similar point can be made with reference to the economic motivation in language. Since human possessors are simply the most frequent and salient in discourse, they are the most predictable possessors.[5] As such, human possessors take the shortest possible expression, which is the s-genitive, to account for the economic motive. At the same time, the s-genitive construction places the possessor referent before the head noun. The possessor that is salient, familiar, and first in a possessive

 ISSN 2453-8035

NP has the best chance to function as a reference-point entity and, thus, most efficiently help the hearer to identify the referent of the possessum phrase.

This would suggest that human possessors should be the most frequent within the use of possessives. And, indeed, within the use of the s-genitive human possessors are the most commonly used. Overall, however, inanimate possessors are the most frequent in the dataset. This is due to, firstly, the exclusion of the two most prototypically human possessive notions, namely LEGAL OWNERSHIP and DISPOSAL (since they cannot be expressed with prepositional constructions in Swedish). Secondly, inanimate possessors do occur with the s-genitive relatively frequently, and if we count spatial and temporal possessors into one category with inanimate possessors, they account for as much as 49.6% of the use of the s-genitive. While this does not contest the claim that human possessors are more salient and therefore more frequent in the s-genitive construction, it suggests that inanimate possessors take the s-genitive more often than expected. This may point to a certain development in language that is associated with economy-related factors.[6] The research suggests that inanimate possessors take the s-genitive more often than expected, particularly in press texts, because of the constraint of topicality (highly thematic and salient referents are more likely to take the s-genitive) as well as an increasing density of journalistic prose.[7] The latter observation points to the economy-related motivation. The s-genitive is the construction that enables the condensation of the information in the text, which may be specifically needed in newspaper texts. This tendency is substantiated by the results from the present dataset. Out of 347 inanimate possessors that take the s-genitive (spatial and temporal possessors are included in this count), 46.4% (161 out of 347) occur in press texts, 28.8% (100 out of 347) in literary texts, and 24.8% (86 out of 347) in blog texts. For comparison, out of 260 human possessors that take the s-genitive, 34.2% (89 out of 260) occur in press texts, 30.8% (80 out of 260) occur in literary texts, and 35.0% (91 out of 260) in blog texts. Even though the data is not very robust, and even though register is not a significant variable for the selection of the s-genitive vs. the prepositional construction (see Table 9), there is an evident tendency for inanimate

ISSN 2453-8035

possessors in the s-genitive to occur more often in press texts, in agreement with the economy-related motives.

I assume thus that the economic motivation has a strong indirect bearing on the choice of the possessive construction and it may account for some of the variance in the results. The same can be argued for the factor of definiteness. The frequency and predictability of the possessor go hand in hand with its status as a well-known, and thus definite, referent. With respect to the factor of length, the predominance of longer possessor phrases in prepositional constructions may again be understood as an aspect of economy of language and processing efficiency. Swedish, as well as English, is a right-branching language. Thus, not only new information, but also longer and more complicated constructions tend to occur later in a sentence or phrase to facilitate processing. Shorter constituents occur before longer ones and heads occur before modifiers and complements. In conclusion, the effect of different linguistic factors on the choice of the possessive construction is linked to various aspects of language economy and processing efficiency. Studying these factors in Swedish may tell us more about conditioning factors not only for possessive expressions, but also for the structure of Swedish as a whole.

Notes

1. In the context of English genitive variation a construction of this type is often referred to as *the of-genitive* or *of-possessive* as an analogy to *the s-genitive* (Hinrichs & Szmrecsanyi 2007; Rosenbach 2005; 2008). This term is avoided here as Swedish possessive prepositions are not grammaticalised to the same degree as the English one is. The term prepositional construction or PP construction is used in this paper.

2. In all of the remaining examples the possessor phrase is marked in bold, while the possessum phrase is underlined.

3. In all statistical tests presented here I take $p < 0.05$ as the threshold for statistical significance, as is customary in linguistic studies (Levshina 2015: 12).

 ISSN 2453-8035

4. See, for example, Koptjevskaja-Tamm (2002a: 148), Langacker (1995: 58-61) and Taylor (1996: 17).

5. See Haspelmath (2008).

6. See Lančarič & Bojo (2020) for more on economy-related factors in language use.

7. See Hinrichs & Szmrecsanyi (2007: 467-468).

List of abbreviations

DEF – definite article

DF – degrees of freedom

INDF – indefinite

PL – plural

POSS – possessive

PP – prepositional phrase construction

PR – possessor phrase

PM – possessum phrase

S-GEN – s-genitive

WK – weak adjective

χ^2 – chi-square

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fields of interest:	Possessive constructions, semantics of possession, historical linguistics, North Germanic languages.

Résumé

Swedish has two adnominal possessive constructions that are largely interchangeable: the s-genitive (*Annas dotter* 'Anna's daughter') and the prepositional construction (*dotter till Anna* 'daughter of Anna'). With the exception of possessives expressing LEGAL OWNERSHIP or DISPOSAL relations, either of the two constructions is allowed. Whenever there is a variation between two constructions, however, some linguistic factors are at play determining the use of one or the other expression. The aim of the paper is to analyse and determine which factors influence the selection of the s-genitive as opposed to the prepositional construction in Modern Swedish. The factors considered are animacy, definiteness and length of the possessor phrase. The study is based on a newly-compiled corpus of literary, press, and blog texts. A broad range of

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statistical measures is used to show how the aforementioned factors determine the selection of the possessive construction in the dataset. A multivariate analysis based on a model of binary logistic regression is conducted to determine which factor is decisive in the choice of the possessive. The results indicate that animacy has the strongest influence on the genitive variation in the Swedish dataset, followed by definiteness and length of the possessor phrase. The hypothesis that the Swedish s-genitive prefers human, definite, and short possessors finds strong support in the results. The analysis suggests that despite the s-genitive favouring human possessors, the construction is increasingly often found with inanimate referents, specifically in press texts, which is in line with the economy-related motivation in language. What is more, the study shows that definiteness has a significant impact on the genitive variation, in that the possibility for indefinite singular nouns to take the s-genitive is very limited in the dataset.

Key words: possessive expression, genitive variation, Swedish, animacy, s-genitive, prepositional construction.

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