Simplification, complexification, and microvariation: Towards a quantification of inflectional complexity in closely related varieties

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1. Introduction

In recent typological work the structural complexity of languages has become a centre of interest (cf. e.g. Miestamo *et al.* (eds.) 2008 or Sampson *et al.* (eds.) 2009). This is somewhat surprising given the fact that throughout the 20th century it has been more or less explicitly assumed that overall structural complexity is constant across languages. That is, greater complexity in one area of grammar (e.g. morphology) has been expected to be compensated by a lower degree of complexity in another (e.g. syntax): "[...] impressionistically it would seem that the total grammatical complexity of any language, counting both morphology and syntax, is about the same" (Hockett 1958: 180). So, whereas the existence of complexity differences between languages has been at least doubted (if not denied) by structural linguistics and linguistic typology, another line of research, variationist linguistics, has talked about complexity differences quite unscrupulously from its very beginnings. In his seminal paper on diglossia Ferguson says, with regard to structural differences between High and Low varieties, that "[o]ne of the most striking differences between H[igh] and L[ow] variety [...] is in the grammatical structure: H has grammatical categories not present in L and has an inflectional system of nouns and verbs which is much reduced or totally absent in L" (Ferguson 1959: 241). Statements about the reduced, simplified structural characteristics of vernacular dialects as opposed to codified standard languages are abundant in the dialectological literature. However, to our knowledge (most of) these statements are purely intuitive, for they have never been based on solid measurements of complexity.

In a more recent line of research at the intersection between linguistic typology and sociolinguistics attempts are being made to (i) uncover complexity differences between languages / varieties and (ii) to explain those differences by reference to the structure of the community where the language/variety is spoken. In particular, it is claimed that languages spoken by small, close-knit, isolated communities display a greater degree of structural complexity (Trudgill 2004, 2009, 2011, Nichols 1992, Braunmüller 1984, 2003). We will call this idea 'Isolation Hypothesis' (IH). If the IH is correct, it predicts something not only about large-scale typological comparison but also about sets of genetically closely related and similar languages or varieties: In isolated varieties lacking contact processes of simplification are less likely to occur than in non-isolated cognate varieties. Similarly, isolated varieties are more likely to display complexification than others.

Trudgill (2011) proposes three possible extralinguistic scenarios with different effects on simplification or complexification, respectively. First, traditional, remote dialects with no L2 learners are an ideal biotope for those types of complexification which cannot be attributed to structural borrowing: "[…] spontaneous (as opposed to additive) complexification will develop on a large scale mainly in low-contact communities, where 'low contact' refers in particular to an absence of a history of large-scale acquisition by non-native adult speakers" (Trudgill 2011: 89). Also, archaic features

seem to be more stable in isolated languages (Trudgill 2011: 13). Second, languages / varieties which are (or have been) acquired by many adult non-native speakers are expected to display simplification processes such as regularization of irregularities, increase in morphological transparency, reduction in syntagmatic redundancy, or loss of morphological categories (Trudgill 2011: 34, 40, 62). The third type is also due to language contact, but of a different kind. In contact-induced change grammatical features may spread from one language into another, which may lead to the addition of new features and thus to greater complexity of the influenced language (Trudgill 2011: 27). This kind of contact-related complexification "is most likely to occur in long-term co-territorial contact situations involving child bilingualism" Trudgill (2011: 34).

In this preliminary study we attempt to put to test the IH, using evidence from different varieties of German. We believe that a set of cognate varieties provides a marvellous piece of evidence since we can observe the results of diachronic processes of simplification and complexification in a very direct way, due to the close genetic affiliation and thus the common historical origin of the varieties. In order to test the predictions of the IH in a substantial way, complexity must be operationalised. This is why the paper focuses on the complexity of noun inflection only. We are not yet able at this point to make any substantial claim about the overall complexity of the grammars of our varieties. However, our preliminary findings on noun inflection give us at least a hint whether the IH is worth to be pursued any further (we will argue that this is indeed the case). To put it differently: If our findings even within a limited, relatively cross-linguistically easily comparable area such as noun inflection were totally incompatible with the IH already, it seems very unlikely to us that including other areas of grammar would lead to a less disparate picture.

The paper is structured as follows. We will first address the research questions (section 2). Section 3 presents the sample of the varieties studied (3.1), a definition of absolute complexity (3.2), some previous approaches to complexity and microvariation (3.3), and our proposed procedure to measure complexity of noun inflection in closely related, similar varieties (3.4). The results of our investigation are presented in section 4. In section 5 we will discuss the results in the light of our research questions, and we will give a short outlook.

2. Research questions and hypotheses

Question 1: Is there an overall diachronic tendency?
In the light of the references mentioned above, the expectations are unclear. There seems to be a certain consensus that, all other things being equal, languages tend to gradually simplify their grammars, in particular their morphologies: If isolated languages / varieties (i) show a slower rate of change (Trudgill 2011: 2-8) and (ii) a greater degree of complexity, one might easily conclude that this greater complexity is an archaic trait which just survives longer if the language changes at a slow rate. This view presupposes, of course, the idea that the 'normal thing' for a language is to simplify across time. Perhaps this intuition is particularly influenced by linguists' familiarity with the older Indo-European languages and their intricate inflectional systems. Thus, if there is an overall diachronic tendency at all we might hypothesize this tendency leads towards simplification.

Question 2: What are the effects of isolation?
With regard to question 2, our expectations are much clearer: If the IH is correct, we expect a greater degree of complexity in isolated varieties.

Question 3: What are the effects of contact?

As outlined in section 1, contact situations can lead to both complexification and simplification. Complexification is expected in pre-threshold bilingualism, i.e., in situatations of stable contact where both languages are acquired early. Simplification in post-threshold bilingualism, i.e. in situations where the language in question is acquired by adult non-native speakers (Trudgill 2009:101). As will be shown in Chapter 3.1, we are concerned with pre-threshold bilingualism in the case of Issime German and therefore we expect complexification rather than simplification here.

Question 4: Are there instances of complexification?
Complexification seems to be uncommon in larger, non-isolated languages. Genuine ("spontaneous", Trudgill 2011: 89) complexification, i.e., complexification which is not due to structural borrowing, is expected to occur only in isolated dialects.

Question 5: What is the role of codification?
Here the expectations are unclear. If we take seriously Ferguson's quote from section 1, High varieties are notorious in their greater structural complexity if compared with spoken vernaculars. Also, there might be conserving effects of codification. It therefore seems plausible to assume that codified standard varieties display a greater degree of complexity than spoken dialects.

3. Method

3.1. Sample

To answer these questions we selected five German varieties. Old High German (OHG) is the oldest attested German variety and New High German (NHG) the present-day standard language. The non-standard varieties are the Alemannic dialect of the Kaiserstuhl, an area near Freiburg in the South-West of Germany, the Alemannic dialect of Visperterminen in the Canton of Valais in Switzerland and the Alemannic dialect of Issime, a linguistic island in the Aosta Valley in Italy. The data are based on the following grammatical descriptions: Braune/Reiffenstein (2004) for OHG, Eisenberg (2006) for NHG, Noth (2003) for Kaiserstuhl Alemannic, Wipf (1911) for Visperterminen Alemannic, Zürrer (1999) for Issime Alemannic. Unfortunately there aren't any more recent exhaustive grammars for the dialects in the Valais. For the analysis, this has to be kept in mind.

We consider OHG, NHG and Kaiserstuhl Alemannic as not isolated, the two Walser dialects of Visperterminen and Issime as isolated. There are a few qualitative criteria for considering the Walser dialects as isolated which are introduced in the following.

Visperterminen is situated in the canton of Valais in Switzerland and has 1373 inhabitants (2010; wikipedia). It is located at 1378m above sea level and at the dead end of its only road access from Visp.

Issime is one of several Alemannic colonies in northern Italy. In the 13th century people migrated from the canton of Valais to the Aosta Valley in Italy. As for Issime, there hasn't been any contact with the German speaking language area since then. Many of the 400 inhabitants in Issime are quinquelingual: Alemannic, Franco-Provençal, Piemontese, Standard French (which is the official language of the région autonome Vallée d'Aoste) and Standard Italian (the official language of Italy). However, they do not speak Standard German.

Although this sample is small, it contains some interesting contrasts: historical (OHG) vs. recent, codified (NHG) vs. vernacular, isolated (Visperterminen, Issime) vs. non-isolated, contact (Issime) vs. monolingual environment.

3.2. Absolute complexity

In the literature a difference is made between relative and absolute complexity. In relative complexity one is interested in whether a linguistic phenomenon is complex to a speaker, a hearer, an L1 acquirer, an L2 learner, etc, i.e. "how difficult a phenomenon is to process (encode/decode) or learn" (Miestamo 2008: 25).

In absolute complexity one considers only the language system itself. Following Miestamo "the [absolute] complexity of a linguistic phenomenon may be measured in terms of the length of the description of that phenomenon [...] A less complex phenomenon can be compressed to a shorter description without losing information" (Miestamo 2008: 24). We can adapt this to the language system and assume that the longer the description of the language system is (the less it can be compressed), the more complex the language system will be.

Another important point is that we consider here only inflectional complexity, more precisely the inflectional complexity of nouns, which does of course not mean that phonological or syntactic complexity should be excluded. Rather, they must be included if one wants to calculate the overall complexity of the entire language system. Other nominal and verbal parts of speech will be measured in a later stage of our project.

3.3. Previous approaches to microvariation and complexity

In this chapter we will briefly discuss some central proposals for measuring complexity (especially in closely related varieties) and show why they are not appropriate for our purposes.

There are large-scale typological comparisons (Shosted 2006, McWorther 2001, Nichols et al. 2006) whose common ground is that they count the number of grammatically encoded features. This is clearly operationalising, but too coarse for the purposes of micro-comparison of closely related languages and varieties. Dammel & Kürschner (2008) compare the noun plural allomorphy in ten Germanic languages. They incorporate ideas of Natural Morphology (Wurzel 1984) such as uniformity and iconicity to account for aspects of relative complexity. Relevant factors are e.g. the number of plural allomorphs, stem involvement, multiple exponence, zero marking and fusion. As the weights of the factors are assigned merely intuitively, an operationalisation does not seem to be possible. Szmrecsanyi & Kortmann (2009) compare 42 varieties of English: traditional L1, high-contact L1, L2 and creoles. They analyse 31 features which are a selection of the 76 features covered by the *World Atlas of Morphosyntactic Variation in English*. Their method is clearly operationalising. However, the features are very English-specific and themselves treated in a binary way (presence or absence of the feature). Therefore it is of limited use for microvariation especially in highly inflecting languages.

Since there has not been any appropriate tool to measure complexity in inflecting and closely related varieties, we have tried to develop a simple method adapted to our sample, which will be presented in the following chapter.

3.4. Measuring inflectional complexity

In this subsection we propose a simple procedure to uncover complexity differences in inflectional systems even of genetically closely related, similar languages / varieties. We will first outline the concrete steps we have undertaken when analysing our sample in a cookbook-like fashion, before we briefly address some of the insights which naturally follow from the proposed procedure.

The main goal of our procedure is to make visible the raw data structure in the first place. We deliberately do that as much as possible in a pre-theoretic way. The immediate results of the procedure should be analysable in theoretical contexts of different flavours (we come back to the issue in the concluding section 5). Originally, we believed that structuring the data in such a rather mechanical way is a relatively easy task. However, it turned out that even our toolkit-style procedure requires a considerable amount of hand-made morphological analysis, for many decisions can be made only if the functioning of the respective inflectional systems is linguistically well understood.

We use the following method in four steps in order to measure inflectional complexity:

- Step 1: Collect the distinguishable inflectional paradigms of the respective language/variety.
- Step 2: Break each paradigm down into a list of inflectional markers.
- Step 3: Put the markers on a list and remove repeated occurrences of markers. Count the remaining markers.
- Step 4: Multiply the number of markers by the number of marker combinations (=inflectional classes).

We thus define complexity as the number of inflectional markers multiplied by the number of inflectional classes.

Step 1: Every grammatical description forms the paradigms in a different way, even if we are concerned with the same variety. For example, with regard to NHG, the Duden-Grammatik (1998: 223-224) distinguishes ten inflection types (Deklinationstypen), but Eisenberg (2006: 152-154) only four types with two subtypes. However, since we aim to compare the paradigms of different varieties we need comparable paradigms, i.e. paradigms which are identified in similar ways. Our paradigms are not organised in inflection types but in inflectional classes. Furthermore each paradigm must be maximally compressed to obtain the shortest description of the noun inflection. We are then able to compare the shortest description of variety A with the shortest description of variety B.

Step 2: We define a marker as a distinct pairing of exponent and grammatical feature. For example the paradigm of *Tag* consists of three markers (for the full paradigm see table 2):

m_1: -es $\begin{pmatrix} \text{NUM} & \text{SG} \\ \text{CASE} & \text{GEN} \end{pmatrix}$

m_2: -e $\begin{pmatrix} \text{NUM} & \text{PL} \end{pmatrix}$

m_3: -n $\begin{pmatrix} \text{NUM} & \text{PL} \\ \text{CASE} & \text{DAT} \end{pmatrix}$

For convenience we write the markers without attributes as follows: -es:sg.gen, -e:pl, -n:pl.dat. In cases of multiple exponence, each exponent is counted as a marker. Thus, *Hand-Hände* is made of umlaut and the suffix –e. Umlaut demonstrates that not only segmentable morphs but also (not phonologically conditioned) stem alternations can be a marker. We note them as a rewriting rule: V → [+front, -low] / [NUM PL]. Again for convenience, we write the marker as UL:pl.

Table 1 displays the paradigm of *Student* which has homophonous markers –n. They may occur whenever they cannot be assigned to a uniform function. Thus, –n in the paradigm of *Student* has four distinct functions: –n:acc.sg, –n:dat.sg, –n:gen.sg, –n:pl. Concerning syncretism, we distinguish between "good" and "bad" syncretism. For example, the paradigm of *Student* (Table 1) has the following markers in the plural: -n:nom.pl, –n:acc.pl, –n:dat.pl, –n:gen.pl. However, this –n can be attributed to consistent

function, namely plural. Therefore the plural has only one and not four markers. This type of "good" syncretism does not add to complexity. The singular of the paradigm of *Student* contains the following markers: –n:acc.sg, –n:dat.sg, –n:gen.sg. Since it is impossible to assign a consistent function to this –n (the nominative singular is not marked), each of these three suffixes has to be counted as a separate marker, so the paradigm has three markers in the singular. This syncretism adds to complexity and we therefore call it "bad" syncretism.

Table 1: Paradigm of *Student*

	SG	PL
nom	Student	Studenten
acc	Studenten	Studenten
dat	Studenten	Studenten
gen	Studenten	Studenten

In step 3 the markers are put on a list and the repeated occurrences of markers are being removed. This is a very important step because varieties of German notoriously re-use the same markers across different paradigms. For instance, if the dative plural is marked in NHG, the marker –n is suffixed across all inflectional classes (cf. Table 11).

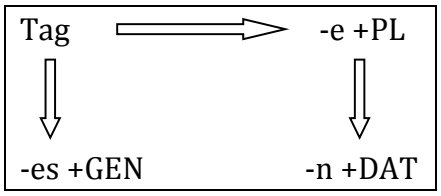
Step 4: Inflectional complexity is calculated by multiplying the number of markers by the number of inflectional classes. The inflectional class can be defined as a specific combination of markers. Therefore, both larger marker inventory and large numbers of inflectional classes add to complexity, but they do not automatically follow one from another. We multiply the number of markers by the number of inflectional classes because our intuition is that each marker combination is to be counted as one way of making use of the same marker inventory. For instance, if there are five inflectional classes, the morphology uses the marker inventory five times to create different paradigms.

In our method we assume Underspecification and the Elsewhere Condition (Anderson 1992, Kiparsky 1973; for German morphology cf. Eisenberg 2006, Thieroff&Vogel 2009). Traditionally paradigms of German nouns are represented by means of eight instructions, whereby each instruction contains a full specification of feature content and associated exponent. The paradigm of *Tag* (Table 2) contains the following eight instructions: nom.sg→Tag, acc.sg→Tag, dat.sg→Tag, gen.sg→Tages, nom.pl→Tage, acc.pl→Tage, dat.pl→Tagen, gen.pl→Tage. Assuming Underspecification, the paradigm of *Tag* contains only three instructions (cf. Table 3): Add –es in the genitive singular, -e in the plural and –n in the dative plural. However, how does the case-underspecified form *Tag* know that it may not be used as genitive? Why does the grammar not generate **wegen des Tag*, rather *wegen des Tages* (the preposition *wegen* governs a genitive). Here the Elsewhere Condition comes into play: If there is a more specific instruction you must not follow a less specific one. For example, if a genitive singular is required, the most specific available form must be used in the first place. Since *Tages* is more specific for genitive singular than *Tag*, *Tages* will be used first and blocks the insertion of *Tag* for the genitive singular.

Table 2: Paradigm of *Tag*

	SG	PL
nom	Tag	Tag-e
acc	Tag	Tag-e
dat	Tag	Tag-en
gen	Tag-es	Tag-e

Table 3: Paradigm of *Tag* assuming unterspecification



When the method as outlined above is applied to an inflectional system, it naturally falls out without any further assumptions or stipulations that the following factors add to the amount of inflectional complexity:

- Number of inflectionally distinguished grammatical features, e.g. the number of cases.
- Allomorphy created by a number of inflectional classes, e.g. the plural allomorphs (–e, –n, –er, etc.) in NHG.
- Multiple exponence, e.g. in *Wald-Wälder* the plural is expressed by the umlaut and the suffix –er.
- "bad" syncretism, e.g. the homophonous singular markers of the Paradigm *Student* (Table 1).

The following factors do not add to complexity:

- Re-use of markers across inflectional classes, e.g. the suffix –n (dative plural) in NHG.
- Absence of otherwise attested distinctions in particular inflectional or lexical classes, e.g. Kaiserstuhl Alemannic nouns do not distinguish cases, but determiners and pronouns do.
- Allomorphy which is predictable on phonological grounds.

4. Results

As already mentioned in section 3.4 above, we are faced with a great deal of decisions when analysing the inflectional systems of our varieties even if such a cookbook-like method is applied. In 4.1, we will briefly discuss a few of the analytical difficulties we encountered. We do that in a very exemplary way by choosing one or two typical problems for each variety in order to illustrate the reasoning which is behind the categorisations we have made. The complete paradigms of each variety are listed in the appendix. Subsection 4.2 presents the results of our investigation.

4.1. Paradigms

4.1.1. OHG

Traditionally so-called a-stems and wa-stems are analysed as two different inflectional classes of OHG. However, their sets of endings are identical. The difference between a-stems and wa-stems is the stem alternation in the wa-stems. For instance, the dative of *tag* (a-stem) is *tag-e* whereas the dative of *hleo* (wa-stem) is *hlew-e*. To form the dative of both a– and wa–stems, the ending –e is suffixed. The difference between the two paradigms is that *hleo-hlewe* does show a stem alternation, but *tag-tage* does not. However, as we cannot attribute any uniform meaning to this alternation, we consider these two stems (*hleo-*, *hlew-*) as stem allomorphs and therefore end up with only one inflectional class. What is now the shortest description of this alternation? The linguistic

generalisation is that there is a stem allomorph for unsuffixed forms (*hleo*) and another stem allomorph for affixed forms (*hlew*-). We note this contextual conditioning as a rewriting rule, which is counted as an additional marker: …eo→ew/_suffix, …o→aw/_suffix. In stems which do not end in ...eo/...ew- the rule simply runs vacuously, i.e., it is not applicable.

Table 4: a-stems and wa-stems in OHG

		SG					PL			
	IC[12]	nom	acc	dat	gen	instr	nom	acc	dat	gen
a-stem	1	tag	tag	tag-e	tag-es	tag-o	tag-a	tag-a	tag-on	tag-o
wa-stem		hleo	hleo	hlew-e	hlew-es		hlew-a	hlew-a	hlew-on	hlew-o
wa-stem		horo	horo	horaw-e	horaw-es		horo	horo	horaw-on	horaw-o
a-stem	8	wort	wort	wort-e	wort-es	wort-o	wort	wort	wort-on	wort-o

4.1.2. NHG

We did not take into account the –en/–n variation in the dative plural (e.g. *Staat-en*, *Wäld-er-n*). We assume that this variation is purely phonologically conditioned. More precisely, there is a preference for words to end in a trochee. In *Staaten* the ending is therefore syllabic, but not in *Wäldern*.

We ignored also the –es/–s variation in the genitive singular (e.g. *Gast-es*, *Schaden-s*) because the use of –es and –s depends on the final sound, the stress and the number of syllable the word has (Eisenberg et al. 1998: 224-225).

In inflectional class 7 (sg. *Wald* - pl. *Wälder*), the plural is formed by –er and umlaut. This inflectional class includes also words like *Bild-Bilder* without an umlautable vowel. However, words like *Bild* do not form their own inflectional class because words which form the plural with –er always umlaut the stem vowel if possible.

As in OHG, there is a stem alternation in the inflectional class 10 (*Blume-Blumen* and *Pizza-Pizzen*) (table 5). The endings of *Blume* and *Pizza* are identical. The only difference is the stem alternation of *Pizza* in the plural. For this contextual conditioning we have a rewriting rule which says: stem-final vowel is deleted in plural environment (… V#→ -ø[NUM PL]). This rule is like in OHG counted as a marker. For the same reasons *Konto-Konten* does not have its own inflectional class but makes part of the inflectional class 9.

Table 5: stem alternation in NHG

	SG				PL			
IC	nom	acc	dat	gen	nom	acc	dat	gen
10	blume	blume	blume	blume	blume-n	blume-n	blume-n	blume-n
	pizza	pizza	pizza	pizza	pizz-en	pizz-en	pizz-en	pizz-en
9	staat	staat	staat	staat-es	staat-en	staat-en	staat-en	staat-en
	konto	konto	konto	konto-s	kont-en	kont-en	kont-en	kont-en

4.1.3. Kaiserstuhl Alemannic

In Kaiserstuhl Alemannic we consider the –n– in *schdainer* ('stones') as purely phonological, because it is introduced only if otherwise suffixation would create a hiatus (table 6). We observe similar patterns also in other contexts. For example in *wu-n-er*: *wu* means 'as' or 'when', *er* means 'he'and *n* is a glide.

In inflectional class 3 the plural is formed by adding the suffix –er, the plural of *Wald* additionally by umlaut (table 6). However, for the same reasons as in Standard

12 IC=inflectional class

German, we have only one inflectional class for the plural on –er with or without an umlaut, i.e., if the plural is formed with –er, the stem vowel always takes an umlaut if it is possible.

Table 6: inflectional class 3 in Kaiserstuhl Alemannic

	SG			PL		
IC	nom	acc	dat	nom	acc	dat
3	schdai	schdai	schdai	schdai-n-er	schdai-n-er	schdai-n-er
	wald	wald	wald	wäld-er	wäld-er	wäld-er

4.1.4. Visperterminen Alemannic

As opposed to NHG and Kaiserstuhl Alemannic, we need two inflectional classes for the plurals ending on –er in Visperterminen Alemannic (IC 10 and 11) (table 7) because there are some words with an umlautable vowel and –er in the plural which do not umlaut the vowel (e.g. *lamm-lammer*) whereas others do (e.g. *chrut-chriter*).

We consider the -n- in *redlini* (IC 12) not as a plural marker but as phonologically conditioned for the same reasons as in the dialect of the Kaiserstuhl, i.e. to prevent a hiatus.

Table 7: plural on -er and the glide -n- in Visperterminen Alemannic

	SG				PL			
IC	nom	acc	dat	gen	nom	acc	dat	gen
10	chrut	chrut	chrut	chrut-sch	chrit-er	chrit-er	chrit-er-u	chrit-er-o
11	lamm	lamm	lamm	lamm-sch	lamm-er	lamm-er	lamm-er-u	lamm-er-o
12	redli	redli	redli	redli-sch	redli-n-i	redli-n-i	redli-n-u	redli-n-o

4.1.5. Issime Alemannic

Concerning the plural of the inflectional class 10 (table 8) we must first define the morphemes. We think it is uncontroversial that we can segment –i and –u. –I is the marker for nominative and accusative plural and –u the marker for dative and genitive plural. But how to deal with the –n– between the stem and the case endings? If we compare the paradigm of *berri* (IC 10) with the paradigm of *bet* (IC 9) we see that the endings are identical and the only difference between these two inflectional classes is this –n–. Therefore, we could have considered the –n– as phonologically conditioned, to prevent a hiatus as has been demonstrated for Kaiserstuhl and Visperterminen Alemannic.

However, a closer look at the data reveals that this -n- is not purely phonological. With *sia-siawa* (IC 8) we have a similar case. The endings are the same as in the inflectional class 1 (*weg-wega*) and –w– could be a glide. We would thus have two glides, –n– and –w–. However, the choice of –n– and –w– is unpredictable on purely phonological grounds. Therefore, we analyse –n– and –w– as two distinct plural markers.

We find further evidence for –n– as a plural marker in the paradigm of *uave* (IC 2). Here, the plural also shows an –n– between the stem and the case endings but we cannot find any phonological explanation: -n-insertion does not prevent a hiatus anyway.

To sum up, the –n– and –w– in the paradigm of Issime are plural markers.

Table 8: -n- and -w- as plural marker in Issime Alemannic

	SG				PL			
IC	nom	acc	dat	gen	nom	acc	dat	gen
10	berri	berri	berri	berri-sch	berri-n-i	berri-n-i	berri-n-u	berri-n-u
9	bet	bet	bet	bet-sch	bet-i	bet-i	bet-u	bet-u

8	sia	sia	sia	sia-sch	sia-w-a	sia-w-a	sia-w-e	sia-w-u
1	weg	weg	weg	weg-sch	weg-a	weg-a	weg-e	weg-u
2	uav-e	uav-e	uav-e	uav-endsch	uav-n-a	uav-n-a	uav-n-e	uav-n-u

4.2. Inflectional complexity of nouns

In this section we present and discuss the main results of our investigation, i.e. the complexity of noun inflection of our five varieties, which we calculated by multiplying the number of markers by the number of inflectional classes (figure 1). Subsequently we will compare the number of markers with the number of inflectional classes (figure 2). Table 9 shows the number of markers and inflectional classes as well as the complexity of noun inflection.

Table 9: markers-inflectional classes-complexity

varieties	markers	inflectional classes	complexity (markers * inflectional classes)
OHG	40	18	720
Issime	26	19	494
Visperterminen	24	18	432
NHG	11	14	154
Kaiserstuhl	7	7	49

First of all, we see in figure 1 that the five varieties are not equally complex, despite their close genetic affiliation. We can form three groups: The most complex is OHG, a second group with Issime and Visperterminen Alemannic, and a third group with NHG and Kaiserstuhl Alemannic.

Since OHG is the most complex variety, we observe an overall diachronic simplification tendency. Of course figure 1 is perhaps somewhat suggestive because we arranged the varieties from the most to the least complex. However, Issime, Visperterminen, Kaiserstuhl Alemannic and NHG are all present-day varieties.

To answer the question of whether codification leads to complexification or simplification, we compare NHG (codified) with the non-standard varieties. Between the Walser dialects (Issime, Visperterminen) and NHG there is a steep decrease in complexity. Thus, noun inflection in Issime and Visperterminen Alemannic is much more complex than the inflection in NHG. In contrast, Kaiserstuhl Alemannic is less complex than NHG. However, compared with the Walser dialects the decrease in complexity between NHG and Kaiserstuhl Alemannic is moderate. As NHG is neither more complex nor simpler than all the non-standard varieties (but between theses varieties) we can conclude that codification does not play a major role with regard to complexity.

We will now turn our attention to the nonstandard varieties and especially to the Walser dialects. Figure 1 displays a steep decrease in complexity between the Walser dialects (isolated) and the Kaiserstuhl Alemannic (non-isolated). This is in accordance with the IH: that isolated varieties are more complex than non-isolated varieties.

Between Issime and Visperterminen we can observe a moderate decrease in complexity. This is perhaps due to the double isolation of Issime or to language contact (which is in this case with Italian and French). First, Issime is not only topographically isolated but also linguistically (it does not make up part of the West-Germanic dialect continuum). Therefore, if it is correct that the more a language is isolated the more it is complex and if we consider Issime as doubly isolated, Issime's greater complexity is expected. A second possible explanation is that language contact has a complexifying effect, but (as discussed in sections 1-2) only in "long-term child contact situations" (Trudgill 2011: 120), which is indeed the case in Issime. However, this complexification

is a particular type of complexification called by Trudgill (2011) "additive complexification", i.e. morphological categories are borrowed from the contact language/s. As the noun inflection in French and Italian (and the respective dialects spoken in the Aosta Valley) is less complex than the one in Issime Alemannic, we would expect simplification rather than complexification as a result of contact. Therefore the higher complexity in Issime Alemannic is presumably due to the absence of contact with the West-Germanic dialect continuum and supports the IH.

Figure 1: complexity of noun inflection

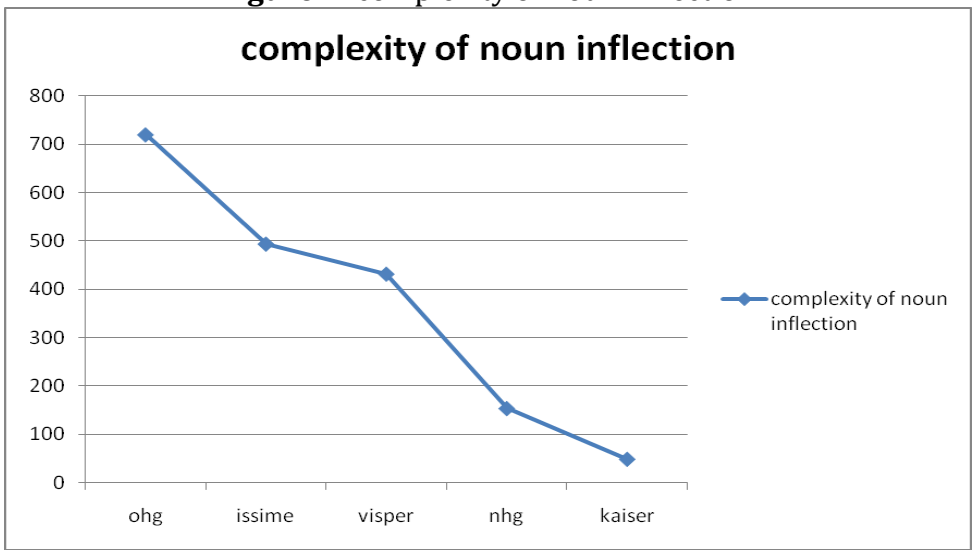
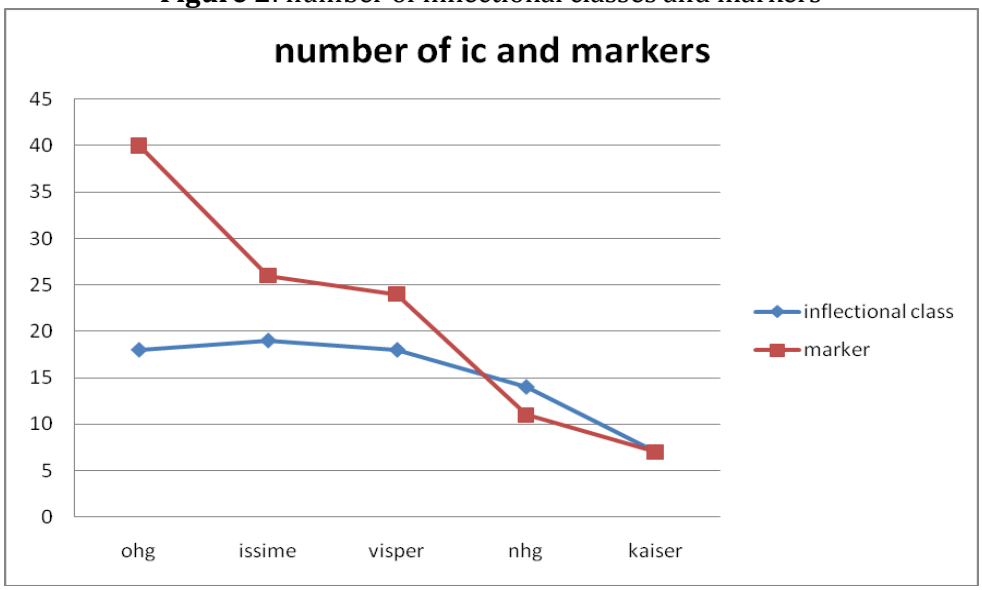


Figure 2 displays the number of inflectional classes and the number of markers. Compared to the overall complexity of noun inflection, the number of markers shows the same order: The variety with most markers (40) is OHG, the second group is constituted by Issime Alemannic (26 markers) and Visperterminen Alemannic (24 markers) and the third group by NHG (11 markers) and Kaiserstuhl Alemannic (7 markers).

The inflectional classes display a different pattern. They are relatively stable in the first three varieties: Issime Alemannic has 19 inflectional classes; OHG and Visperterminen Alemannic, 18. By contrast, we can observe a clear decrease in NHG (14 inflectional classes) and Kaiserstuhl Alemannic (7 inflectional classes). Issime Alemannic provides a very interesting case. Concerning the total complexity of noun inflection (markers*inflectional classes) and the number of markers, all the present-day varieties are less complex than OHG, which corresponds to an overall diachronic simplification tendency. However, Issime Alemannic has one inflectional class more than OHG, which we interpret as an instance of complexification. In the research questions (section 2) it was argued that instances of complexification could occur only in isolated dialects. This result is in accordance with the IH.

Figure 2: number of inflectional classes and markers



5. Discussion

Let us now discuss the findings in the light of the research questions and expected answers from section 2, repeated here:

Question 1: Is there an overall diachronic tendency? (Expected: simplification)
We have indeed found a general simplification tendency from OHG to all more recent varieties. The only exception is the number of inflectional classes in Issime which is greater than in OHG.

Question 2: What are the effects of isolation? (Expected: greater complexity)
With regard to question 2, our results are almost shockingly clear. The inflectional systems of our isolated varieties, Visperterminen and Issime, are clearly more complex than those of other recent varieties. Since their inflectional complexity is much closer to OHG than to the other varieties one might interpret this state of affairs as an instance of conservatism.

Question 3: What are the effects of contact? (Expected: Complexification is expected in pre-threshold bilingualism)
The high-contact dialect of Issime is more complex than the dialects without contact. However, it is not clear at this point whether this is due to the contact situation (Issime speakers are multilingual from childhood) or due to Issime's geographical and linguistic isolation from the West-Germanic dialect continuum since both factors are expected to have similar effects. Since the nominal inflection systems of the Romance contact varieties is much simpler we favour the second explanation.

Question 4: Are there instances of complexification? (Expected: only in isolated dialects)
There is one clear instance of complexification, namely the increase of the number of inflectional classes from OHG to the Issime dialect, which matches the expectations.

Question 5: What is the role of codification? (Expectation: greater complexity of codified varieties)
The only codified standard variety, NHG, displays a rather low degree of complexity, but it is more complex than the Kaiserstuhl dialect. On the basis of our data we can conclude

that codification is not a predictive factor with regard to inflectional complexity. Its possible relevance is outranked by other factors such as isolation. However, if the IH is applied consistently, NHG is expected to have the lowest degree of complexity since NHG is the variety with the farthest reach and the greatest number of speakers. Under these assumptions it is unexpected that the dialect of Kaiserstuhl (with much fewer speakers) is less complex. The greater complexity of NHG as compared to Kaiserstuhl must therefore be due to some other factor, and this factor might be codification.[13]

This paper may serve as basis for further analysis on more varieties and parts of speech. Since our sample is still relatively small, future research will include more (Alemannic) varieties to obtain more comparable results. Furthermore, our ultimate goal is to measure overall inflectional complexity. To do this, we will extend the analysis to the paradigms of other parts of speech, e.g. determiners, pronouns, adjectives, verbs. Since there is no obvious counterpart of inflectional classes in the inflectional systems of determiners, pronouns and adjectives, it will possibly be necessary to reconsider the influence of the number of inflectional classes on overall complexity.

It seems to us that our preliminary study feeds well into very recent approaches to morphological theory where principal parts play a crucial role. Principal parts could be used to measure the inflectional complexity especially of nouns and verbs where we are faced with a considerable number of inflectional classes. Principal parts are those morphosyntactic properties and their exponents which are necessary to predict the other cells of a paradigm. Finkel&Stump (2007) distinguish three kinds of principal parts: static, adaptive and dynamic. For illustration, table 10 shows a hypothetical conjugation system. The system contains seven conjugation classes (I-VI) and four morphosyntactic properties (W-Z). The different inflectional exponents are represented by a-o and the dynamic principal parts shaded:

Table 10: Dynamic principal parts (Finkel & Stump 2007: 44)

	morphosyntactic property			
conjugation	W	X	Y	Z
I	a	e	i	m
II	b	e	i	m
III	c	f	j	n
IV	c	g	j	n
V	d	h	k	o
VI	d	h	l	o

In a static system of principal parts the morphosyntactic property set which identifies the principal parts is the same for every conjugation class. For instance, for the paradigms in table 10 the static principal parts are the morphosyntactic properties W, X, Y and their exponents. By contrast, the dynamic principal parts "are neither linearly ordered nor necessarily parallel from one conjugation to another" (Finkel/Stump 2007: 44). If a lexeme has the exponent c for the morphosyntactic property W, we do not know to which conjugation class the lexeme belongs. However, if this lexeme shows the exponent f for the morphosyntactic property X, we can deduce that it belongs to conjugation class III. Therefore in this paradigm we need to know only one dynamic principal part for each conjugation. In a static conception we needed three principal parts. Finkel and Stump

[13] Many thanks to Helen Christen, Fribourg, for making this point.

summarise that a dynamic scheme "allows us to assume a much smaller inventory of principal parts than is possible under the static or adaptive conception" (Finkel/Stump 2007: 44). Underspecification and absolute complexity can be nicely implemented in this dynamic conception. If we assume underspecification, we have to specify only a minimum of forms and the rest can be underspecified. To measure the absolute complexity we assume that the longer the description of the language system is, the more complex the language system will be (cf. Miestamo 2008 and section 3.2). A system of dynamic principal parts shows the minimum of principal parts necessary to deduce all the other forms of the paradigm. Therefore the language system is maximally compressed, which is a necessary prerequisite for the comparison of different languages' complexities.

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Appendix

Table 10: noun inflection in OHG

		SG					PL			
	IC	nom	acc	dat	gen	instr	nom	acc	dat	gen
	1	tag	tag	tag-e	tag-es	tag-o	tag-a	tag-a	tag-on	tag-o
	2	hirt-i	hirt-i	hirt-e	hirt-es	hirt-u	hirt-a	hirt-a	hirt-on	hirt-o
	3	gast	gast	gaste-e	gaste-es	gaste-u	gest-i	gest-i	gest-in	gest-o
	4	win-i	win-i	win-e	win-es		win-i	win-i	win-in	win-o
	5	sit-u	sit-u	sit-e	sit-es	sit-u	sit-o	sit-i	sit-in	sit-i
	6	han-o	han-un	han-in	han-in		han-un	han-un	han-on	han-ono
	7	fater	fater	fater-e	fater-es		fater-a	fater-a	fater-un	fater-o
	8	wort	wort	wort-e	wort-es	wort-o	wort	wort	wort-on	wort-o
	9	lamb	lamb	lamb-e	lamb-es	lamb-o	lemb-ir	lemb-ir	lemb-ir-on	lemb-ir-o
	10	kunn-i	kunn-i	kunn-e	kunn-es	kunn-o	kunn-i	kunn-i	kunn-in	kunn-o
	11	herz-a	herz-a	herz-in	herz-in		herz-un	herz-un	herz-on	herz-ono
	12	geb-a	geb-a	geb-u	geb-a		geb-a	geb-a	geb-on	geb-ono
	13	kuningin	-a	-u	-a		-a	-a	-on	-ono
	14	anst	anst	enst-i	enst-i		enst-i	enst-i	enst-in	enst-o
	15	zung-a	zung-un	zung-un	zung-un		zung-un	zung-un	zung-on	zung-ono
	16	hoh-i	hoh-i	hoh-i	hoh-i		hoh-i	hoh-i	hoh-in	hoh-ino
	17	muoter	muoter	muoter	muoter		muoter	muoter	muoter-un	muoter-o
	18	naht	naht	naht	naht		naht	naht	naht-on	naht-o
wa-stem	?	hleo	hleo	hlew-e	hlew-es		hlew-a	hlew-a	hlew-on	hlew-o
wa-stem	?	horo	horo	horaw-e	horaw-es		horo	horo	horaw-on	horaw-o

Table 11: noun inflection in NHG

	SG				PL				
IC	nom	acc	dat	gen	nom	acc	dat	gen	
1	gast	gast	gast	gast-es	gäst-e	gäst-e	gäst-en	gäst-e	
2	tag	tag	tag	tag-es	tag-e	tag-e	tag-en	tag-e	
3	schaden	schaden	schaden	schaden-s	schäden	schäden	schäden	schäden	
4	brunnen	brunnen	brunnen	brunnen-s	brunnen	brunnen	brunnen	brunnen	
5	vater	vater	vater	vater-s	väter	väter	väter-n	väter	
6	lehrer	lehrer	lehrer	lehrer-s	lehrer	lehrer	lehrer-n	lehrer	

7	wald	wald	wald	wald-es	wäld-er	wäld-er	wäld-er-n	wäld-er	bild-er
8	matrose	matrose-n	matrose-n	matrose-n	matrose-n	matrose-n	matrose-n	matrose-n	
9	staat	staat	staat	staat-s	staat-en	staat-en	staat-en	staat-en	konto
10	blume	blume	blume	blume	blume-n	blume-n	blume-n	blume-n	pizza
11	stadt	stadt	stadt	stadt	städt-e	städt-e	städt-e-n	städt-e	
12	mutter	mutter	mutter	mutter	mütter	mütter	mütter-n	mütter	
13	zoo	zoo	zoo	zoo-s	zoo-s	zoo-s	zoo-s	zoo-s	
14	pizza	pizza	pizza	pizza	pizza-s	pizza-s	pizza-s	pizza-s	

Table 12: noun inflection in Kaiserstuhl Alemannic

	SG			PL			
IC	nom	acc	dat	nom	acc	dat	
1	braif	=nom	=nom	briaf	=nom	=nom	
2	gumb	=nom	=nom	gimb	=nom	=nom	
3	schdai	=nom	=nom	schdai-n-er	=nom	=nom	wäld-er
4	grab	=nom	=nom	grab-a	=nom	=nom	
5	ghuch-i	=nom	=nom	ghuch-ana	=nom	=nom	
6	dand-a	=nom	=nom	dand-ana	=nom	=nom	
7	baziand-i	=nom	=nom	baziand-inna	=nom	=nom	

Table 13: noun inflection in Visperterminen Alemannic

	SG				PL			
IC	nom	acc	dat	gen	nom	acc	dat	gen
1	tag	tag	tag	tag-sch	tag-a	tag-a	tag-u	tag-o
2	chopf	chopf	chopf	chopf-sch	chepf	chepf	chepf-u	chepf-o
3	ar-o	ar-o	ar-u	ar-u	arm-a	arm-a	arm-u	arm-o
4	santim	santim	santim	santim-sch	santim	santim	santim	santim
5	han-o	han-o	han-u	han-u	han-e	han-e	han-u	han-o
6	bog-o	bog-o	bog-u	bog-u	beg-e	beg-e	beg-u	beg-o
7	senn-o	senn-o	senn-u	senn-u	senn-u	senn-u	senn-u	senn-o
8	jar	jar	jar	jar-sch	jar	jar	jar-u	jar-o
9	hor-u	hor-u	hor	hor-sch	hor-u	hor-u	horn-u	hor-o
10	chrut	chrut	chrut	chrut-sch	chrit-er	chrit-er	chrit-er-u	chrit-er-o
11	lamm	lamm	lamm	lamm-sch	lamm-er	lamm-er	lamm-er-u	lamm-er-o
12	redli	redli	redli	redli-sch	redli-n-i	redli-n-i	redli-n-u	redli-n-o

13	öig	öig	öig	öig-sch	öig-u	öig-u	öig-u	öig-o
14	farb	farb	farb	farb	farb-e	farb-e	farb-u	farb-o
15	bon	bon	bon	bon	bon-a	bon-a	bon-u	bon-o
16	sach	sach	sach	sach	sach-u	sach-u	sach-u	sach-o
17	mus	mus	mus	mus	mis	mis	mis-u	mis-o
18	tsun-a	tsun-a	tsun-u	tsun-u	tsun-e	tsun-e	tsun-u	tsun-o

Table 14: noun inflection in Issime Alemannic

	SG				PL			
IC	nom	acc	dat	gen	nom	acc	dat	gen
1	weg	weg	weg	weg-sch	weg-a	weg-a	weg-e	weg-u
2	uav-e	uav-e	uav-e	uav-endsch	uav-n-a	uav-n-a	uav-n-e	uav-n-u
3	noam-e	noam-e	noam-e	noam-endsch	noam-i	noam-i	noam-e	noam-u
4	hoan-u	hoan-u	hoan-e	hoan-ensch	hoan-i	hoan-i	hoan-u	hoan-u
5	vus	vus	vus	vus-sch	vüs	vüs	vüs-e	vüs-u
6	att-u	att-u	att-e	att-e	att-i	att-i	att-e	att-e
7	schu	schu	schu	schu-sch	schu	schu	schun-e	schun-u
8	sia	sia	sia	sia-sch	sia-w-a	sia-w-a	sia-w-e	sia-w-u
9	bet	bet	bet	bet-sch	bet-i	bet-i	bet-u	bet-u
10	berri	berri	berri	berri-sch	berri-n-i	berri-n-i	berri-n-u	berri-n-u
11	lam	lam	lam	lam-sch	lamm-er	lamm-er	lamm-er-e	lamm-er-u
12	lan	lan	lan	lan-sch	lenn-er	lenn-er	lenn-er-e	lenn-er-u
13	matt-u	matt-u	matt-u	matt-u	matt-i	matt-i	matt-u	matt-u
14	mum-a	mum-a	mum-u	mum-u	mum-i	mum-i	mum-u	mum-u
15	chötti	chötti	chötti	chötti	chötti-n-i	chötti-n-i	chötti-n-u	chötti-n-u
16	schuld	schuld	schuld	schuld	schuld-in-i	schuld-in-i	schuld-in-u	schuld-in-u
17	nacht	nacht	nacht	nacht	necht-in-i	necht-in-i	necht-in-u	necht-in-u
18	han	han	han	han	hen	hen	hen-e	hen-u
19	geiss	geiss	geiss	geiss	geiss	geiss	geiss-e	geiss-u