

## On the emergence of paradigm structure: Blocking, analogy, and the cyclic nature of language change\*

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### 1 Introduction

It is a long-standing observation that morphological change often proceeds in a cyclic fashion. On the one hand, distinctive morphology is lost via phonological erosion and analogical leveling. On the other hand, the loss of distinctions is compensated for by grammaticalization processes that provide new and more expressive (i.e., more specified) phonological exponents of inflectional categories. Traditional explanations for the ups and downs on this cycle often appeal to functionalist notions such as speaker- vs. hearer-oriented economy, or the need to coin new forms to pursue certain communicative goals. This paper explores whether it is possible to account for the interplay between paradigm leveling and grammaticalization in more formal terms, focusing on the historical development of verbal agreement marking in a set of German dialects (notably Bavarian and Alemannic). I am going to argue that we can gain a deeper understanding of the relevant changes if we take a closer look at the feature specifications of individual Vocabulary items and the way these specifications are learned in the process of first language acquisition. The central proposal put forward in this paper is that the cyclic nature of morphological change is guided by (apparently) conflicting strategies that shape the acquisition of inflectional morphology.

First, I assume that there is a learning strategy based on morphological blocking that selects the most specified variant in case the input contains more than a single potential realization of a given inflectional category (cf. Fuß 2005). This learning strategy may promote grammaticalization processes that lead to more distinctive inflectional markers.<sup>1</sup> The effects of blocking-induced change are balanced by a second acquisition strategy that aims at minimizing the number of elements/features stored in the lexicon (*Minimize Feature Content*, Halle 1997). I am going to argue that this strategy may give rise to effects traditionally subsumed under the notion of analogical change. Furthermore, it will become clear that the workings of this acquisition strategy may lead to a more transparent relation between form and function/meaning. In contrast to functionalist approaches, however, I claim that this particular outcome (sometimes referred to as the “agglutinative ideal”) does not drive language change, but is rather to be analyzed as a side-effect of the workings of *Minimize Feature Content*.

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<sup>1</sup> Similar to the *Elsewhere Condition*, which requires that a more specific form or rule block a less specific form or rule (Kiparsky 1982, Anderson 1992, Halle & Marantz 1993, Halle 1997).

## 2. Blocking and the grammaticalization of verbal inflection

Across languages, we can observe that the grammaticalization of inflectional markers does not replace existing formatives in a random fashion. Focusing on the rise of verbal agreement marking, it seems that the creation of new inflectional material complies with the following generalization (cf. Fuß 2005 for discussion and references):

- (1) New verbal agreement formatives arise only for those slots of the agreement paradigm where the existing inflections are non-distinctive.

In Fuß (2005), I argue that this generalization can be formally accounted for if we assume that the acquisition of phonological exponents of inflectional categories is shaped by an economy constraint that favors the use of more specified exponents over less specified exponents:

- (2) *Blocking Principle (BP)* (cf. Fuß 2005: 233)

If several appropriate phonological realizations of a given morpheme are attested in the Primary Linguistic Data (PLD), the candidate matching the greatest subset of the morphosyntactic features included in the morpheme must be chosen for storage in the lexicon.

Thus, I assume that child learners scan the input they receive for the most specific phonological realization of a given underlying inflectional category. Similar to structural economy principles (cf. e.g. Roberts & Roussou 2003), the BP is called into service only if the cues provided by the input data are for some reason ambiguous and not sufficient for identifying the exponent of an underlying morpheme on independent grounds. The BP ensures that the development of new inflections can affect only underspecified slots of the paradigm, replacing non-distinctive markers.<sup>2</sup> An instructive example for this kind of blocking-induced change comes from the historical development of the verbal agreement paradigm of Bavarian.

### 2.1 The grammaticalization of agreement markers in Bavarian

In a number of varieties of German, new agreement suffixes developed via a reanalysis of subject enclitics in inversion contexts (cf. e.g. Pfalz 1918, Bayer 1984, Wiesinger 1989, Weiß 2002, Fuß 2005 on Bavarian). The former clitics mostly turned into enlargements of the existing inherited agreement endings. The most wide-spread of these changes led to the 2sg suffix *-st*, which is commonly analyzed as a combination of the inherited ending 2sg *-s* and the onset of the 2sg nominative clitic *thu* (cf. e.g. Brinkmann 1931, Braune & Reiffenstein <sup>15</sup>2004:

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<sup>2</sup> Note that it is presumably more adequate to characterize the Blocking Principle as a restriction and not as a driving force in grammar change (in contrast to what is suggested in Fuß 2005). See below for some discussion of the interaction between blocking and analogical change.

261). In this section, I will focus on the changes that affected the verbal agreement paradigm of Bavarian.

Interestingly, it appears that the reanalysis of clitics as realizations of verbal agreement morphemes did not take place in a wholesale fashion, despite the fact that the relevant varieties of Bavarian exhibited a full paradigm of subject clitics. Rather, the change in question is confined to the following contexts:

- (3) a. 2sg *-s* ⇒ *-st* (early OHG; found in most varieties of German)  
 b. 2pl *-t* ⇒ *-ts* (13th cent. Bavarian; found in most Bav. varieties)  
 c. 1pl *-an* ⇒ *-ma* (18th century; e.g., in Lower Bavarian dialects)

The limited scope of this grammaticalization process raises the question of whether there is a principled explanation of why the reanalysis of clitics took place in some contexts but not in others. In what follows, I show that the facts in (3) can be directly related to the workings of the BP, focusing on the changes that affected 2pl and 1pl forms.<sup>3</sup>

If we take a closer look at the changes that took place in the history of Bavarian, it becomes apparent that the development of the new endings 2pl *-ts*, 1pl *-ma* served to eliminate syncretism in the verbal agreement paradigm. Table 1 illustrates the effects of the rise of 2pl *-ts* (orig. 2pl ending *-t* + clit. 2pl *-(ē)s*), which is first attested in 13th century texts (cf. Wiesinger 1989: 72f.):

	Old paradigm	New paradigm
1sg	-∅	-∅
2sg	-st	-st
3sg	-t	-t
1pl	-an	-an
2pl	-t	-ts
3pl	-ant	-ant

Table 1: Verbal agreement paradigms (pres. indic.), 13th century Bavarian

A look at the shaded lines reveals that prior to the reanalysis, the agreement suffixes for 3sg and 2pl were identical. The reanalysis of the 2pl clitic *-s* as an enlargement of the existing agreement formative 2pl *-t* removed this syncretism from the paradigm, giving rise to fully distinctive 2pl and 3sg markers. By the 18th century, 3pl and 1pl forms had fallen together in many Bavarian dialects

<sup>3</sup> For reasons of time and space, I do not go into the details of the earlier development giving rise to 2sg *-st*. In Fuß (2005: 235ff.), it is argued that the change in question was promoted by the fact that the resulting form was unambiguously specified for verbal mood (indicative) and therefore proceeded in line with the BP. Another causal factor involved in this change was presumably the fact that other verbs already showed *-st* for the 2sg present indicative (notably, the class of preterite-presents, e.g. *kanst* ‘can-2sg’, *tarst* ‘dare-2sg’, *muost* ‘must-2sg’, *weist* ‘know-2sg’, and the 2sg of ‘be’ *bist*, which resulted from an independent and earlier development, cf. Lühr 1984).

(due to erosion of final *-t* in 3pl forms). In some Lower Bavarian varieties, the resulting syncretism was eliminated by the development of a new agreement ending 1pl *-ma*, compare the shaded lines in Table 2 (cf. Pfalz 1918, Bayer 1984, Wiesinger 1989, Weiß 1998):

	Old paradigm	New paradigm
1sg	-∅	-∅
2sg	-st	-st
3sg	-t	-t
1pl	-an	-ma
2pl	-ts	-ts
3pl	-an(t)	-an(t)

Table 2: Verbal agreement paradigms (pres. indic.), late 18th century Bavarian

These observations suggest that the reanalysis of clitics as agreement markers is connected to the elimination of syncretisms in the paradigm. This is exactly what we expect under the assumption that the acquisition (and grammaticalization) of inflectional morphology is governed by blocking constraints which operate during language acquisition and scan the input for the most specific realization of a given agreement morpheme. In the following, I show that the new agreement suffixes 2pl */-ts/*, 1pl */-ma/* satisfy the Blocking Principle since they realize a greater subset of agreement features than their respective predecessors (cf. Fuß 2005 for details).

[+speaker, +hearer]	1st person inclusive
[+speaker, -hearer]	1st person exclusive
[-speaker, +hearer]	2nd person
[-speaker, -hearer]	3rd person

Table 3: Binary system of person features

Adopting the binary system of person features illustrated in Table 3, (cf. Benveniste 1966, Halle 1997, Noyer 1997, Cysouw 2003, and many others), the relevant changes can be accounted for in terms of blocking effects in the following way. First, the new formative */-ts/* is unambiguously specified for both 2nd person (i.e., [-speaker], [+hearer]) and number ([+pl]), while the former exponent */-t/* is clearly underspecified for number since it occurs in both 3sg and 2pl contexts:<sup>4</sup>

- (4) *New 2pl /-ts/ vs. old 2pl /-t/*  
 a. [-speaker, +hearer, +pl] ↔ */-ts/*  
 b. [-speaker] ↔ */-t/*

<sup>4</sup> However, */-t/* may be linked to a person specification [-speaker], since this is the feature common to both 1st and 3rd person contexts

The later change affecting 1pl also proceeded in line with the BP. Note that /-ma/ signals first person (i.e., [+speaker], [-hearer]) and number ([+pl]), while -an is presumably only specified for number since it occurs in both 1pl and 3pl contexts:<sup>5</sup>

- (5) *New 1pl /-ma/ vs. old 1pl /-an/*  
 a. [+speaker, -hearer, +pl] ↔ /-ma/  
 b. [+pl] ↔ /-an/

Thus, the BP makes available an explanation of why the rise of new agreement formatives took place in some contexts, but not in others: The relevant grammaticalization processes could affect only contexts where the potential new agreement formative was more distinctive than the existing marker.

## 2.2 Properties of blocking-induced change

From the above discussion it is clear that blocking-induced changes select the most specific marker of a set of candidates (robustly) attested in the PLD, dismissing other potential (less specified) realizations of the same inflectional category. Thus, it is a characteristic property of blocking-induced change that the resulting grammar produces less linguistic variation than the target grammar. In somewhat more formal terms, this can be stated as in (6).

- (6) The PLD contains more than a single potential phonological realization of an inflectional category X with features  $\{F_1, F_2 \dots F_n\}$ :

$$\left. \begin{array}{l} / \alpha / \leftrightarrow [{}_X F_1 \dots F_i] \\ / \beta / \leftrightarrow [{}_X F'_1 \dots F'_j] \end{array} \right\} \begin{array}{l} / \beta / \leftrightarrow [{}_X F'_1 \dots F'_j] \\ \text{(selected by the BP if } |\{F'_1 \dots F'_j\}| > |\{F_1 \dots F_i\}|) \end{array}$$

Suppose the learner is confronted with two potential realizations (/α/ and /β/) of a given underlying abstract morpheme X that contains a set of morphosyntactic features  $\{F_1, F_2 \dots F_n\}$ . All other things being equal, the BP will ensure that /β/ is stored as the Vocabulary item realizing X if the cardinality of the set of features realized by exponent /β/ is greater than the cardinality of the set of features realized by /α/. Note that it is likely that the application of the BP may be preempted by other factors such as relative frequency of the competing formatives. As pointed out in Fuß (2005: 287), the more specified exponent can only be acquired if it is robustly attested in the PLD. Accordingly, if a less specified form is much more frequent than the more specified form, then the learner will probably acquire the less specified form, despite the workings of the

<sup>5</sup> Note that even if we took /-an/ to be specified for person (i.e., [-hearer]), the new formative /-ma/ would still be more specific than /-an/ since it is specified for [+speaker] and [-hearer], that is, it unambiguously identifies 1st person.

BP. Furthermore, as will be discussed in the following section, analogical change is another factor that might work against the effects of the BP: In the absence of robust evidence for a irregular/more specified form, the learner may acquire a more regular/less distinctive form for a given verb as a default.<sup>6</sup>

### 3 Analogical change

It is a well-known fact that analogical change may create regular variants of originally irregular forms, as illustrated in (7) and (8) with alternating regular and irregular past tense forms and past participles in German:

- (7) a. buk (irreg.) vs. backte (regular) ‘I/he/she/it baked’  
 b. glomm (irreg.) vs. glimmte (regular) ‘I/he/she/it glowed’
- (8) a. gegoren (irreg.) vs. gegärt (regular) ‘fermented (participle)’  
 b. geblichen (irreg.) vs. gebleicht (regular) ‘bleached (participle)’

Furthermore, analogical changes typically lead to more uniformity among forms organized in a paradigm. In (7) and (8), for example, we can observe reduction to a single stem form via the elimination of stem vowel alternations (see Albright 2002, Fuß 2005). In frameworks such as Natural Morphology, the apparent drift towards more uniformity in a paradigm is often analyzed as a natural development toward a one-to-one correspondence between form and meaning/function (cf. e.g. Mayerthaler 1980).

This section argues that at least a subset of apparent analogical changes is triggered by an acquisition strategy that aims at minimizing the number of features/elements stored in the lexicon. Moreover, it will become clear that the drift toward a one-to-one correspondence between form and meaning/function is in fact an epiphenomenon resulting from the workings of this acquisition strategy. Another issue I am going to address concerns the relationship between blocking-induced change and analogical change. It is immediately clear that the phenomenon of analogical change raises an issue for the claims put forward in the previous section since it is usual the regular, less specified form that wins out over the irregular form, and not vice versa.<sup>7</sup> We will see that this apparent tension can be solved if we take a closer look at the contexts in which the different types of changes are set off.

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<sup>6</sup> Evidence from language acquisition (cf. Prasada & Pinker 1993) shows that this process affects primarily parts of speech that are less frequent in the PLD, a fact which seems to be in line with the assumption that the BP selects between forms that are robustly attested in the input.

<sup>7</sup> Note that leveling via phonological erosion is not a real issue here: When reduction processes lead to the erosion of inflectional distinctions, the relevant forms simply disappear from the input and fail to be acquired.

### 3.1 The development of *Einheitsplural* in Alemannic

The development of *Einheitsplural* (henceforth ‘common plural’) in Alemannic varieties of German constitutes a particularly instructive example of analogical leveling expanding the domain of less distinctive formatives in a paradigm. As is well-known, most Alemannic dialects spoken in Switzerland and Southwest Germany exhibit only a single plural agreement formative /-ə(n)t/, which originated from the 3pl *-ent* (via vowel reduction and, in some varieties, elision of /n/). Table 4 gives a rough overview of the different historical stages that eventually led to the paradigm in the rightmost column. The rise of the common plural began already in the Old High German (OHG) period after 3sg (previously /-it/ with strong verbs and weak verbs of class I) and 2pl had fallen together in *-et*, due to a general reduction of vowels in non-stressed (final) syllables, consider the second column in Table 4 (attested in the works of Otfried, mid-8th century). Interestingly, it appears that this change, which was driven by phonological erosion, led to the very same set of distinctions that marked the outset of the changes that took place in Bavarian (see section 2). However, in contrast to Bavarian, Alemannic did not choose to eliminate the syncretism of 3sg with 2pl via grammaticalizing a new 2pl formative.<sup>8</sup> Instead, it gradually extended the original 3pl form to all plural contexts.

	Original paradigm (Early OHG, ca. 800)	1pl <i>-mēs</i> → <i>-en</i> (Otfried, ca. 865)	2pl <i>-et</i> → <i>-ent</i> (Notker, ca. 1000)	1pl <i>-ēn</i> → <i>-ent</i> (MHG/Alem., 13th-15th cent.)
1sg	-u	-u	-o	-e(n)
2sg	-is	-ist	-est	-eʃ(t)
3sg	-it	-it (→ -et)	-et	-(e)t
1pl	-mēs	-ēn	-ēn	-ent
2pl	-et	-et	-ent	-ent
3pl	-ent	-ent	-ent	-ent

Table 4: The development of *Einheitsplural* in OHG/Alemannic, pres. indic. (inflections of strong verbs and weak verbs of class I, including theme vowels)

Upon closer inspection, it becomes clear that the development of a ‘common plural’ proceeded via two major stages (cf. Braune & Reiffenstein<sup>15</sup>2004: 263, Paul<sup>24</sup>1998: 240, and in particular Weinhold 1863: 332ff., Schirmunski 1962:

<sup>8</sup> Presumably, Alemannic failed to grammaticalize a new, more distinctive 2pl formative since it lacked an appropriate pronominal source. First of all, the relevant 2pl clitic *er* (full pronoun: *ir*) was very similar to 3sg.masc and therefore perhaps not distinctive enough for the purposes of the Blocking Principle. Moreover, the reanalysis of the clitic as part of the verbal agreement ending was perhaps hindered by the fact that the relevant reanalysis (giving rise to a new 2pl formative \*/-tir/) would have changed both the syllable structure and the accent structure of the verbs affected by that change (in contrast to Bavarian, where the relevant properties were largely unaffected by the reanalysis of the consonantal onsets of the subject clitics).

521ff., Besch 1967: 310ff.): In a first change, the 3pl ending *-nt* replaced the former 2pl *-t*. The earliest instances of 2pl *-nt* are attested in 8th and 9th century OHG (in the Paris and St. Gallen manuscripts of the glossary of Abrogans; all of the earliest forms are imperatives: *haffent*, *dannent* (Paris), *firnēmant* (St. Gallen)). The innovation is mostly confined to Alemannic varieties of OHG (although there are also some relevant examples in the OHG *Tatian*, cf. Sievers 1961). In the work of Notker (950-1022), the new 2pl formative is found consistently in all tenses and moods. Then, in the Middle High German (MHG) period, *-nt* spread to 1pl (formerly *-ēn*), leading to the complete loss of person distinctions in the plural part of the verbal agreement paradigm.

Traditionally, the rise of the common plural is analyzed as an analogical change on the model of the 3pl (cf. e.g. Weinhold 1863, Braune & Reiffenstein<sup>15</sup>2004: 263). However, even if we accept an explanation in terms of analogy, certain open questions remain. For example, we might ask why Alemannic chose to innovate 2pl on the model of 3pl (and not vice versa). In what follows, I am going to argue that we can gain a deeper understanding of the historical developments that led to the rise of the common plural if we take a closer look at the feature specifications of the individual Vocabulary items that are part of the verbal agreement paradigm, and the way these Vocabulary items (and their feature specifications) are acquired by the learner. In particular, I claim that the relevant ‘analogical’ changes were triggered by an acquisition strategy that aims at minimizing the number of elements/features mentioned in the lexicon (which may lead to the impression of a more transparent relation between form and function/meaning).

### 3.1.1 The extension of 3pl *-nt* to 2pl

This section focuses on the first stage of the development of the common plural in Alemannic, that is, the early (OHG) change in which the 3pl marker */-nt/* was extended to 2pl contexts, replacing the original 2pl marker */-t/*. Table 5 lists the forms of the verbal agreement paradigm of OHG before and after the extension of 3pl to 2pl (note that */e/* is merely a theme vowel):

	Old paradigm	Paradigm after 3pl → 2pl
1sg	-o	-o
2sg	-est	-est
3sg	-et	-et
1pl	-ēn	-ēn
2pl	-et	-ent
3pl	-ent	-ent

Table 5: 2pl */-t/* → */-nt/* (pres.indic) in OHG/Early Alemannic

As already noted, traditional approaches treat this change as a typical case of analogical leveling. Thus, it is usually assumed that the exponent of 2pl has been



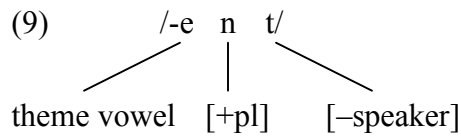
reshaped on the model of the formative realizing 3pl. While this is a possible account, it leaves many aspects of the change in the dark. For example, it says nothing about possible motivations that might lead speakers to favor /-nt/ over /-t/ as a realization of 2pl. In particular, the fact that the change proceeded in the way it did, replacing the 2pl formative with the 3pl formative, comes out as completely accidental. Under the analogy approach, it could also have been the other way around. Thus, it appears that an analysis appealing to the notion of analogical change lacks explanatory force. Of course, it is not always possible to give principled explanations for all aspects of language change (cf. Lightfoot 1999 on this point), but at least we should try and see if we can do better than simply invoking analogy. In what follows, I am going to argue that it is in fact possible to isolate a set of factors that possibly acted as a driving force in the emergence of the common plural if we examine the individual Vocabulary items listed in Table 5 and their feature specifications in some more detail. What I am going to claim is that the extension of 3pl /nt/ to 2pl was part of a major reanalysis that affected the form-function pairings in the verbal agreement paradigm of early Alemannic.

My proposal is based on two assumptions. First, I adopt the system of person features proposed above, that is, I assume that the traditional 3-way distinction for person features must be decomposed by using the binary features [ $\pm$ speaker] and [ $\pm$ hearer]. In addition, I will assume a lexical decomposition analysis in which the traditional inflectional markers of the agreement paradigm are split up into smaller units of exponence (cf. e.g. Müller 2006 on German). Under these assumptions, the extension of 3pl /nt/ to 2pl can be analyzed as the result of two separate changes.

First, let us suppose that the earlier innovation of 2sg *-st* (inherited ending /-s/ + onset of subject clitic *thu*) made available a reanalysis of the segment /t/ as a realization of the feature [ $-$ speaker] since final /t/ appears in all 2nd and 3rd person forms (cf. Table 4 and Table 5). An additional change led to nasalization of 2pl forms (/t/  $\rightarrow$  /nt/), which seems to be a common strategy across Alemannic to reinforce/strengthen inflectional formatives (cf. Weinhold 1863). Note that after nasalization of 2pl, the segment /n/ could be analyzed as being uniquely paired with the inflectional feature [ $+pl$ ], since it occurs in all plural forms and nowhere else. Thus, at some point, the distribution of /t/ and /n/ in the verbal agreement paradigm led to a reanalysis that affected the feature specifications of these segments. The result of this change is illustrated in (9), where the inflectional marker /-ent/ (including a theme vowel) is decomposed as a combination of smaller phonological exponents:<sup>9</sup>

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<sup>9</sup> Decomposing the relevant agreement markers requires that the relevant inflectional head may split up into several insertion sites prior to the insertion of phonological exponents (so-called ‘Fission’, see e.g. Noyer 1997). Under the assumption that Vocabulary Insertion discharges morphosyntactic features of the underlying morpheme, exponents compatible with the (remaining) feature set may be inserted as long as there are features left that can be discharged. See Müller (2006) for a related analysis of the verbal inflection of Standard German.



Interestingly, there are reasons to believe that the nasalization of 2pl was promoted by additional factors apart from merely phonetic reinforcement. If we apply lexical decomposition to all inflectional formatives of the verbal agreement paradigm, then it appears that the innovation of 2pl /-nt/ gave rise to a more transparent relationship between form and function/meaning via creating a phonological exponent which was uniquely paired with the feature [+pl] (compare the shaded line in Table 6).

Old feature specification	Exponent	New feature specification
[+speaker, -pl]	/-o/ <sup>10</sup>	[+speaker, -pl]
[+hearer, -pl]	/-s/	[+hearer, -pl]
[-hearer, +pl]	/-n/	[+pl]
[-speaker]	/-t/	[-speaker]

Table 6: Reanalysis giving rise to 2pl /-nt/, OHG/early Alemannic

From a functionalist perspective, the change in question certainly led to a welcome result (cf. conditions on analogical change proposed in the framework of Natural Morphology, e.g., Mayerthaler 1980). However, it appears that we do not need to appeal to functionalist notions in order to explain this effect. As it turns out, it can also be modeled in purely formal terms if we assume that the acquisition of phonological exponents and their feature specifications is subject to the following constraint (cf. Halle 1997: 430):

(10) *Minimize Feature Content*

The number of features mentioned in the Vocabulary [i.e., the lexicon, EF] must be minimized.

According to (10), child learners acquire the most economical lexical inventory compatible with the input they are exposed to.<sup>11</sup> This has the following two consequences for the acquisition of phonological exponents and their featural properties. First, the set of lexical entries/Vocabulary items stored in the lexicon consists of the minimal number of formatives required for generating the input.

<sup>10</sup> If /-o/ is analyzed as a theme vowel, the combination of features underlying 1sg is realized by  $\emptyset$ , the zero exponent.

<sup>11</sup> According to Halle (1997: 430), independent motivation for this constraint comes from considerations of memory load: "Such an economy constraint is entirely plausible, because the Vocabulary entries represent items that speakers must memorize, and since our memories are finite, the load on memory must be minimized."

Second, each inflectional marker is associated with the most economical feature specification compatible with the input data. In other words, the learner acquires the minimal set of feature specifications that is necessary for deriving the distribution of a given phonological exponent/Vocabulary item. Interestingly, upon closer inspection it turns out that the workings of (10) may also lead to a more transparent relation between form and function/meaning, in particular if inflectional markers are decomposed into smaller units of exponence, as in (9): The smaller the individual units of exponence are, the more likely it is that (10) leads to a one-to-one relation between form and meaning. The development of a unique plural formative is a case in point. In other words, the fact that the change in question led to a more transparent relationship between form and function/meaning was not a driving force, but rather merely an epiphenomenal outcome of the reanalyses giving rise to (9). We might suspect that the in-built tendency to posit an economical system of featural distinctions may lead learners to coin new variants that are not part of the input (or associated with a different feature specification in the target grammar), but comply with (10):

- (11) The learner innovates a regular/less specified phonological exponent  $/\beta/$  of an inflectional category  $X$  with features  $\{F_1, F_2 \dots F_n\}$  (an irregular/more specified form  $/\alpha/$  may be part of the input):

$$\left. \begin{array}{l} (/ \alpha / \leftrightarrow [X F_1 \dots F_i]) \\ (/ \beta / \leftrightarrow [X F'_1 \dots F'_j]) \\ (\text{innovated form, with } |\{F'_1 \dots F'_j\}| \leq |\{F_1 \dots F_i\}|) \\ (/ \alpha / \leftrightarrow [X F_1 \dots F_i]) \end{array} \right\}$$

(11) states that ‘analogical’ change may introduce new variants formerly absent in the grammar and not attested in the linguistic input the learner receives. Crucially, the innovations are typically more regular/less distinctive than the existing forms, which is captured by the statement that the cardinality of the set of features realized by the innovating form  $/\beta/$  is smaller than (or equal to) the cardinality of the set of features realized by the existing Vocabulary item  $/\alpha/$ . The innovating form may result from overgeneralization (after the learner has mastered the relevant inflectional rule) or from the workings of the acquisition strategy (10), which compels the learner to minimize the number of features mentioned in the Vocabulary. In this way, (10) may promote the introduction of new, more economical variants that enter into a competition with older formatives that are more distinctive (i.e., specified for more features), but ‘harder’ to acquire, since the relation between exponent and features is one-to-many. Thus may give rise to the effect of paradigm leveling when the change has been completed. In the next section, I am going to examine the second historical stage of the development of the *Einheitsplural* in Alemannic, in which the formative  $/nt/$  was extended to 1pl contexts during the MHG period.

### 3.1.2 The rise of a general plural marker: Extension to 1pl

Between the 13th and 15th century, /-(e)nt/ evolved into the general plural marker for all persons, replacing 1pl /-(e)n/ (cf. Weinhold 1863: 366, Schirmunski 1962: 521ff., Besch 1967: 310ff., Paul <sup>24</sup>1998: 240). This change is represented in the following table, which lists the relevant forms (with theme vowels):

	Old paradigm	New paradigm
1sg	-e	-e(n)
2sg	-st	-ſ(t)
3sg	-et	-et
1pl	-en	-ent
2pl	-ent	-ent
3pl	-ent	-ent

Table 7: 1pl /-en/ → /-ent/ (pres.indic) in MHG/Alemannic (~13th-15th century)

The extension of /nt/ to 1pl can be connected to two other changes that altered the make-up of the verbal agreement paradigm of Alemannic. In particular, there are reasons to believe that the changes affecting the shape of the exponents of 1sg and 2sg required a major reorganization of the form-function pairings in other parts of the paradigm. More precisely, what we can observe is that the extension of /-nt/ to 1pl was accompanied by the loss of final /-t/ in 2sg contexts (presumably due to phonological erosion) and nasalization of 1sg giving rise to a new 1sg exponent /-(e)n/.<sup>12</sup> Interestingly, it seems that there is a systematic connection between the three changes highlighted by shading in Table 7. First of all, we can observe that the phenomenon of ‘common plural’ is also a characteristic of Low German dialects: Western Low German dialects exhibit the form /-(ə)t/, while /-ən/ is the typical ending found in Eastern Low German dialects (cf. Schirmunski 1962: 543f. for details). Interestingly, many of these dialects also exhibit loss of final /-t/ in 2sg forms, similar to Alemannic (Schirmunski 1962: 544).<sup>13</sup> Second, Besch (1967: 301) observes that there is a geographic connection between the extension of the *Einheitsplural* to 1pl and the presence of the 1sg form /-(e)n/, in the sense that in the 15th century, 1sg /-n/ is found in particular in those dialectal areas that also participated in the development of the *Einheitsplural*. Thus, we may conclude that the joint appearance of (i) the changes affecting the 1sg/2sg forms and (ii) the rise of the *Einheitsplural* is not coincidental.

Let’s now address the question of how the apparent link between these changes can be modeled in a more formal way. First of all, note that due to the

<sup>12</sup> 2sg /-st/ → /-ſ/ after /-st/ → /-ft/ in most varieties; cf. Weinhold (1863: 365), Schirmunski (1962: 520f.), Weber (1987: 174). The nasalization of 1sg forms is traditionally analyzed as an extension of the relevant 1sg ending of the weak verbs of classes II and III, cf. Schirmunski (1962: 519).

<sup>13</sup> The possible connection between the loss of 2sg /-t/ and the rise of the common plural /-nt/ was pointed out to me by Helmut Weiß.

loss of final /-t/ in 2sg, /-t/ could no longer be analyzed as a marker realizing the feature [-speaker] (otherwise we would expect /-t/ to occur in all 2nd and 3rd person contexts). Thus it appears that this change not only affected the shape of 2sg forms, but also had a considerable impact on the whole system of feature distinctions that underlies the verbal agreement paradigm. In a similar vein, nasalization of 1sg leading to 1sg /-en/ did not only alter the shape of 1sg forms, but also affected the system of form-function pairings in the plural part of the paradigm since /-n/ could no longer be analyzed as the realization of [+pl]. After /-t/ and /-n/ could no longer be paired with a unique feature value, the ‘analogical’ extension of /-nt/ to 1pl facilitated a reanalysis of the combination /-nt/ as a pure plural marker, with /-t/ turning into the elsewhere marker. Furthermore, the systematic absence of person distinctions in the plural suggests an analysis in terms of an Impoverishment rule that deletes person features in the context [+pl] (see e.g. Halle 1997, Noyer 1997 on the notion of Impoverishment):

- (12) *Impoverishment in Alemannic (Einheitsplural)*  
 [±speaker], [±hearer] → ∅ / [+pl]

I assume that the development of the Impoverishment rule in (12) was promoted by *Minimize Feature Content* since Impoverishment typically serves to expand the domain of less specified (and therefore less costly) exponents. As illustrated in (13), this set of changes eventually led to a highly economical agreement paradigm, where each phonological exponent is uniquely paired with a single syntactico-semantic feature.<sup>14</sup>

- (13) a. [+speaker] ↔ /-n/  
 b. [+hearer] ↔ /-ʃ/  
 c. [+pl] ↔ /-nt/  
 d. elsewhere ↔ /-t/

Conditions on Vocabulary Insertion such as the *Subset Principle* (Halle 1997) guarantee that the phonological exponents realizing person features (1sg /-n/, 2sg /-ʃ/) cannot be inserted in plural contexts, since they contain features not present in the agreement morpheme after Impoverishment has taken place. As a result, the relevant Vocabulary items need not be specified for number, giving rise to a one-to-one relation between form and function. Crucially, this ‘optimal’ outcome can be analyzed in purely formal terms via attributing the relevant changes to the interaction between learning strategies (*Minimize Feature Content*) and operations of the phonological component (Impoverishment), without appealing to any functionalist considerations.

<sup>14</sup> Note that this analysis raises a number of issues which I cannot address in detail here. For example, more has to be said about the status of the elsewhere marker /-t/ if Agr is still subject to Fission at this stage.

#### 4. Analogical change vs. blocking-induced change

How can the apparently conflicting properties of blocking-induced change and change driven by *Minimize Feature Content* be reconciled? First of all, note that ‘analogical’ changes introducing new less marked variants typically originate at an early point during language acquisition when children begin to master inflectional rules. They are triggered either by overgeneralization (after the learner has mastered the relevant rule) or by *Minimize Feature Content*, which aims at minimizing the number of elements stored in the lexicon. However, if a more distinctive/irregular formative is robustly attested in the input, it will replace the innovation due to blocking effects, and no change will occur. If the older form is not frequent enough, the child may fail to acquire it and the innovated form will replace the older form.<sup>15</sup> While analogical changes typically affect forms that are less frequent and therefore less robustly attested, blocking-induced change selects between candidates that are robustly attested in the PLD, reducing linguistic variation. Crucially, regular/less distinctive forms are always potentially available (due to overgeneralization and acquisition strategies such as *Minimize Feature Content*), while the acquisition of irregular/more marked forms is only possible via the input the child receives. This perhaps explains the apparent predominance of analogical leveling across languages and times.

Furthermore, note that *Minimize Feature Content* does not require the learner to select the least marked/specified formative for storage in the lexicon. Rather, it ensures that the child acquires the most economical lexical inventory compatible with the input he/she is exposed to. For example, if a feature specification [+speaker] is sufficient to guarantee that a 1sg exponent is inserted in the contexts where it appears in the input, the child will not acquire a redundant feature specification [+speaker, –hearer] for this exponent (compare (13) above). This function of *Minimize Feature Content* does not interfere with the claim that the learner scans the input for the most marked (and therefore salient) realization of a given inflectional head. In other words, the Blocking Principle ensures that the most specified candidate is selected while *Minimize Feature Content* warrants that this candidate is assigned a non-redundant feature specification. In addition, it seems that blocking operates in a local fashion, comparing two possible candidates for realizing a certain terminal node. In contrast, our discussion of the rise of *Einheitsplural* in Alemannic suggests that the scope of *Minimize Feature Content* is wider, including the featural make-up of whole paradigms. So, tentatively, we may conclude that the conflict between the different learning strategies is merely apparent. The BP and *Minimize Feature Content* differ both with respect to their scope and the contexts where they apply. In this way, the two principles may actually be taken to work hand in hand during language acquisition, warranting that the learner selects an optimal paradigm and lexicon structure based on the evidence available to him/her.

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<sup>15</sup> Alternatively the learner may acquire the older form in addition to the innovated variant, giving rise to morphological doublets and linguistic variation.

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