The ongoing eclipse of possessive suffixes in North Saami

A case study in reduction of morphological complexity

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North Saami is replacing the use of possessive suffixes on nouns with a morphologically simpler analytic construction. Our data (>2K examples culled from >.5M words) track this change through three generations, covering parameters of semantics, syntax and geography. Intense contact pressure on this minority language probably promotes morphological simplification, yielding an advantage for the innovative construction. The innovative construction is additionally advantaged because it has a wider syntactic and semantic range and is indispensable, whereas its competitor can always be replaced. The one environment where the possessive suffix is most strongly retained even in the youngest generation is in the Nominative singular case, and here we find evidence that the possessive suffix is being reinterpreted as a Vocative case marker.

Keywords: North Saami; possessive suffix; morphological simplification; vocative; language contact; minority language

1. The linguistic landscape of North Saami[1]

North Saami is a Uralic language spoken by approximately 20,000 people spread across a large area in northern parts of Norway, Sweden and Finland. North Saami is in a unique situation as the only minority language in Europe under intense pressure from majority languages from two different language families, namely Finnish (Uralic) in the east and Norwegian and Swedish (Indo-European

1. This research was supported in part by grant 222506 from the Norwegian Research Council. The authors would also like to thank their employer, UiT The Arctic University of Norway, for support of their research. We would also like to thank the editor and peer reviewers for many helpful comments.

Diachronica 33:3 (2016), **330–366**. DOI 10.1075/dia.33.3.02jan
ISSN 0176–4225 / E-ISSN 1569–9714

Germanic) in the west (Ylikoski 2009: 201–202). With respect to the present study, it is relevant to note that Finnish has possessive suffixes whereas Norwegian and Swedish lack such suffixes.

As a result of language contact and discriminatory language policies in the past, the sociolinguistic landscape of North Saami today is highly heterogeneous. North Saami is itself dialectically diverse. For several decades in the middle of the 20th century, North Saami children were removed from their L1 environment and forced to live in dormitories at residential schools; exact dates and details differ across the region, but this policy impacted most members of the speech community that grew up in that time period. There is considerable mobility across borders, and it is not unusual for adult speakers of North Saami to have some fluency in at least two of the three contact languages: Finnish, Norwegian and Swedish. There are some localities where North Saami is the dominant language, but also many Saami people who live elsewhere, particularly in major cities such as Oslo and Helsinki. Mature generations include various types of North Saami speakers. There are native speakers of North Saami (especially among those living in inner parts of Finnmark, the county in northeastern-most Norway, and those engaged in traditional livelihoods); some people who as children heard or spoke North Saami, shifted to a majority language during their school years, but subsequently reacquired the language; and there are people who learned the language as adults. Reclaiming the language is part of an ongoing movement to assert Saami pride after decades of discriminatory assimilation policies. In the context of a language revitalization effort, representatives of all types of speakers (L1, those who shifted L1 > L2, L2 and semi-speakers) are transmitting the language to their children. North Saami children in areas with access to bilingual schooling are now, at least in some areas (such as the Norwegian Saami language administrative region), being raised with both North Saami and a majority language, though coverage is uneven and the schools face challenges (cf. Keskitalo et al. 2013). Still, most speakers of North Saami have not received education in the language and are literate only in a majority language. For more details on the sociolinguistic situation of North Saami, see Aikio et al. 2015.

Whereas morphological complexity is not in itself a liability and there is no overall trend toward simplification in the world's languages, complexity interacts with sociolinguistic situations. Language complexity is known to be reduced in situations of intense language contact, especially when a language is not used primarily as a first language. Both Trudgill (2002) and McWhorter (2007, 2011) argue that the 'normal' state of language is highly complex, and that languages that are most exposed to contact and adult learners show evidence of simplification. Among the types of simplification they point to is an increase in analytic transparency, as in using the transparent *did go* as opposed to *went* (cf. Trudgill 2002: 66). The central claim of Bentz & Winter (2013) is that languages with many second

language learners tend to have simpler nominal inflection, which would parallel patterns well established among heritage speakers (e.g., Polinsky 2006).

On Trudgill's (2011: 147) six-point scale of communities, where '1' is the type of language that tends most toward complexification, North Saami would rank as a '4', with a small size, loose network and high level of contact. As we show in §3, the morphological simplification that we witness also coincides with the policies that removed North Saami children from their L1 environment. The possessive suffix, as a highly complex feature of North Saami as detailed below in §2, can be considered a 'mature feature' of the language in the terms of Dahl (2004: 286) who says that such features "tend to get 'filtered out' in those transmission situations where there is heavy influence from non-native speakers and/or strong interference from another language that is dominant in the environment." Given these trends, we should expect North Saami to be a target for simplification, including reduction in paradigmatic redundancy: loss of morphological categories compensated for by an increase in transparent analytical structures (Trudgill 2011: 20–26, Mühlhäusler 1977). This means that the possessive construction with the simplest and most transparent morphology could be favored in the ongoing change in North Saami.

We describe the competing possessive constructions and their morphology in North Saami in §2. The innovative analytic construction does indeed have considerably simpler morphology than the synthetic one, since possessive suffixes trigger complex morphophonological alternations in case markers. In §3 we present our database, detail the annotation of our data and show the longitudinal progress of the competition between possessive constructions. Whereas the synthetic construction is used in over 90% of examples in the earliest time period covered by our data, it is gradually replaced by the innovative analytic construction, with the distribution following a characteristic S-curve. §4 gives a statistical analysis of the variables represented in our database and assesses their relative importance. We find that although the innovative construction is initially of low frequency, it is also more flexible because it can be used in non-prototypical expressions of possession where the synthetic construction is rare or unattested. The one synthetic form that is retained best is the non-anaphoric use of the possessive suffix with the Nominative case and first-person singular reference ("my X!"); in §5 we argue that this use of the possessive suffix is possibly being reinterpreted as a Vocative case. We offer conclusions in §6.

2. The competing North Saami possessive constructions

The competing possessive constructions examined in this study are illustrated by the examples in (1). Unless otherwise noted, all examples are drawn from our

database described in §3. The source for each example appears in square brackets as "[SOURCE: page no.]" for items in printed format, and as "[SOURCE]" for items in digital format. The abbreviations for the sources can be found in the Appendix.

(1) Two North Saami possessive constructions

(a) *Vuoi go sáhtt-en jur nie jalla,*
Oh SUBJUNCTION be.able-IND.PST.1SG just so stupid
jurdili-i Kátjá go olli-i$_i$
think-PST.3SG Kátjá.NOM.SG SUBJUNCTION reach-IND.PST.3SG
latnja-s-is$_i$ ja bálkesti-i
room-ILL.SG-3SG.POSS and throw-IND.PST.3SG
skuvlaveaskku čihki-i. [EMV1: 46]
schoolbag.ACC.SG corner-ILL.SG
"Oh how could I be so stupid, thought Kátjá when she$_i$ got to her$_i$ room and threw the schoolbag in the corner."

(b) *Kátjá ii lea-n šat*
Kátjá.NOM.SG NEG.IND.3SG be-IND.PST.CVB.NEG anymore
čirro-n guhkes áigá-i muhto go
cry-PRF.PTCP long time-ILL.SG but SUBJUNCTION
olli-i$_i$ ieža-s$_i$ latnji-[i] maŋŋil
reach-IND.PST.3SG REFL.GEN-3SG.POSS room-ILL.SG after
go Niillas-a luhtte báhtari-i
SUBJUNCTION Niillas-GEN.SG at flee-IND.PST.3SG
eret, de … [EMV1: 61]
away then
"Kátjá hadn't cried in a long time, but when she$_i$ got to her$_i$ room after running away from Niillas, then …"

These two examples share many features. In both examples, the verb (*ollet* "reach") appears in the third person singular past tense and the noun (*latnja* "room") is inflected for the Illative case in the singular. The subject of the verb, who is the possessor, is also the same (*Kátjá*), and these two sentences were composed by the same author in the same novel.

However, whereas (1a) expresses possession by means of the possessive suffix *-s* [3SG.POSS] on the noun, (1b) expresses possession by means of a reflexive pronoun in the Genitive case *ieža-s* [REFL.GEN-3SG.POSS]. We will refer to the possessive suffix construction as in (1a) as 'NPx' (Noun + Possessive suffix) and the analytic construction as in (1b) as 'ReflN' (Reflexive pronoun + Noun).

2.1 Comparison of morphological complexity of NPx vs. ReflN

The left-hand side of Table 1 shows the paradigm of the reflexive genitive pronoun, which consists of a stem *ieža-* [REFL.GEN-] and the possessive suffixes for the nine combinations of three persons and three numbers (Singular, Dual and Plural).

The right-hand side of the table represents the basic paradigm of a North Saami noun with thirteen case/number slots and ten unique forms, as illustrated by the forms of the noun *guoibmi* "partner" in Table 1. The North Saami cases are NOM = Nominative, GEN = Genitive, ACC = Accusative, ILL = Illative, LOC = Locative, COM = Comitative and ESS = Essive. Genitive and Accusative are morphologically syncretic for nouns, as are the Comitative Singular and Locative Plural, but can be distinguished syntactically. Essive does not distinguish number.

This paradigm of *guoibmi* "partner" illustrates three kinds of morphophonemic alternations that are regular in North Saami: (a) diphthong simplification of *uo* > *u* in Comitative Singular and all oblique plural cases, (b) consonant gradation of *ibm* > *imm* in all cases except Nominative Singular and Essive and (c) vowel alternation of *i* > *á* in Illative Singular. North Saami nouns have three inflectional types, depending on whether their stems have an even number of syllables (also known as vowel stems) like *guoibmi*, an odd number of syllables (also known as consonant stems), or contracted stems, and although the same morphophonemic alternations are relevant, they are distributed differently in each inflectional type.

Table 1. ReflN components = reflexive Genitive pronoun + noun inflection

Paradigm of reflexive genitive pronoun		**Paradigm of noun *guoibmi* "partner"**	
1SG	*ieža-n*	NOM.SG	*guoibmi*
2SG	*ieža-t*	GEN.SG=ACC.SG	*guoimmi*
3SG	*ieža-s*	ILL.SG	*guoibmá-i*
1DU	*ieža-me*	LOC.SG	*guoimmi-s*
2DU	*ieža-de*	COM.SG=LOC.PL	*guimmi-in*
3DU	*ieža-ska*	NOM.PL	*guoimmi-t*
1PL	*ieža-met*	GEN.PL=ACC.PL	*guimmi-id*
2PL	*ieža-det*	ILL.PL	*guimmi-ide*
3PL	*ieža-set*	COM.PL	*guimmi-iguin*
		ESS	*guoibmi-n*

The two paradigms in Table 1 exist independently of any possessive construction since the pronoun fulfills its titular function where it is also syncretic with the reflexive Accusative pronoun as in example (2), and likewise the absolute

inflectional paradigm is invoked every time any noun is used. As a construction, ReflN is entirely componential and transparent, composed merely of the combination of these two otherwise necessary paradigms.

(2) Pronominal use of reflexive pronoun

Son	*ii*	*orro-n*	*dovda-me*
3SG.NOM	NEG.IND.3SG	seem-IND.PST.CVB.NEG	recognize-AKTIO.ESS
ieža-s		*speadjali-s…*	[MÁS2014:252]
REFL.ACC-3SG.POSS		mirror-LOC.SG	

"She didn't seem to recognize herself in the mirror…"

NPx, on the contrary, takes the existing paradigm of a noun from the thirteen case/number slots listed in the right-hand side of Table 1 and adds nine more sets of thirteen slots, one for each of the nine person/number combinations. This is achieved by adding the possessive suffix for person and number to the absolute noun inflection paradigm represented in Table 1. Thus we have both the original thirteen slots without the possessive suffix, plus another $9 \times 13 = 117$ slots with the possessive suffix, bringing the grand total to $13 + 117 = 130$ slots. Syncretisms reduce the number of unique forms added to the paradigm to the eighty-one unique forms shown in Table 2, where the possessive suffixes are boldfaced. This table also indicates syncretisms in the paradigm marked by '='.

Inflecting the forms in Table 2 is not just a matter of adding possessive suffixes, since there are numerous additional morphophonemic hurdles to deal with (cf. Nickel & Sammallahti 2011:103–105, Nielsen 1979 [1926–1929]: 118–119). There are two whole distinct sets of nine possessive suffixes each, one set that is added to forms ending in a vowel, as in the Nominative Singular, and another set that is added to forms ending in a consonant, as in the Illative Singular. Whereas the suffix is attached after the case ending in most of the paradigm, in the Comitative Plural it is attached inside the case ending and preceded by *-d-* that is otherwise absent from the Comitative Plural.[2] Five case endings undergo unique changes only in the presence of the possessive suffix, and these changes are different depending upon the inflectional type of the stem: Illative Singular *-i*/*-ii* > *-s-*/*-asa-*; Locative Singular *-s*/*-is* > *-st-*/*-isttá-*/*-istti-*; Illative Plural *-ide*/*-iidda* > *-idas-*/*-iiddás-*; Comitative Singular/Locative Plural *-in-* > *-inná-*/*-inni-* (consonant stems only); Accusative/Genitive Plural *-id-* > *-iddá-*/*-iddi-* (consonant stems

2. Historically this *-d-* comes from the Genitive Plural ending from which the modern Comitative Plural was built by eliding the *-d-* and adding *-guin* (itself a phonologically reduced form of *guoibmi* 'partner'; Sammallahti 1998:70). However, this diachronic fact is likely opaque to learners of North Saami.

Table 2. 81 additional paradigm forms required by NPx for *guoibmi* "partner"

NOM.SG:		GEN.SG=ACC.SG:		ILL.SG:	
1SG	*guoibmá-**n***	1SG	*guoibmá-**n***	1SG	*guoibmá-s-**an***
2SG	*guoibmá-**t***	2SG	*guoimmá-**t***	2SG	*guoibmá-s-**at***
3SG	*guoibmi-**s***	3SG	*guoimmi-**s***	3SG	*guoibmá-s-**is***
1DU	*guoibmá-**me***	1DU	*guoibmá-**me***	1DU	*guoibmá-s-**eame***
2DU	*guoibmá-**de***	2DU	*guoimmá-**de***	2DU	*guoibmá-s-**eatte***
3DU	*guoibmi-**ska***	3DU	*guoimmi-**ska***	3DU	*guoibmá-s-**easkka***
1PL	*guoibmá-**met***	1PL	*guoibmá-**met***	1PL	*guoibmá-s-**eamet***
2PL	*guoibmá-**det***	2PL	*guoimmá-**det***	2PL	*guoibmá-s-**eattet***
3PL	*guoibmi-**set***	3PL	*guoimmi-**set***	3PL	*guoibmá-s-**easet***
LOC.SG:		COM.SG=LOC.PL:		GEN.PL=ACC.PL (=NOM.PL 1SG/DU/PL):	
1SG	*guoimmi-st-**an***	1SG	*guimmi-in-**an***	1SG	*guimmi-id-**an***
2SG	*guoimmi-st-**at***	2SG	*guimmi-in-**at***	2SG	*guimmi-id-**at***
3SG	*guoimmi-st-**is***	3SG	*guimmi-in-**is***	3SG	*guimmi-id-**is***
1DU	*guoimmi-st-**eame***	1DU	*guimmi-in-**eame***	1DU	*guimmi-id-**eame***
2DU	*guoimmi-st-**eatte***	2DU	*guimmi-in-**eatte***	2DU	*guimmi-id-**eatte***
3DU	*guoimmi-st-**easkka***	3DU	*guimmi-in-**easkka***	3DU	*guimmi-id-**easkka***
1PL	*guoimmi-st-**eamet***	1PL	*guimmi-in-**eamet***	1PL	*guimmi-id-**eamet***
2PL	*guoimmi-st-**eattet***	2PL	*guimmi-in-**eattet***	2PL	*guimmi-id-**eattet***
3PL	*guoimmi-st-**easet***	3PL	*guimmi-in-**easet***	3PL	*guimmi-id-**easet***
ILL.PL:		COM.PL:		ESS:	
1SG	*guimmi-idas-**an***	1SG	*guimmi-id-**an**-guin*	1SG	*guoibmi-n-**an***
2SG	*guimmi-idas-**at***	2SG	*guimmi-id-**at**-guin*	2SG	*guoibmi-n-**at***
3SG	*guimmi-idas-**as***	3SG	*guimmi-id-**is**-guin*	3SG	*guoibmi-n-**is***
1DU	*guimmi-idas-**ame***	1DU	*guimmi-id-**eame**-guin*	1DU	*guoibmi-n-**eame***
2DU	*guimmi-idas-**ade***	2DU	*guimmi-id-**eatte**-guin*	2DU	*guoibmi-n-**eatte***
3DU	*guimmi-idas-**aska***	3DU	*guimmi-id-**easkka**-guin*	3DU	*guoibmi-n-**easkka***
1PL	*guimmi-idas-**amet***	1PL	*guimmi-id-**eamet**-guin*	1PL	*guoibmi-n-**eamet***
2PL	*guimmi-idas-**adet***	2PL	*guimmi-id-**eattet**-guin*	2PL	*guoibmi-n-**eattet***
3PL	*guimmi-idas-**aset***	2PL	*guimmi-id-**easet**-guin*	3PL	*guoibmi-n-**easet***

only). Note that Table 2 shows only one of the three types of noun paradigms, namely the vocalic stem type. In the consonantal type, the patterns of the endings and consonant gradation are reversed.

NPx is associated with two additional morphophonemic variations in the stem. The first additional variation is *-i* > *-á-* in parts of the subparadigms (in nouns ending in *-u*, we find *-u* > *-o* and additional diphthong simplifications in the stem, as in *viessu* house.NOM.SG "house" > *visso-s-an* [house-ILL.SG-1SG.POSS] "to my house"). The second is the use of the *-ibm-* version of the consonant cluster instead of the expected *-imm-* in the First Person forms of the Singular, Dual and Plural in the Genitive/Accusative Singular subparadigm. This latter variation in consonant gradation creates a syncretism between these three forms and the corresponding three forms in the Nominative Singular subparadigm. A serious problem for disambiguation crops up since the Third Person Singular form for the

Genitive/Accusative Singular, which is incidentally the single most common NPx form, is syncretic with the Locative Singular form of the noun without the suffix: both are *guoimmis*. Finally, note that the Nominative Plural is mostly missing from this set of forms; only the First Person forms of that subparadigm survive, and they are syncretic with the First Person forms of the Genitive/Accusative Plural.

Mastering all the inflectional peculiarities associated with NPx is a challenge for North Saami learners. Normally morphological complexity would not disfavor one construction as opposed to another, but in a situation where there is significant language contact and learners for whom North Saami is not their only or primary language, complexity is disadvantaged. Once again, ReflN has the advantage since it gives users an easy way to avoid morphological complexity. ReflN is built entirely from pronominal and nominal case forms that are widely used in other constructions, thus placing no extra burden of morphological complexity on the learner.

2.2 Other means of expressing possession

In addition to NPx and ReflN, possession can be left unmarked in North Saami, as in (3a). However, the lack of an overt marker of possession can be ambiguous, as we see in (3b–d). All examples in (3) appear within a few pages of each other in the beginning of the novel *Ilmmiid gaskkas* (*In Between Worlds*) by Máret Ánne Sara.

(3) Noun phrases not overtly marked for possession

(a) *Son ani-i olles gorud-a* [MÁS: 10]
3SG.NOM use-IND.PST.3SG whole body-ACC.SG
"He used [the??/]his whole body."

(b) *Viellja njuiki-i eret sihkkel alde.* [MÁS: 11]
brother.NOM.SG jump-IND.PST.3SG away bike.GEN.SG on
"Brother jumped off [the?/his?] bike."

(c) *Fáhkka iđi-i álás juolgi*
suddenly appear-IND.PST.3SG bare foot.NOM.SG
Convers-a báldii [MÁS: 14]
Converse-GEN.SG next.to
"Suddenly a bare foot appeared next to [the?/]her Converse [sneaker]."

(d) *Son čohkohala-i suhkosi-s ja*
3SG.NOM sit-IND.PST.3SG swing-LOC.SG and
čievččadi-i sáddo. [MÁS: 13]
kick-IND.PST.3SG sand.ACC.SG
"She sat on the[/her??] swing and kicked at the sand."

Whereas possession is very likely intended in (3a), the more one looks at examples, the less clear it is whether a noun that is not in an overt possessive construction

is actually expressing possession. The wider discourse context can be helpful in interpreting possession, but does not necessarily remove all ambiguities. (3b) is the first sentence in the novel where the bike is mentioned. It is only much later in the narrative that we discover that "brother" is indeed the owner of the bike. So did the author expect us to assume a possessive relationship or not? The subject of (3b) illustrates another problem: "brother" is the first character who appears in the narrative, several pages before any sibling that he could belong to. Likewise, in (3c) the foot appears before its possessor. Together, (3b) and (3c) demonstrate that we cannot simply assume that inalienable possessions expressed by kinship terms and body parts always appear in possessive constructions, regardless of whether they are overtly marked: "brother" is just a person and the bare foot is just a thing in those sentences. The Converse sneaker in (3c) had been previously introduced and we know it is on the subject's foot, so it is probably possessed by her. But what about the swing she is sitting on in (3d)? It is less likely that the swing is hers, but not excluded either. The sand is perhaps the only thing we can safely exclude from a possessive relationship.

It is difficult to operationalize objective criteria to tag such data. In order to avoid subjective judgments about null markers in our dataset, we restricted our study to the two overtly marked possessive constructions, NPx and ReflN, that can be objectively observed as competitors in the ongoing language change. It is possible that the issue of unmarked constructions could be taken up in future research, and that this will be facilitated by the current study that maps out the overtly marked constructions.

In addition, it is possible to find examples of non-reflexive pronouns used instead of the reflexive pronoun in ReflN in what is possibly an innovative variant of that construction, as seen in (4).

(4) Non-reflexive pronoun *su* [3SG.GEN] used instead of reflexive pronoun

Gonagaslaš	*Majestehta*	*Gonagas*	*Harald*		
royal	majesty.NOM.SG	king.NOM.SG	Harald.NOM.SG		
namuhi-i	*su*	*loahppa-sáni-in*	*man*	*ollu*	
name-IND.PST.3SG	3SG.GEN	closing-word-LOC.PL	how	much	
lea	*ovdána-n*	*dan*	*rájes*	*go*	
be.IND.PRS.3SG	progress-PRF.PTCP	3SG.GEN	since	SUBJUNCTION	
Sámediggi	*ásahuvvu-i.*				[Ávvir 2009]
Saami.parliament.NOM.SG	be.established-IND.PST.3SG				

"His majesty King Harald commented in his closing words on how much progress has been made since the Saami parliament was established."

However, these non-reflexive variants are fairly rare. We have found such examples only in administrative texts, newspapers (like *Ávvir*) and social media. No such

examples were found in our database of literary texts. In the present study these non-reflexive constructions have not been included for lack of data, although they could be the topic of a future study.

3. A longitudinal database of North Saami possessive constructions

Our database contains 2,272 examples of possessive constructions culled from literary texts, approximately 0.53M words. Our data are further stratified for both generation – tagged as 'Old', 'Mid' and 'Young' – and geography – tagged as 'East' vs. 'West'. The Old group has five writers born between 1870 and 1927, representing the first authors to publish in North Saami. Prior to that, North Saami publications were authored primarily by missionaries and linguists rather than by North Saami people themselves. After the first wave of publications there was a period of suppression of the North Saami language, and the Mid group picks up the next wave of novels with three writers born between 1947 and 1957. Two writers born in 1972 and 1983 constitute the Young group, and are the youngest authors who have published novels in North Saami. Authors in both the Old and Mid groups further represent two geographic areas, namely East, in the territory of Finland, and West, in the territory of Norway. However the Young group represents only the West area since there are no North Saami authors in that age group who have published fiction in Finland. A few of the literary texts in our sample are available in electronic versions, but in most cases examples had to be culled by hand. All of the sentences and their annotations are available at: http://giellatekno.uit.no/research/oamasteapmi_materialat.html.[3]

Figure 1 plots the chronological progress of the language change as represented in the literary texts, with the authors' names and year of birth plotted against the relative proportion of the innovative construction (ReflN).[4] Figure 1 contains a "lowess" (locally weighted scatterplot smoothing) line that visualizes the overall trend evident in the scatterplot. The lowess line shows that this change follows the characteristic shape of an S-curve commonly associated with language change (cf. Blythe & Croft 2012).

Note that two authors, J. Turi and J. M. Mienna, both lie above the S-curve in Figure 1, since they both have more use of ReflN than their contemporaries. In

3. The website also includes annotated examples from the New Testament that are not included in this study, but were part of a different study reported in Antonsen & Janda 2015.

4. Here data was restricted to the anaphoric and endophoric uses (see explanation of *Reference* below).

the case of J. Turi, we have other evidence that his use of grammatical constructions (namely adpositional phrases) is somewhat different from that of his peers (Antonsen et al. 2012). J.M. Mienna's book targets young people, and this might have motivated avoidance of the morphologically complex NPx (although young adult readers are also in the target audience for the works of M.Á. Sara and E.M. Vars and for one of the works of K. Paltto).

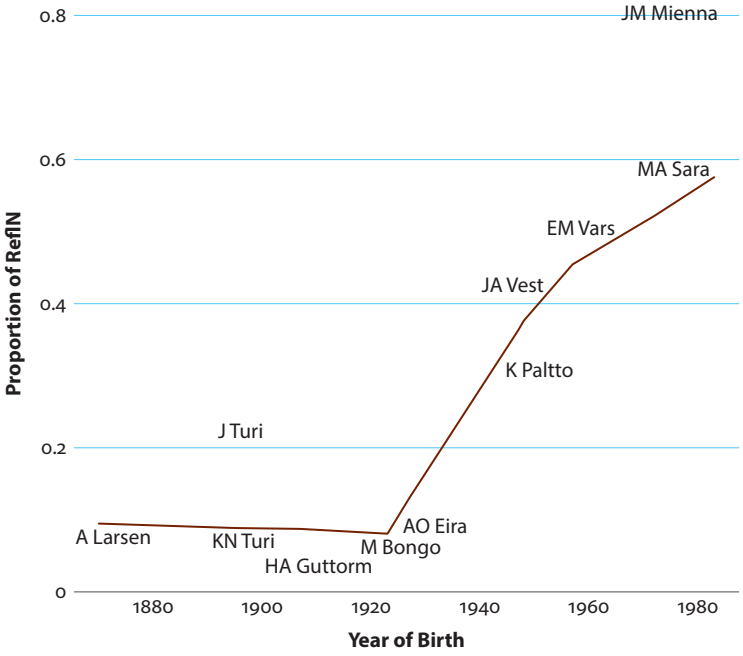

Figure 1. Proportion of ReflN plotted against year of birth for authors of literary works

The point at which the language change takes off coincides with the period when North Saami children were forcibly removed from their L1 environment during their school years. The three authors from the Mid generation date from that time period.

3.1 Linguistic variables represented in the database

All examples have been analyzed and tagged by hand for the variables described below.

Possessive construction ('PossCon'). Here we distinguish between the two variants in the ongoing language change: NPx is the construction with the possessive suffix attached to the possessum noun, and ReflN is the analytic construction

with the Genitive reflexive pronoun. These two constructions are illustrated in examples (1a–b).

Reference. Both constructions provide anaphoric reference to a possessor expressed in the same clause in the vast majority of uses (88% for NPx and 96% for ReflN). The relationship between anaphor and possession is enhanced by the fact that both are reference point relationships (Langacker 2008: 505–539). According to Nickel & Sammallahti (2011: 501–504), possessive constructions in North Saami can additionally provide endophoric reference to a possessor in a previous clause, and exophoric (deictic) reference to a possessor that is a speech-act participant. Endophoric and exophoric reference can be seen as extensions from prototypical anaphoric reference, parallel to the pattern observed by van Hoek (1995). In addition to anaphoric reference found in examples (1a–b), endophoric and exophoric reference are represented in examples (5–6), where the (a) examples show use of NPx, and the (b) examples show ReflN.

(5) Endophoric reference

(a) *Málbma-geaidnu* *han* *le-i* *ain*
mining-road.NOM.SG PARTICLE be-IND.PST.3SG still
sin *hálddu-s,* *ja* *ulbmil* *le-i*
3PL.GEN administration-LOC.SG and goal.NOM.SG be-IND.PST.3SG
dieđusge *geahčča-li-t* *doalla-t* *dán*
of.course try-INF hold-INF 3SG.ACC
buot *návcca-id-easet-guin* [AOE: 66]
all strength-PL-3PL.POSS-COM
"The mining road was, after all, still in their possession, and the goal was of course to try to hold onto it with all their strength."

(b) *Dušše* *heasta* *guođu-i* *stálla-njálmme-s*
just horse.NOM.SG graze-IND.PST.3SG stable-opening-LOC.SG
bádde-geaže-s. *Dat* *lea-i* *ieža-set*
rope-end-LOC.SG 3SG.NOM be-IND.PST.3SG REFL.GEN-3PL.POSS
heasta [HAG2: 26]
horse.NOM.SG
"There was just a horse grazing by the stable door at the end of a rope. It was their own horse."

In (5a) the third person plural possessive suffix on the noun for "strength" points back to a possessor represented by a third plural Genitive pronoun in the previous clause. In (5b) the possessive construction points back to a possessor that has been mentioned earlier in the narrative. Less than 1% of our data expresses endophoric reference.

(6) Exophoric (deictic) reference

(a) *Na de geahččali-i mearra-nanus-vuođa-met* [KNT: 124]
then so try-IND.PST.3SG sea-strong-ness.ACC.SG-1PL.POSS
"Then it tested our resistance to seasickness."

(b) *Ieža-met čivgga-t, liikká jallat*
REFL.GEN-1PL.POSS kid-NOM.PL just.as stupid
go dáčča-t! [MÁS: 29]
SUBJUNCTION outsider-NOM.PL
"Our kids, just as stupid as outsiders!"

In (6a–b) the possessor, in both cases the First Person Plural 'we', is available via a speech participant rather than being anchored in the syntax of the current or any previous clause. The exophoric type represents less than 6% of our data and is extremely rare for ReflN.

Because the endophoric and exophoric types are rare in our data and do not really allow for competition between the two constructions, only anaphoric examples are used as the basis for the statistical analyses in §4. Because 94% of our data express anaphoric reference, we are thus able to retain most of our data and represent a homogeneous set of reference environments where the two constructions are clearly in competition. A portion of the NPx exophoric uses behave as Vocative forms, and this is the topic of §5.

Possessum ('PM'). Three factors are tagged in connection with the possessum: case ('PMCase'), semantic class ('PMClass') and the lemma. The semantic classes are Kin, Body (for body parts), Property (for artifacts typically owned by people such as clothing and tools), Human (for non-Kin relationships such as "teacher" and "friend"), Place (for locations), Event, Abstraction and Other for the purposes of statistical analysis. The tagging of possessum factors for example (1a) is as follows:

Case: Illative
Semantic class: Place
Lemma: *latnja* "room"

Possessor ('PR'). The possessor is likewise tagged for case ('PRCase'). Because North Saami is a pro-drop language and the inflection of finite verb forms indicates person and number, there are many examples like (1a–b) with an unexpressed but fully recoverable subject that is the possessor (Nickel & Sammallahti 2011: 500). These examples are tagged as 'Verb', meaning that the possessor is the subject of the verb, which would have appeared in the Nominative case if expressed overtly. While the majority of possessors are either overtly expressed in the Nominative case or recoverable as the subject of a finite verb, both anaphoric and endophoric reference can involve an argument other than the grammatical subject. Possessors can be found in other cases: Accusative, Locative, Genitive and Illative. Both NPx and ReflN con-

structions are attested for all of these cases in our data. There are, in addition, a few examples where an infinitive form of the verb binds the anaphoric referent without an overt subject, and in these cases we used the tag 'Infin', as in examples (7a–b):

(7) Anaphoric reference with an infinitive verb form

(a) *Máŋgii lea nu buorre beassa-t*
many.times be.IND.PRS.3SG so good succeed-INF
bidja-t sáni-id-is báhpár-a ala. [KP2: 53]
put-INF word-ACC.PL-3SG.POSS paper-GEN.SG on
"Many times it is so good to get a chance to put one's words down on paper."

(b) *Mihá buoret livčči leamaš baicca*
much better be.COND.3SG be.PRF.PTCP instead
ruovttu-s ieža-s seaŋgga-s oađđi-t. [EMV1: 224]
home-LOC.SG REFL.GEN-3SG.POSS bed-LOC.SG sleep-INF
"It would have been much better to stay home and sleep in one's own bed."

Citation. Each example is supplied with citation information, which includes the source, along with relevant location information (page number for non-digital sources). The age group (Old, Mid, Young) and geographical location (East, West) of each author is tagged.

The full tagset includes some additional variables that will not be discussed further because they were found to be non-significant in the statistical analysis. These include the semantic class of the possessor (which is overwhelmingly Human), the number of the possessum and the presence vs. absence of an adjectival modifier to the possessum.

All of our data (annotated examples and spreadsheets of frequency distributions), along with the R scripts (R Development Core Team 2008) used to produce the statistical models and the diagrams in this article are publicly archived at the Tromsø Repository for Language and Linguistics (opendata.uit.no) with the permanent URL http://hdl.handle.net/10037.1/10294.

4. CART analysis

Our statistical analysis is based upon the 2,136 examples of anaphoric reference in our data. Our data show the distribution of NPx vs. ReflN constructions in these examples in relation to various features of the possessor, possessum and source of the text. When evaluating the impact of various factors on a binary choice (such as NPx vs. ReflN), a traditional statistical method is logistic regression. However, logistic regression is not ideal for our data, or indeed for most linguistic data, for two reasons. The first reason is that a logistic regression model assumes that

the distribution of data is parametric, following what is called a 'normal' (bell-shaped) distribution, but corpus data are usually skewed (Kilgarriff 2005). The second reason is that logistic regression assumes that all possible combinations of variables should be represented in the data. Again, languages tend to have paradigmatic gaps, such as the lack of possessums in the Nominative case and the lack of possessors in Comitative and Essive case in our anaphoric NPx data. And there are other types of gaps: for example, we do not have data from the Young age group in the East, only from the West. All these factors mean that a logistic regression is not a good choice.

We choose instead classification and regression trees, also known as CART (Strobl et al. 2009) to model the distribution of NPx vs. ReflN forms in North Saami. The CART model is appropriate for non-parametric data and is not compromised by data in which all combinations are not represented. The CART model has been compared against logistic regression in a series of linguistic analyses (Baayen et al. 2013) and shown to be very comparable in its results. CART gives us an optimal sorting of the data, yielding a 'tree' as in Figure 2. The tree is built using the Gini index to ensure that each split yields daughter nodes that are on average more pure than the parent node (Strobl et al. 2009: 326).

The tree in Figure 2 shows the outcome of a CART analysis of our data using the formula "PossCon ~ PMClass + Generation + PMCase+ Geography + PRCase", which means that the outcome (dependent variable) is the Possessive Construction, and the independent (predictor) variables that we are examining are the semantic class of the possessum, the generation of the author, the case of the possessum, the geographical region that the author comes from and the case of the possessor.

Figure 2 shows nodes numbered 1 to 13 where the data are sorted into the cleanest possible splits between NPx and ReflN. We will follow the nodes from top to bottom and from left to right, in numerical order. At node 1 at the top of the tree, Generation is the most relevant criterion, which is not surprising given the fact that we are observing a change (recall Figure 1). At node 1, CART splits the data into two groups: Old, with 597 examples in which there is significantly more NPx, as opposed to the Mid and Young generations with 1,539 examples and stronger representation of ReflN.

We follow the left branch from node 1 and at node 2 we split the data from the Old generation according to the case of the possessor. Here we oppose 18 examples where the possessor is marked as Genitive or Locative and ReflN is preferred vs. 579 examples where the possessor is marked Nominative, by the verb (equivalent to Nominative due to pro-drop), or Accusative and NPx is preferred.

Node 3 is a terminal node with the 18 Genitive and Locative possessor examples for the Old generation. In the terminal nodes we see a graph of the percentage-wise distribution of examples according to the possessive construction,

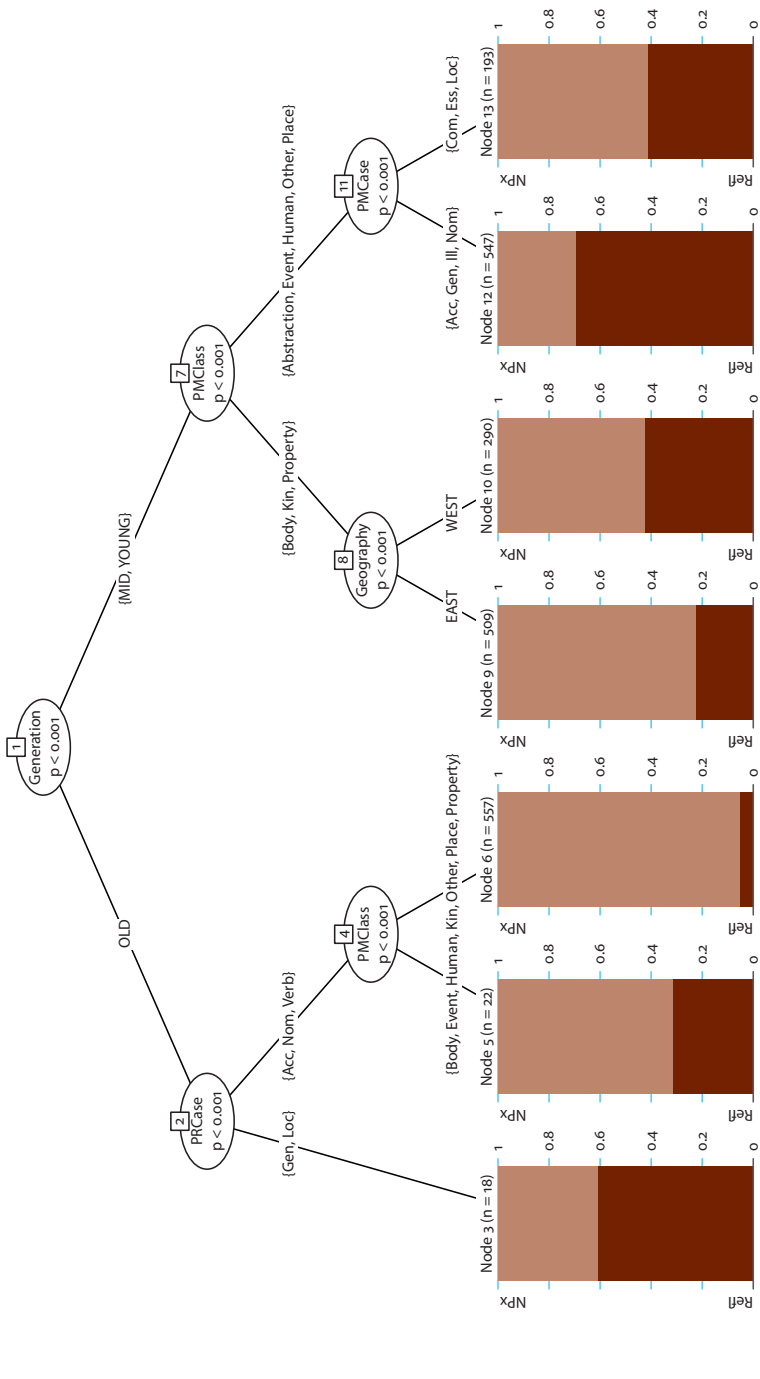

Figure 2. CART analysis of anaphoric uses of NPx and ReflN

with NPx represented in grey and ReflN in black. Node 3 contains 18 examples, 7 of which are NPx, and 11 of which are ReflN.

The remaining examples for the Old generation are split at node 4 according to the semantic class of the possessum, with 22 examples of Abstract possessums in node 5 vs. 557 examples for all other semantic classes in node 6. Among Abstract possessums, ReflN is relatively frequent (32%, 7 examples of ReflN vs. 15 of NPx), as opposed to all other semantic classes where it is rare (5%, 30 examples of ReflN vs. 527 of NPx).

Now we go back to the top and follow the right branch to node 7, where the 1,539 examples from the Mid and Young generations are split according to the semantic class of the possessum. Here the left branch represents 799 examples with possessums in the Body, Kin and Property classes where NPx is relatively common (70%, 559 examples). The right branch represents the 740 examples with all other semantic classes (Abstraction, Event, Human, Place and Other), where ReflN predominates (62%, 461 examples).

Following the left branch from node 7 (Body, Kin and Property possessums for Mid and Young generations), we come to node 8, where we see a geographic split. We find more NPx in the east in node 9 (NPx in 393 examples, 77%) than in the west in node 10 (NPx in 166 examples, 57%).

We return to node 7 and follow the right branch to node 11, where the case of the possessum is the criterion for finding that we get more ReflN if the possessum is in the Accusative, Genitive, Illative or Nominative case (381 examples, 70% of node 12) vs. less ReflN if the possessum is in the Comitative, Essive or Locative case (80 examples, 41% of node 13).

We also ran the CART analysis with the formula "PossCon ~ PMClass + Author + PMCase+ PRCase". This produces the same tree, with the authors sorted according to generation (A. Larsen, K.N. Turi, J. Turi, H.A. Guttorm, M. Bongo and A.O. Eira, who all belong to the Old generation vs. K. Paltto, J.Á. Vest, E.M. Vars, M.Á. Sara and J.M. Mienna, who all belong to Mid and Young generations) at node 1 and then the Mid and Young authors sorted according to geography (with K. Paltto and J.Á. Vest, who are both from the east vs. E.M. Vars, M.Á. Sara and J.M. Mienna, who all come from the west) at node 8. In other words, the CART model can sort the authors according to their generation and location based entirely upon their use of NPx vs. ReflN. This also means that there is no author whose individual use of possessive constructions deviates strongly from the patterns given by generation and geography.

We can summarize the results in the CART tree in Figure 2 as follows. The cleanest initial split is according to Generation, showing difference between the Old generation, where 92% of examples are NPx, and the Mid and Young generations, where only 55% of examples are NPx. We see an interaction between the factors of Generation and PMClass: for the Old generation the relevant

distinction is between Abstract and all other classes, with Abstract giving ReflN a boost. For the Mid and Young generations, the relevant semantic distinction is Body, Kin and Property (which prefer NPx) vs. all other classes. For the Old generation, use of ReflN is stronger in the few examples where the possessor is marked as Genitive or Locative. For Mid and Young generations, NPx is favored if the possessum's semantic class is Body, Kin or Property, but this effect is less pronounced if the author comes from the west. Also for Mid and Young generations, the use of ReflN is particularly strong (70%) when the possessum class is not Body, Kin or Property and the possessum is marked Accusative, Genitive, Illative or Nominative.

CART further gives us the option of using so-called 'random forests' to validate our results and measure the relative importance of the variables. This is a bootstrapping technique for validating the data and measuring the relative importance of variables. What CART does is to withhold a randomly selected portion of the data and of the variables, repeating this process many times and creating a 'forest' of classification trees based on subsets of the data and comparing those to discover the various strengths of the variables. Variable importance is based on the reduction of predictive accuracy that results when a factor is removed. This makes it possible to compute a Gini importance index over the decrease in node impurities averaged over all trees in the forest. Figure 3 shows the outcome of this process, with the variables arranged according to their strength. Note that the y-axis of this figure is a mathematical construct based on the behavior of the variables in the bootstrapping procedure (cf. Grömping 2009). This is the Gini importance measure, which describes the average improvement in purity of splits achieved by a predictor variable (Strobl et al. 2009: 335).

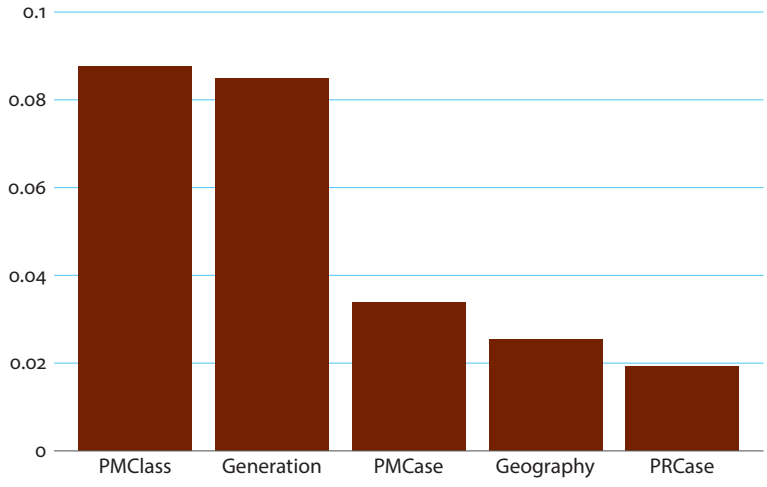

Figure 3. Variable importance analysis of anaphoric uses of NPx and ReflN

The variable importance analysis achieved by the random forest method is depicted in Figure 3. We see that PMClass and Generation are nearly tied as the most important factors, followed by PMCase, Geography and PRCase. We examine each of these factors in the order of their importance in the following subsections.

4.1 PMClass: Semantics of the possessum

There are no semantic classes that determine the choice of one possessive construction to the exclusion of the other. If we focus on the longitudinal progression in the data from literary works, we see that initially NPx predominates as the choice for over 85% of examples for all semantic classes except Abstraction, for which over 30% of examples use the ReflN construction. An Abstraction such as *ráhkisvuohta* "love" in example (8) is arguably an atypical possessum, as opposed to more prototypical possessums such as Kin, Body and Property.

(8) Possessum as Abstraction

(a) *Son* *le-i* *massá-n* *bártni-s* *ja*
3SG.NOM be-IND.PST.3SG lose.PRF.PTCP son.ACC.SG-3SG.POSS and
dan *mielde* *ráhkisvuođa-s…* [JÁV2]
3SG.GEN with love.ACC.SG-3SG.POSS
"He had lost his son and with that his love…"

(b) *Son* *eli-i* *vuot* *oktii*
3SG.NOM live-IND.PST.3SG again once
ieža-s *ráhkisvuođa.* [JÁV3]
REFL.GEN-3SG.POSS love.ACC.SG
"Once more she relived her love…"

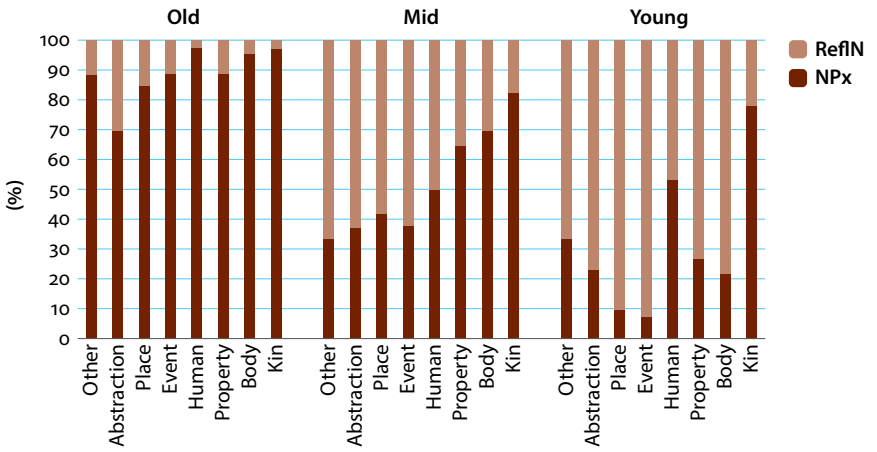

Figure 4. Distribution of NPx and ReflN across semantic classes of possessum and generation

Figure 4 shows the relationship of NPx and ReflN with the semantic class of the possessum, with a different distribution for each generation: Old, Mid and Young. Over time, ReflN comes to dominate in all semantic classes except Kin, where NPx persists, and Human, where authors in the Young generation use NPx and ReflN nearly equally.

In other words, ReflN starts out with its strongest foothold on the periphery of possessive relations, namely with Abstract possessums, and with thorough representation across the spectrum of semantic classes. ReflN thus plays the role of a default marker of possession, while NPx gradually narrows its focus primarily to Kin for the Young generation. ReflN behaves as an all-purpose marker of possession, not strongly specialized to any semantic class.

4.2 Generation

Generation is nearly tied with the semantic class of the possessum as the most important factor. The strength of generation as a factor is not surprising given that we are witnessing a change, as shown in Figure 1. However, it is remarkable that the timing of the strongest burst in ReflN's expansion at the expense of NPx comes exactly at the time of discriminatory educational policies that forced North Saami children to attend schools in majority languages and live away from their families for most of the year.

4.3 PMCase: Case marking of possessum

Table 3 shows the distribution of case marking on anaphoric uses of NPx and ReflN in our data. Percentages are cited both horizontally and vertically to make it possible to draw comparisons both across constructions and across cases. The top row shows, for example, that the possessum appears in the Comitative case for 193 examples of the NPx construction and 48 examples of the ReflN construction. Those 193 vs. 48 examples represent 80% vs. 20% of our examples of possessum marked as Comitative, showing that NPx predominates for the Comitative case. However, the shaded columns with vertical percentages show that the Comitative case is relatively infrequent for both constructions, since it is found only in 14% of examples of the NPx construction and in only 6% of examples of the ReflN construction.

Table 3. Case marking of possessum in anaphoric uses of NPx and ReflN

PM Case	NPx	vert %	horiz %	ReflN	vert %	horiz %	Total
Comitative	193	14%	80%	48	6%	20%	100%
Locative	187	14%	70%	82	11%	30%	100%
Accusative	572	41%	66%	296	40%	34%	100%

(*Continued*)

Table 3. (*Continued*) Case marking of possessum in anaphoric uses of NPx and ReflN

PM Case	NPx	vert %	horiz %	ReflN	vert %	horiz %	Total
Genitive	217	16%	61%	137	18%	39%	100%
Illative	213	15%	62%	128	17%	38%	100%
Essive	5	<1%	50%	5	<1%	50%	100%
Nominative	0	0%	0%	53	7%	100%	100%
Overall	***1387***	**100%**	***65%***	***749***	**100%**	***35%***	***100%***

By far the most common case for the possessum is the Accusative, which accounts for roughly 40% of uses of both NPx and ReflN, as in examples (9a–b). Both possessive constructions are robustly attested also for possessums in the Illative (1a–b), Comitative (10a–b), Genitive (11a–b) and Locative (12a–b). However, ReflN predominates in the Nominative (13a–b) case, and both possessive constructions are found among the few attestations of possessums in the Essive (14a–b) case. Although we found no examples of NPx with anaphoric reference in the Nominative case in our literary database, such examples can be found in the New Testament, as in (13b).[5]

(9) Possessum in Accusative

(a) *Muhto jos ii daga nu,*
but if NEG.IND.3SG do.IND.PST.CVB.NEG thus
de massá dearvvaš máná-s… [JTuri]
then lose.IND.PRS.3SG healthy child.ACC.SG-3SG.POSS
"But if one doesn't do that, then one loses one's own healthy child …"

(b) *… soames jallas suttolačč-a dihte gii*
some stupid sinner-ACC.SG due.to who.NOM.SG
dolin gotti-i ieža-s máná … [MÁS: 138]
long.ago kill-IND.PST.3SG REFL.GEN-3SG.POSS child.ACC.SG
"… because of some stupid sinner who killed his/her own child long ago …"

(10) Possessum in Comitative

(a) *Biera le-i olbmá-id-is-guin návet*
Biera.NOM.SG be-IND.PST.3SG friend-PL-3SG.POSS-COM barn.GEN.SG
luhtte eatni veahkehea-me. [EMV1: 33]
in mother.ACC.SG help-AKTIO.ESS
"Biera was with his friends in the barn helping mother."

5. However, note that Nominative case for the possessum is not rare when NPx is used for exophoric reference, as in the vocative uses described in §5.

(b) *Várra son doaivvu-i son beassá*
probably 3SG.NOM believe-IND.PST.3SG 3SG.NOM succeed.IND.PRS.3SG
dájuhi-t mu vaikko mot, ja maŋŋil
make.fun-INF 1SG.ACC even how and after
fas ieža-s olbmá-iguin boagusti-t man álki
again REFL.GEN-3SG.POSS friend-COM.PL laugh-INF how easy
dálu niedda-id lea fille-t. [EMV1: 55]
farm.GEN.SG girl.ACC.PL be.IND.PRS.3SG trick-INF
"He probably thinks he can make fun of me as much as he wants and then laugh with his friends over how easy it is to trick farm girls."

(11) Possessum in Genitive
(a) *Ari le-i jo beaivit jávka-n*
Ari.NOM.SG be-IND.PST.3SG certainly daytime disappear-PRF.PTCP
skihpári-idd-is lusa gillá-i. [KP1: 146]
friend-GEN.PL-3SG.POSS toward village-ILL.SG
"During the day Ari went off to the village to see his friends."
(b) *Mana dan ieža-t*
go.IMP.2SG DEM.GEN.SG REFL.GEN-2SG.POSS
eŋgel-a lusa. [EMV1: 94]
angel-GEN.SG toward
"Go to your angel."

(12) Possessum in Locative
(a) *… son lávi-i ieš-ge muhtumin*
3SG.NOM be.in.habit-IND.PST.3SG REFL.NOM-PARTICLE sometimes
čuojahi-t irgá-s-is piano-in lávlagi-id,
play-INF girlfriend-ILL.SG-3SG.POSS piano-COM.SG song-ACC.PL
maid le-i oahppa-n mánnávuođa
which.ACC.PL be-IND.PST.3SG learn-PRF.PTCP childhood.GEN.SG
ruovttu-st-is [JÁV2]
home-LOC.SG-3SG.POSS
"… he himself was in the habit of sometimes playing for his girlfriend on the piano songs that he had learned in childhood in his home."
(b) *Son … beasa-i vásihi-t boaresvuođa*
3SG.NOM succeed-IND.PST.3SG experience-INF old.age.GEN.SG
beivvi-id-is oahpes olbmu-id gaskkas
day-ACC.PL-3SG.POSS familiar person-GEN.PL among
ieža-s ruovttu-s [JÁV2]
REFL.GEN-3SG.POSS home-LOC.SG
"He … got to spend the days of his old age among familiar people in his own home."

(13) Possessum in Nominative

(a) *Máhttájeaddji ii leat stuorit*
disciple.nom.sg neg.ind.3sg be.ind.prs.cvb.neg greater
go oahpaheaddji-s… [New Testament]
subjunction teacher.nom.sg-3sg.poss
"The disciple is not greater than his teacher…"

(b) *Vielja-s le-dje*
brother-loc.sg be-ind.pst.3pl
ieža-s heađi-t [MÁS: 31]
refl.gen-3sg.poss problem.nom.pl
"Brother was having his own problems."

(14) Possessum in Essive

(a) *son ii dahka-n duojášii*
3sg.nom neg.ind.3sg do-ind.pst.cvb.neg always
oččodea-men aivve Maria bealli-n-is [AL: 45]
get-aktio.ess rather Maria.acc.sg side-ess-3sg.poss
"he didn't even get Maria to always be on his side"

(b) *Mu le-i váttis dovda-t*
1sg.gen be-ind.pst.3sg difficult acknowledge-inf
su ieža-n áhčči-n. [JÁV1: 39]
3sg.acc refl.gen-1sg.poss father-ess
"It was hard for me to acknowledge him as my father."

The greater syntactic flexibility of ReflN in terms of the case marking of the possessum probably gives it a competitive advantage in the ongoing language change in North Saami.

4.4 Geography

Given that Finnish has possessive suffixes whereas Norwegian and Swedish lack such suffixes, one might expect that the replacement of NPx by ReflN should be restricted to or greater in the west than in the east. Further reason for this expectation comes from the observation of other features that show the expected geographical distribution. For example, North Saami has a number of adpositions that can serve both as prepositions and as postpositions, as in *maŋŋel soađi* [after war.gen.sg] and *soađi maŋŋel* [war.gen.sg after], both of which mean "after the war". Given that postpositions predominate in Finnish, whereas Norwegian and Swedish have prepositions with almost no postpositions, one would expect to find more postpositional use of ambipositions in the eastern range of North Saami and more prepositional use in the west. An empirical study of four North Saami

ambipositions revealed precisely that distribution (Antonsen et al. 2012, Janda et al. 2014). However, while we do detect some geographic differences in the use of NPx vs. ReflN particularly among Mid and Young generations, geography does not emerge among the most important factors in this study. This may be due in part to missing data. As already noted, at the time of the study there was no prose sample available from any North Saami author born in the east after 1948. The lack of data representing the eastern range of North Saami may explain why geography emerged as a weak factor in this study.

4.5 PRCase: Case marking of possessor

Table 4 shows the case marking of the possessor in our data. The difference in distribution between the prototypical case marking and all other case markings is more extreme for the possessor than the possessum; 97% of all NPx and 86% of all ReflN uses involve possessors either marked in the Nominative case or identified by subject-agreement marking on the finite verb in clauses with pro-drop. In this prototypical setting NPx dominates, though ReflN is also robust. However, the picture changes when we look at less prototypical case-markings for the possessor. When the possessor is marked Locative or Genitive, ReflN has a strong advantage, visible particularly in the Old generation (see node 3 on Figure 2). ReflN is also somewhat advantaged when the possessor is marked Illative or indicated by an Infinitive verb form. The layout of this table is parallel to that of Table 3, presenting both horizontal and vertical percentages. In the top row we see that among possessive constructions with a possessor marked in the Nominative case, there are 1007 examples of the NPx construction and 413 examples of the ReflN construction, in relative terms 71% NPx and 29% ReflN. A Nominative possessor is also very common for both types of construction, but more so for the NPx, where 73% of possessors are Nominative, as opposed to ReflN where only 56% of possessors are Nominative.

Table 4. Case marking of possessor in anaphoric uses of NPx and ReflN

PR Case	NPx	vert %	horiz %	ReflN	vert %	horiz %	Total
Nominative	1007	73%	71%	413	56%	29%	100%
Verb	331	24%	60%	224	30%	40%	100%
Accusative	24	2%	59%	17	2%	41%	100%
Illative	6	<1%	38%	10	1%	62%	100%
Locative	9	<1%	20%	35	5%	80%	100%
Genitive	7	<1%	14%	44	6%	86%	100%
Infinitive	3	<1%	33%	6	<1%	67%	100%
Overall	***1387***	**100%**	***65%***	***749***	**100%**	***35%***	***100%***

Most of the examples cited thus far have shown possessors marked in the Nominative case. We see the possessor indicated by the subject-agreement markings on a finite verb in example (1). Genitive marking of the possessor for the two constructions is illustrated in examples (5a) and (14b). Examples (7a–b) show a possessor indicated by an Infinitive form. Examples (15–17) below show marking of the possessor in the Accusative, Illative and Locative cases.

(15) Possessor in Accusative

(a) *Son čuovu-i Kátjá latnja-s-is* [EMV1: 173]
3SG.NOM follow-IND.PST.3SG Katja.ACC.SG room-ILL.SG-3SG.POSS
"He followed Katja to her room."

(b) *Oaidni-t Biera ja Máret Láillá Ken Thomas-a*
see-INF Biera.ACC.SG and Máret Láilá.ACC.SG Ken Thomas.ACC.SG
ieža-s nieidda-in – vazzi-me giehtalaga
REFL.GEN-3SG.POSS girl-COM.SG walk-AKTIO.ESS hand.in.hand
bálgá-id mielde … [EMV1: 219]
path-GEN.PL along
"To see Biera and Máret Láilá and Ken Thomas with his girlfriend, walking hand in hand along the path…"

(16) Possessor in Illative

(a) *Birggehi-i le-i hui lossat čuovvu-t*
Birget-ILL.SG be-IND.PST.3SG very hard follow-INF
bártni-s duššálaš eallim-a. [JÁV2]
son.ACC.SG-3SG.POSS trivial life-ACC.SG
"It was very hard for Birget to follow her son's trivial life."

(b) *Sudnos eai lean máná-t ja*
3DU.LOC NEG.IND.3PL be.IND.PST.CVB.NEG child-NOM.PL and
danin Elláš le-i goaská-i
therefore Ella-DIM.NOM.SG be-IND.PST.3SG aunt-ILL.SG
dego ieža-s nieida. [KP2: 127]
like REFL.GEN-3SG.POSS daughter.NOM.SG
"They didn't have any children and therefore little Ella was to the aunt like her own daughter."

(17) Possessor in Locative

(a) *Sus le-i ollu maid áiggu-i*
3SG.LOC be-IND.PST.3SG much which.ACC.PL will-IND.PST.3SG
olbmá-s-is muitali-t. [EMV2]
friend-ILL.SG-3SG.POSS tell-INF
"She had [lit. "at her were"] a lot of things to tell her friend."

(b) *Sus* *ii* *lean* *miella* *vuolgi-t*
3SG.LOC NEG.IND.3SG be.IND.PST.CVB.NEG mood.NOM.SG go-INF
ieža-s *váivves* *latnji-i* *vel, …* [EMV1: 97]
REFL.GEN-3SG.POSS miserable room-ILL.SG anymore
"She didn't feel like [lit. "at her was not mood"] going to her miserable room anymore…"

The data in Table 4 show that when the possessor appears in the Locative and Genitive cases, ReflN prevails. A closer inspection of this data reveals that there are specific constructions associated with these two cases where ReflN is the only option.

Heine (1997: 25) claims that all languages distinguish between attributive possession, such as that expressed by the NPx and ReflN constructions in North Saami, and predicative (verbal) possession. Predicative possession can be expressed in a variety of ways (Stassen 2013), among them via a transitive 'have' verb, as in English, or via an intransitive existential sentence, and one variety of this strategy employs a locational construction. In North Saami the 'have' relationship is expressed using the possessor marked in the Locative case and a copular verb agreeing with the possessum, which is the grammatical subject marked in the Nominative case. Example (18a) shows the use of the ReflN construction in such a sentence (cf. also (17b)). Replacement of ReflN with NPx in this context yields a sentence that native speakers do not find grammatical (18b). In our data we find twenty-seven examples like (18a), but no examples like (18b).

(18) (a) *Muhto* *dien* *ádjagi-s* *lea*
but DEM.LOC.SG.ATTR spring-LOC.SG be.IND.PRS.3SG
ieža-s *suollemasvuohta.* [KP2: 107]
REFL.GEN-3SG.POSS secret.NOM.SG
"But that spring has [lit. "at that spring is"] its secret."

(b) **Muhto* *dien* *ádjagi-s* *lea*
but DEM.LOC.SG.ATTR spring-LOC.SG be.IND.PRS.3SG
suollemasvuohta-s. [KP2: 107]
secret.NOM.SG-3SG.POSS

In Table 4 we see that the ReflN construction has the strongest advantage when the possessor is in the Genitive case. In large part this is due to the effect of examples where the possessive construction is enhanced by a preposed Genitive in the same noun phrase, making the expression of possession emphatic, as in (19). In these examples, if the Genitive possessor is a noun (as in 19a), only ReflN appears (with 20 examples). If the Genitive possessor is a pronoun (as in 19b), ReflN predominates and is the only possible choice for both Mid and Young generations. ReflN

is arguably irreplaceable here, particularly for the younger generations (with 36 examples for Mid and Young generations).

(19) Emphatic expression of possession with preposed Genitive

(a) *Návddi* *ieža-s* *luodda*
wolf.GEN.SG REFL.GEN-3SG.POSS track.NOM.SG
lea *buorre* [JT]
be-IND.PRS.3SG good
"The wolf's own track is good."

(b) *Lea* *du* *ieža-t* *sivva* [EMV2]
be-IND.PRS.3SG 2SG.GEN REFL.GEN-2SG.POSS fault.NOM.SG
"It's your own fault."

As we saw above with respect to case-marking of the possessum, ReflN is the construction of choice in syntactically peripheral uses. There is a clear opposition here between the cases that typically mark the syntactic arguments of the verb, and those that typically mark adverbials and other elements of clauses. The main syntactic arguments are typically marked with the Nominative (= 'Verb'; typically the agent), the Accusative (typically the patient) and the Illative (typically the recipient). These are opposed to the Locative and Genitive, which are syntactically more peripheral markings for a possessor. Peripheral uses are known to be more vulnerable to linguistic change (see Nesset & Janda 2010 and references therein), so ReflN's strong position on the periphery gives it a strategic advantage. Additionally, ReflN can be used in some specific syntactic constructions where NPx is not found. Thus ReflN is poised to spread precisely in environments most vulnerable to change.

4.6 Summary of variables

The semantic class of the possessum and the generation of the author are the strongest factors associated with the distribution of NPx vs. ReflN, reflecting the language change underway. In terms of semantic classes, ReflN is most robust initially with Abstract possessums, and over time NPx comes to be frequent only with Kin, Body and Property possessums. Of the two competing possessive constructions, only ReflN is robustly attested across the spectrum of syntactic environments as indexed by the case marking of both the possessum and the possessor. ReflN is actually preferred precisely in the syntactic environments that are most atypical for the expression of possession, making ReflN the construction of choice in the environments that are likely to be most influential in language change. Despite ReflN's lower overall frequency, its strategic positioning in terms of syntactic environments arguably gives it an advantage.

5. Possible advent of a Vocative case in North Saami

There is one unusual cell in the expanded paradigm of nouns with the possessive suffix represented in Table 2: the NPx in the Nominative Singular with First Person Singular reference. While all other uses are ebbing, this one is robust even in the Young generation. We argue that instead of bucking the trend toward loss of NPx, NOM.SG-1SG.POSS markers may be undergoing a morphological transformation into a Vocative case form. In other words, North Saami is not retaining the possessive suffix in these uses, but instead reinterpreting it as a Vocative marker. Whereas in most of the analysis above we have excluded the exophoric uses of possessive constructions because the two constructions do not compete in this environment, in this section we will focus on a subtype we call we call the 'exophoric Vocative', illustrated in (20).

(20) Exophoric Vocative
Gula, *máná-ž-an.* [KP2: 6]
listen.IMP.2SG child-DIM.NOM.SG-1SG.POSS
"Listen, my little child."

The possessums of exophoric Vocatives are restricted to kinship terms, names, metaphorical names for people and names or words for animals that are addressed as if they were people, and these are nearly always Singular. As in example (20), the possessum often has a diminutive suffix and is often found in combination with an imperative verb form. In our data, all exophoric Vocatives involve First Person Singular reference, though First Person Plural reference is attested in other sources such as the New Testament, cf. *Áhčča-met* [father.NOM.SG-1SG.POSS] "Our Father". The Nominative Plural subparadigm for NPx has collapsed to only the three First Person forms (see Table 2), all of which are syncretic with the Genitive/Accusative Plural, and which are found only rarely and in very formal types of address, particularly in connection with religious rituals (Nickel & Sammallahti 2011: 109).

While our study is the first to quantify the use of First Person Singular reference in NPx as a Vocative in North Saami, this phenomenon has been described before, and it is also part of a larger trend toward the reinterpretation of NPx in Uralic languages. Nielsen (1979 [1926–1929]: 301) cites examples of first person possessive suffixes used (both with and without diminutives) as forms of address in 'Lappish' (a.k.a. Saami). Collinder (1960: 239–240, 1965: 56) mentions the use of such possessive suffixes as "a kind of vocative" in several Uralic languages, including Veps, Vote and Estonian, where the possessive suffix is otherwise obsolete, and parallels in other languages where the possessive suffix survives, among them Mordvin and 'Lappish'. Nikolaeva (2003) adds Udmurt to this list, though her focus is on another type of reinterpretation of possessive suffixes, namely as definiteness markers, which Kaškin (2008) argues can be obligatory in some dialects

of Komi. The reinterpretation of a possessive construction as a Vocative is not limited to Uralic languages. Michael (2013: 157) documents the use of the First Person Singular possessive construction with close kinship terms, as in *ina* "my mother" in Nanti (spoken in Peruvian Amazonia) as Vocatives.

There is a strong connection between the Vocative use of NPx with First Person Singular reference and the presence of the diminutive suffix *-š* (which alternates with *-ž-* intervocalically), as we see in example (20). A similar association with diminutives is found in other languages, such as Russian (Andersen 2012) and Georgian (Abuladze & Ludden 2013). In our data, 88% (53 out of 60 examples) of First Person Singular Vocative uses involve the diminutive suffix, which arguably functions as an expression of endearment rather than size (though of course endearment and size are related concepts, cf. Wierzbicka 1980: 53–60). This is particularly evident in our data from the two authors for whom we have >10 examples of Vocative uses: Larsen (b. 1870) uses the diminutive with thirteen of fifteen Vocative examples (87%), constituting 9% of his overall use of NPx, and Vars (b. 1957) uses the diminutive with all thirty-three (100%) Vocative examples, constituting 18% of her total use of NPx. This suggests that *-ž-an* [-DIM.NOM.SG-1SG.POSS] "my dear/little" may be functioning as a unit for deriving Vocative forms. The nouns that appear with *-ž-an* highlight the connection with the Vocative and the productivity of this use. All examples of NPx with personal names involve *-ž-an*, and these include both traditional Saami names as well as other names: *Ábo*, *Eira*, *Kátjá*, *Liná*, *Maria*, *Márjá*, *Moddi*, *Ovllá*, *Ánná*, *Ane*, *Hilde*, *Ken*. Most other nouns used with *-ž-an* are words for Kin and other Humans, such as *oabbá* "sister" and *gánda* "boy", although some animals (usually domesticated) such as *bussá* "cat" and other objects like *násti* "star" are attested.

If a Vocative is emerging in North Saami, the next question is: What is a Vocative? Sonnenhauser & Hanna (2013: 3) point out that "even though they are amongst the most basic and earliest acquired structures of language, vocatives have hardly ever been discussed in all their facets from a linguistic point of view." Linguists have made at least three different claims about the status of Vocatives as noun forms, verb forms or even a separate part of speech.

The argument that a Vocative is a case form of a noun receives the most support; for example Kiparsky (1967) argues that it is a case because it can have a distinct morphological form and can often be replaced by a nominative, which is also a case. Abuladze & Ludden (2013), Hill (2014) and Julien (2014) all offer syntactic evidence that the Vocative can be considered a case form; for example, in some languages the Vocative can show agreement within a Noun Phrase and can be syntactically integrated via a Vocative Phrase. While Daniel & Spencer (2009) agree that the Vocative is a case, they also point out that it is certainly not prototypical;

they call it 'an outlier case'. Counterarguments are raised by Isačenko (1962: 83), on the grounds that the Vocative is not syntactically integrated into a clause, and by Andersen (2012), who points to peculiar restrictions associated with the Vocative (see more below).

Vocatives do share some characteristics with verbs, particularly Second Person reference, as in imperative forms (with which vocatives often co-occur, as in (20)), an issue raised by Fink (1972), Jakobson (1971) and Greenberg (1996). More recently, Julien (2014) has described Norwegian possessive predicational Vocatives such as *Din idiot!* [your idiot] "You idiot!" as equivalent to a copular predication such as *Du er en idiot* [You are.INDC.PRS an idiot] "You are an idiot". Note, however, that although such Norwegian examples use possessive forms, unlike the North Saami Vocatives, they refer to a Second Person (not First Person) possessor. Furthermore, given the location of NPx within the noun phrase in North Saami, an interpretation of the Vocative as a verb form in this language is infelicitous.

Andersen (2012), with reference to a 'new Vocative' emerging in Russian (e.g., *mam!* "mama!", *Saš!* "Sasha!"), claims that the Vocative is neither noun nor verb, but its own part of speech. Andersen argues that the Vocative is subject to functional restrictions to certain pragmatic expressions, lexical restrictions to words that can serve as forms of address, syntactic restriction to a position independent of the sentence, association with diminutives (which are themselves peculiar), morphophonological restrictions and phonological peculiarities. Contra Andersen, it is possible to find similar restrictions in other markers that are uncontroversially recognized as case desinences: Janda (1996) charts virile vs. deprecatory NOM.PL markers in Polish and lexical and morphophonological restrictions on the "second Locative" in Russian, and Bethin (2012) reports on phonological peculiarities in Russian case endings. Thus none of these restrictions can be said to exclude a marker from being identified with a case. And one must ask what we gain by further expanding the list of parts of speech. If anything, there are perhaps already too many items on that list, creating lack of theoretical clarity (Zwicky 1985) and practical problems for natural language processing (Endresen et al. 2016). From the perspective of North Saami, it seems more likely that a form of a noun will remain associated with the case + number paradigm of nouns than that it will emerge as a new part of speech.

The interpretation of *-ž-an* [-DIM.NOM.SG-1SG.POSS] as an emerging Vocative case marker in North Saami is in line with the interpretation of other productive forces in the language that are possibly yielding another new case. Ylikoski (2014) suggests that *-ráigge* [-"hole"] is developing into a 'prolative' case marker in North Saami in uses such as *uksa-ráigge* [door.GEN-hole] "through the door" and *bálgges-ráigge* [path.GEN-hole] "along the path".

If indeed possessive suffixes in such uses of NPx are being reinterpreted as vocative markers, this development could be further undermining the integrity of the NPx paradigm and thus further disadvantaging NPx vis a vis the ReflN construction. The tendency for inflectional forms to get 'recycled' into new roles when paradigms are under pressure due to historical erosion is well documented, as both Lass (1990) and Janda (1996) have shown with reference to numerous languages.

6. Conclusion

North Saami is undergoing a change in the use of its possessive constructions. We track the replacement of the possessive suffix (NPx) by the reflexive genitive pronoun (ReflN) in the prose of authors born 1870–1983. This change follows an S-curve, and the factors that emerge as most important, aside from time, are the semantics of the possessum, the grammatical case marking of both the possessum and the possessor and the geographical location of the author.

We find evidence that a number of factors converge, creating a complex situation that advantages one possessive construction over the other. These factors include morphological complexity, language contact, the semantic and syntactic range of the competing forms and the possible reinterpretation of some forms as Vocative. All of these factors arguably support the expansion of ReflN at the expense of NPx.

Given the timing of the change, it seems likely that the replacement of NPx by ReflN was sparked in part by educational policies that removed Mid generation speakers from their L1 environment during their school years, creating a sociolinguistic situation in which morphological complexity was disadvantaged. This study thus sheds light on what may be a concrete linguistic effect catalyzed by discriminatory policy.

ReflN is less morphologically complex than NPx, a factor that becomes an advantage for ReflN due to the sociolinguistic situation of North Saami, with intense language contact and heterogeneous speakers (L1, L1 > L2, L2). ReflN is composed entirely of morphological paradigms that are otherwise necessary in the grammar of North Saami (the standard paradigm of noun inflection and the paradigm of the Genitive/Accusative reflexive pronoun). ReflN is analytic and transparent.

ReflN is well represented across the semantic spectrum, with particular strength precisely where possession is less typical, namely with abstract nouns.

Over time, NPx narrows its semantic focus and ReflN emerges as the default choice for most nouns except those referring to kin, other humans and artifacts such as tools and clothing.

Syntactically we find that ReflN is robustly attested in connection with all case markings for both the possessum and the possessor, and furthermore that ReflN is particularly strong precisely in syntactic situations that are unusual for possession. Usually in possessive constructions we find anaphoric reference and the possessor is either the subject of the sentence (Nominative) or occupies another prominent thematic role (direct or indirect object; Accusative or Illative) while the possessum is an object (Accusative) or adverbial (Locative, Comitative, Genitive or Illative). ReflN is strongest precisely where these prototypical expectations are challenged, namely when the possessor is in the Locative or Genitive case and the possessum is in the Nominative or Essive case. Furthermore, NPx is always replaceable, usually by ReflN, but the converse is not true. Syntactically, ReflN is always a 'safe' choice, one's best bet especially in atypical situations. This gives ReflN a syntactic advantage.

NPx forms expressing NOM-SG-1SG.POSS are often used in appellative functions and are possibly being reinterpreted as Vocative case forms, further degrading the paradigmatic integrity of NPx. In such forms the original possessive suffix is frequently enlarged by the diminutive suffix to form Vocatives in *-ž-an* [DIM-1SG.POSS] "my dear/little".

Thus syntax, semantics, morphological complexity in a heterogeneous sociolinguistic situation, and geographic and pragmatic tendencies seem to have aligned in North Saami to promote ReflN. This study shows how a constellation of factors can contribute to a coherent direction in language change.

Abbreviations

ACC	accusative	INF	infinitive
AKTIO.ESS	aktio essive	LOC	locative
COM	comitative	NEG	negative
CVB	converb	NOM	nominative
DEM	demonstrative	PL	plural
DIM	diminutive	POSS	possessive
DU	dual	PRF.PTCP	perfect participle
ESS	essive	PRS	present
GEN	genitive	PST	past
ILL	illative	REFL	reflexive
IND	indicative	SG	singular

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Appendix: List of sources for data and examples

AL = Anders Larsen 2013 (1912): *Beaiveálgu.* Kárášjohka: Čálliid Lágadus.
AOE = Anders O. Eira 1991: *Duottarráfis soahtešilljui.* Kárášjohka: Davvi Girji.
EMV1 = Elle Márjá Vars 1986: *Kátjá*. Kárášjohka: Davvi Media.
EMV2 = Elle Márjá Vars 2002: *Čábbámus iđitguovssu.* [Billávuotna]: Iđut.
HAG1 = Hans Á. Guttorm 2007 (1940): *Gohccán spálli. Divttat ja máidnasat*. Kárášjohka: Davvi Girji. (poems are not included in the data)
HAG2 = Hans Á. Guttorm 1986: *Iešnjárgga šiljut.* Deatnu: Jår'galæđ'đji.
JT = Johan Turi 1987 (1910): *Muitalus sámiid birra*. Jokkmokk: Sámi Girjjit.
JÁV1 = Jovnna-Ánde Vest 1988: *Čáhcegáddái nohká boazobálggis.* Kárášjohka: Davvi Media.
JÁV2 = Jovnna-Ánde Vest 2002: *Árbbolaččat 2*. Kárášjohka: Davvi Girji.

JÁV3 = Jovnna-Ánde Vest 2005: *Árbbolaččat 3*. Kárášjohka: Davvi Girji.
JMM = Jens Martin Mienna 2010: *Eallima čoavdda.* Kárášjohka: Davvi Girji.
KNT = Klemet Nilsen Turi 1982: *Áiggit rivdet*. [Deatnu]: Jår'galæd'dji.
KP1 = Kirsti Paltto 2001: *Suoláduvvan. Noveallat*. Kárášjohka: Davvi Girji.
KP2 = Kirsti Paltto 2007: *Ája*. Kárášjohka: Davvi Girji.
MÁS = Máret Ánne Sára 2013: *Ilmmiid gaskkas.* Guovdageaidnu: Dat.
MÁS2014 = Máret Ánne Sára 2014: *Doaresbealde doali.* Guovdageaidnu: Dat. (used only for a contrastive example)
MPAB = Mikkel P.A. Bongo 1985: *Mus ledje bálgát*. [Deatnu]: Jår'galæd'dji. (poems are not included in the data)

Résumé

Le same du Nord subit actuellement un remplacement des suffixes possessifs nominaux par une construction analytique, plus simple sur le plan morphologique. Nos données identifient ce changement à travers trois générations, examinant des paramètres sémantiques, syntaxiques et géographiques. La forte influence extérieure sur cette langue minoritaire semble provoquer une certaine simplification morphologique, d'où l'avantage pour la construction innovatrice. Autre facteur qui la favorise : son champ syntaxique et sémantique plus large, ainsi que sa présence obligatoire – son concurrent pouvant subir un remplacement. Le suffixe possessif se conserve le mieux au nominatif, où l'on trouve des indications qu'on le réinterprète comme forme marquant le cas vocatif.

Zusammenfassung

Das Nordsamische ersetzt momentan den Gebrauch der Possessivsuffixe an Nomen durch eine morphologisch einfachere analytische Konstruktion. Unsere Daten belegen diesen Wandel über drei Generationen hinweg, wobei semantische, syntaktische und geographische Parameter von Relevanz sind. Intensiver Sprachkontakt übt Druck auf diese Minoritätssprache aus und fördert wahrscheinlich die morphologische Vereinfachung, was. sich günstig für die innovative Konstruktion auswirkt. Ein zusätzlicher Vorteil dieser ist, dass sie syntaktisch und semantisch ein größeres Gebrauchsfeld abdeckt und im Gegensatz zur älteren Form nicht ersetzbar ist. Das Possessivsuffix hält sich – selbst in der jüngsten Generation – am stabilsten im Nominativ und hier finden wir Evidenz für seine Reanalyse als Vokativ.

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