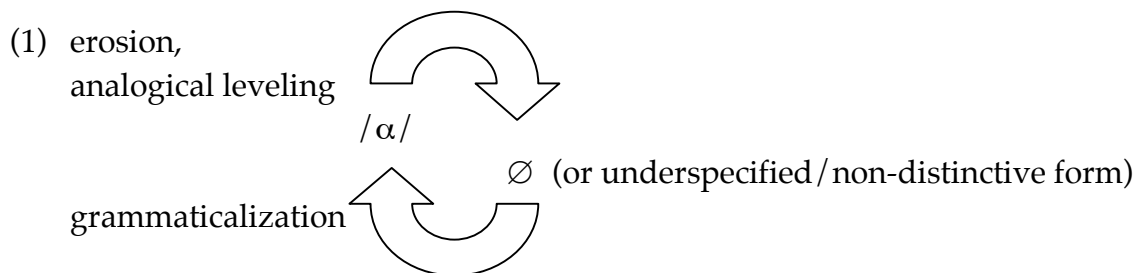


Grammaticalization vs. paradigm leveling: On the cyclic nature of language change

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1 Introduction

- Cyclic nature of language change: – reduction of forms via phonological erosion and analogical leveling is compensated for by grammaticalization processes that create new exponents of inflectional categories:¹



- Aim of this paper: To examine the interplay between paradigm leveling and grammaticalization, focusing on the historical development of verbal agreement marking in a set of German dialects.
- Basic claims: Cyclic course of morphological change is governed by conflicting (learning) strategies that shape the acquisition of inflectional morphology:
 - (i) Blocking constraints: Select the most specified variant in case the input contains more than a single potential realization of a given inflectional category (⇒ **grammaticalization**).
- (i) is reminiscent of synchronic blocking effects driven by some form of the '**elsewhere condition**', which requires that the availability of a more specific form or rule blocks the use of a less specific form or rule (cf. e.g. Kiparsky 1982):²

(2) he/she/it run-s vs. *he/she/it run-∅

(ii) Analogical change:

- (a) may be promoted by learning strategies that aim at minimizing the number of elements/features stored in the lexicon.
- (b) introduces more regular/less specified formatives, which over time may replace older (more distinctive) forms (⇒ **paradigm leveling**).

¹ Cf. e.g. Paul (1880), Gabelentz (1891), Jespersen (1917). The idea that grammaticalization processes are motivated by the need to compensate for the loss of distinctions due to phonological erosion is widely held in typological/functionalist approaches to grammaticalization, cf. Lüdtke (1980), Hopper & Traugott (1993), Siewierska (1999), (2004), Ariel (2000), and Lehmann (2002), among others.

² For a general discussion of blocking/elsewhere effects cf. e.g. Kiparsky (1973), (1982); Aronoff (1976); Anderson (1986), (1992); Halle (1997); Noyer (1997); Giegerich (2001); Embick & Marantz (2006).

2 Morphological blocking and the grammaticalization of verbal inflection

- Observation: The grammaticalization of inflectional markers does not replace existing formatives in a random fashion:³
- (3) New verbal agreement formatives arise only for those slots of the agreement paradigm where the existing inflections are non-distinctive.
- Formal account of this observation: 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 (cf. Fuß 2005):
- (4) *Blocking Principle (BP)*
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.
- Implications:
 - (i) Child learners scan the input they receive for the most specific phonological realization of a given underlying inflectional category.
 - (ii) The BP ensures that the development of new inflections can affect only underspecified slots of the paradigm, replacing non-distinctive markers.

2.1 The grammaticalization of agreement markers in German/Bavarian

- Background: In German/Bavarian, new agreement suffixes developed via a reanalysis of subject enclitics, which (mostly) turned into enlargements of the existing inherited agreement endings (e.g., 2sg *-s* + *t(hu)* 'CLIT.-2sg' >>> 2sg *-st*).
 - This change is confined to the following contexts:
- (5) a. 2sg *-s* ⇒ *-st* (early OHG; *-st* in most mod. varieties of German)
 b. 2pl *-t* ⇒ *-ts* (13th century Bavarian; attested in most mod. varieties)
 c. 1pl *-an* ⇒ *-ma* (18th century; extension to verbs in clause-final position in e.g. some Lower Bavarian dialects)
- Why?

2.2 Bavarian 2pl *-ts*, 1pl *-ma*

- Observation: The development of the new endings 2pl *-ts*, 1pl *-ma* led to the elimination of syncretism in the verbal agreement paradigm.
- Development of 2pl *-ts* (< clit. *-(ē)s*): eliminated syncretism of 3sg with 2pl (13th century, Northern and Middle Bavarian, cf. Wiesinger 1989:72f.):

³ Relevant examples include: various Italian and Rhaeto-Romance dialects (cf. e.g. Spiess 1956, Kuen 1957, Renzi & Vanelli 1983, Linder 1987, Haiman & Benincà 1992, Poletto 1997, Gerlach 2002), Non-Standard French (Wartburg 1970, Ashby 1977, Harris 1978, Auger 1993, Gerlach 2002), a number of German varieties (Wiesinger 1989, Dal Negro 2004, Fuß 2005, Kolmer 2005), Khinalug (North-East Caucasian, Corbett 1991: 123), Kisar (Austronesian, Blood 1992, Siewierska 1999, 2004), Maricopa (Yuman, Siewierska 1999, 2004), and the Papuan language Skou (Donohue 2002).

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

Table 1: Rise of 2pl /-ts/ (pres. indic.), 13th century Bavarian

- Development of 1pl -ma (< clit. -ma): By the 18th century, 3pl and 1pl forms had fallen together in many Bavarian dialects (due to erosion of final -t in 3pl forms).
- In some varieties, the resulting syncretism was eliminated by the development of a new agreement ending 1pl -ma (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: Rise of 1pl /-ma/ (pres. indic.), late 18th century Bavarian

- Analysis in terms of the BP: In each case, the new formatives are more specified than the original agreement markers.
- Background assumption: binary system of person features ([±speaker], [±hearer], cf. Benveniste 1950, Noyer 1997, Cysouw 2003, and many others).
- Earlier formative 2pl /-t/: occurs in 3sg and 2pl contexts; underspecified for number and (possibly) person.⁴
- New 2pl /-ts/: specified for both person and number:

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

- Earlier formative 1pl /-an/: occurs in 1pl and 3pl contexts; presumably underspecified for [person].⁵
- New 1pl /-ma/: specified for both person and number:

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

- Grammaticalization processes took place only in contexts where the new agreement markers were more distinctive than the existing markers (see Appendix I for the earlier development of 2sg -s+t).

⁴ Note that /-t/ may be linked to [-speaker], since this feature is common to both 1st and 3rd person.

⁵ 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].

2.3 Summary: Blocking-induced change

- Blocking-induced change:
 - selects the most specific of a set of candidates (robustly) attested in the input;
 - dismisses other potential realizations of the same inflectional category (reducing linguistic variation produced by the target grammar):

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

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

3 Analogical leveling: Expanding the domain of less distinctive forms

- Paradigm leveling: Less distinctive formatives gain a wider distribution, replacing forms that are apparently more distinctive – **obvious problem for the BP**.⁶
- Einheitsplural ('common plural') in Alemannic: Most Alemannic dialects spoken in Switzerland and Southwest Germany exhibit only a single plural agreement formative, which originated from the 3pl *-ent*:

1sg	-ə
2sg	-ſ
3sg	-t
1pl	-ə(n)t
2pl	-ə(n)t
3pl	-ə(n)t

Table 3: *Einheitsplural* in Alemannic (present indicative)

- The development of a 'common plural' proceeded via two stages:⁷

- (i) 2pl *-et* → *-ent* (2pl *-ent* regularly attested in the work of Notker, 950-1022)
 (ii) 1pl *-ēn* → *-ent* (later change in various Alemannic varieties, 13th-15th century)

	Early OHG (around 900)	OHG/Notker (10th-11th century)	MHG/Alem. (13th-15th cent.)
1sg	-u	-o	-e(n)
2sg	-is → -ist	-est	-eſ(t)
3sg	-it → -et	-et	-(e)t
1pl	-mēs → -ēn ⁸	-ēn	-ent
2pl	-et	-ent	-ent
3pl	-ent	-ent	-ent

Table 4: The development of *Einheitsplural* (pres. indic. strong verbs & weak verbs of class I)

- Unclear: Why did Alemannic choose to innovate 2pl on the model of 3pl?⁹

⁶ Leveling via phonological erosion is not an 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.

⁷ Cf. Braune & Reiffenstein (¹⁵2004: 263), Paul (²⁴1998: 240), Paul (1952: 194), and in particular Weinhold (1863: 332ff.), Schirmunski (1962: 521ff.), Besch (1967: 310ff.).

⁸ It is commonly assumed that the 1pl ending *-ēn* originated in the subjunctive 1pl *-(e)m*.

- Traditional account: Analogical change on the model of 3pl (cf. Weinhold 1863).
- Alternative proposal: ‘Analogical’ change triggered by acquisition strategies that
 - (i) aim at minimizing the number of elements/features stored in the lexicon, and
 - (ii) lead to a more transparent relation between form and function/meaning.

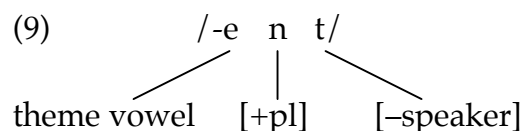
3.1 Extension of 3pl *-ent* to 2pl

- Development of common plural began after 3sg and 2pl had fallen together in *-et*:¹⁰

	Paradigm after conflation of 3sg, 2pl	Paradigm after reanalysis
1sg	-o	-o
2sg	-est	-est
3sg	-et	-et
1pl	-ēn	-ēn
2pl	-et	-ent
3pl	-ent	-ent

Table 5: 2pl /-et/ → /-ent/ (pres.indic) in OHG/Early Alemannic (Notker)

- Claims:
 - (i) The earlier innovation of 2sg *-st* made available a reanalysis of /t/ as the realization of [-speaker] (final /t/ appears in all 2nd and 3rd person forms).
 - (ii) After nasalization of 2pl (/ -et/ → /-ent/) the formative /n/ became to be paired with the inflectional feature [+pl].¹¹
- Decomposition of 2pl, 3pl /-ent/:¹²



- ‘Functionalist’ interpretation: Innovation of 2pl /-ent/ facilitated a more transparent relationship between form and function/meaning (cf. conditions on analogical change proposed in Natural Morphology, e.g. Mayerthaler 1980):

⁹ This change resulted from a general reduction of vowels in non-stressed (final) syllables. Note that in contrast to Bavarian, Alemannic did not grammaticalize a new 2pl formative at this point. This was probably due to the lack of an appropriate pronominal source: The 2pl clitic *er* was similar to 3sg.masc and therefore perhaps not distinctive enough for the purposes of the BP. Moreover, the reanalysis was perhaps hindered by the fact that the grammaticalization of a new 2pl formative */-ter/ would have changed the syllable and accent structure of the relevant verbs (in contrast to Bavarian, where these properties were largely unaffected by the reanalysis of the consonantal onsets of the subject clitics).

¹⁰ 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.

¹¹ Nasalization seems to be a common strategy across Alemannic to reinforce/strengthen inflectional formatives (cf. Weinhold 1863).

¹² A decomposition analysis requires that the relevant inflectional head may split up into several insertion sites prior to the insertion of phonological exponents (‘Fission’, cf. Noyer 1997). Assuming that Vocabulary Insertion discharges 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.

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

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

- **Formal implementation:** Child learners acquire the most economical lexical inventory (based on the input they are exposed to, cf. e.g. Halle 1997):
- (10) *Minimize Feature Content* (Halle 1997)
The number of features mentioned in the Vocabulary [i.e., in the lexicon] must be minimized.
- **Implications of (10):**
 - (i) The set of lexical entries stored by the learner consists of the minimal number of formatives required for generating the input.
 - (ii) Each inflectional marker is associated with the most economical feature specification compatible with the input data.
 - The development of a unique plural formative (without an additional [person] specification, compare Table 6) clearly proceeded in line with (10).
 - **Proposal:** In-built tendency to posit an economical system of featural distinctions may lead learners to
 - (i) slightly rearrange the form/function pairings they encounter in the input;
 - (ii) promote the introduction of new, more economic variants.
 - **Side-effect:** More transparent relation between form/function (in particular, if inflectional markers are decomposed into smaller units of exponence as in (9)).

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

- **MHG:** /-(e)nt/ replaced 1pl /-(e)n/, turning into a general plural marker (Weinhold 1863:366, Schirmunski 1962:521ff., Besch 1967:310ff., Paul ²⁴1998:240):

	Old paradigm	New paradigm
1sg	-e	-e(n)
2sg	-st	-ʃ(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)

- **Observation:** The extension of *-ent* to 1pl was accompanied by two other changes:

(i) Loss of final /-t/ in 2sg: /-t/ could no longer be linked to [-speaker]. ¹³
(ii) Nasalization of 1sg (/e/ ⇒ /-en/): /-n/ could no longer be linked to [+pl].

¹³ 2sg /-st/ → /-ʃ/ after /-st/ → /-ʃt/ in most varieties; cf. Weinhold (1863: 365), Schirmunski (1962: 520f.), Weber (1987: 174).

- Correlation between these changes and the rise of common plural:
 - (i) The combination of 'common plural' and loss of final /-t/ in 2sg is also found in many Low German dialects (Schirmunski 1962: 543f.).¹⁴
 - (ii) Besch (1967: 301) observes that in Alemannic, there is a geographic connection between the extension of the common plural to 1pl and the presence of the 1sg form /-(e)n/.
- Consequence: Major restructuring of the form/function pairings in the verbal agreement paradigm:

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

- (i) 'Analogical' replacement of 1pl /-en/ with /-(e)nt/ facilitated a reanalysis of /-nt/ as a pure plural marker.
- (ii) Due to loss of final /t/ in 2sg, /t/ turns into the elsewhere marker.
- (iii) Absence of person distinctions in the plural suggests the development of an Impoverishment rule that deletes person features in this context:

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

- Due to (12), there is no need to posit additional number specifications for the exponents that realize person features (1sg /-n/, 2sg /-ʃ/ in (11)).¹⁵
- (12) possibly promoted by *Minimize Feature Content*: Impoverishment typically leads to a reduction of features mentioned in the Vocabulary.
- Result: Highly economical inventory of inflectional markers – each phonological exponent is uniquely paired with a single syntactico-semantic feature.¹⁶
- This 'optimal' outcome can be analyzed in purely formal terms (without appealing to any functionalist considerations) via attributing the relevant changes to:
 - (i) learning strategies (*Minimize Feature Content*)
 - (ii) operations of the morphological component (Impoverishment).

4 Conclusion: Analogical change vs. blocking-induced change

- Analogical change introduces new (regular/less distinctive) variants formerly absent in the grammar and not attested in the input the learner receives:

¹⁴ I am indebted to Helmut Weiß for drawing my attention to the possible connection between the loss of 2sg /-t/ and the rise of the common plural /-nt/.

¹⁵ The exponents realizing person features (1sg /-n/, 2sg /-ʃ/) cannot be inserted in plural contexts, since they refer to features that have been deleted by (12) (cf. the *Subset Principle*, Halle 1997). Open question: status of the elsewhere marker /-t/ if Agr is still subject to Fission at this stage.

¹⁶ Later (purely phonological) changes led to the present-day paradigm (cf. Table 3): (i) cluster reduction of /nt/ via elision of /n/ (cross-linguistically a common change, which is usually attributed to a tendency to preserve the least sonorous element of the target cluster, cf. Ohala 1996, 1999, Pater & Barlow 2003); (ii) loss of final /-n/ in 1sg forms (in most varieties).

(13) Learner innovates a regular/less specified phonological exponent /β/ of an inflectional category X with features {F₁, F₂ ... F_n} (an irregular/more specified form may be part of the input):

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

- Analogical change originates at an early point during language acquisition when children begin to master inflectional rules.
- The innovation may result from:
 - (i) Overgeneralization (after the learner has mastered the relevant rule);
 - (ii) Acquisition strategies (*Minimize Feature Content*) that
 - (a) aim at minimizing the number of elements/features stored in the lexicon
 - (b) lead to a more transparent relation between form and function/meaning.
- If a more distinctive/irregular formative is robustly attested in the input, it replaces the innovated variant (blocking effects): ⇒ **no change**.
- If the older form occurs less frequently,
 - (i) the child may fail to acquire it:¹⁷ ⇒ **innovated form replaces older form**, or
 - (ii) acquire it in addition to the innovated variant (often in connection with a certain style or register): ⇒ **morphological doublets/variation**.
- Blocking-induced changes: select an inflectional marker out of a set of candidates (robustly) attested in the input:

(14) The PLD contains more than a single potential phonological realization of an inflectional category X with features {F₁, F₂ ... F_n}:

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

- Blocking-induced changes operate at a later stage during language acquisition, selecting between candidates robustly attested in the input, 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 ⇒ **predominance of analogical leveling (?)**

¹⁷ Analogical change/overgeneralization typically affects less frequent elements, cf. e.g. Prasada & Pinker (1993), Kroch (1994), Clark (1998).

Appendix I: OHG 2sg *-s* >>> *-st*: an apparent problem for the BP

- It seems that the development of 2sg /-st/ presents a problem for an account in terms of blocking. Consider the forms listed in Table 8:¹⁸

	Old paradigm	New paradigm
1sg	nim-u	nim-u
2sg	nim-is	nim-ist
3sg	nim-it	nim-it
1pl	nēm-emēs (-ēm, -ēn)	nēm-emēs (-ēm, -ēn)
2pl	nēm-et	nēm-et
3pl	nēm-ant	nēm-ant

Table 8: Agreement paradigms (pres. indic.) for *nēmen* 'take', early OHG

- Problem:** The creation of the new formative 2sg /-st/ apparently does not lead to a more specified form ⇒ conflicts with the Blocking Principle:

- (15) a. [2, sg, pres.] ↔ /-s/
 b. [2, sg, pres.] ↔ /-st/

- Observation:** In early OHG, the 2sg endings of many verbs were identical in the pres. indic. and the pres. subjunc. (i.e., the 2sg forms were underspecified for verbal mood).
- In contrast, verbal mood was clearly distinguished in other person/number combinations (apart from 2pl), cf. the paradigms for the verbs *salbōn* 'anoint' (class 2) and *habēn* 'have' (class 3):¹⁹

	Present indicative	Present subjunctive
1sg	salbōm	salbo
2sg	salbōs	salbōs
3sg	salbōt	salbo
1pl	salbōmēs	salbōm
2pl	salbōt	salbōt
3pl	salbōnt	salbōn

Table 9: Conjugation of *salbōn* 'anoint' (class 2, present tense), early OHG

¹⁸ Note that the initial vowel in formatives such as *-emēs* is actually not part of the agreement suffix, but rather a theme vowel that originally served to derive verbal stems from roots.

¹⁹ Strong verbs and the weak verbs of conjugation class 1 exhibit *-is* and *-es* for 2sg present indicative and 2sg present subjunctive, respectively. Here, the difference in vowel quality was perhaps not salient enough to differentiate the forms. Furthermore, the difference was presumably further weakened by phonological erosion that affected non-stressed final syllables. Alternatively, one might assume that the change first affected the weak verbs of the conjugation classes 2 and 3 and spread later to other verb classes by analogy.

	Present indicative	Present subjunctive
1sg	habēm	habe
2sg	habēs	habēs
3sg	habēt	habe
1pl	habēmēs	habēm
2pl	habēt	habēt
3pl	habēnt	habēn

Table 10: Conjugation of *habēn* 'have' (class 3, present tense), early OHG

- The development of the new formative /-st/ began in the present indicative (cf. Brinkmann 1931, Braune & Reiffentstein ¹⁵2004: 261).²⁰
- Hypothesis: The change was licensed by the fact that the new ending was unambiguously specified for verbal mood (i.e., indicative) in contrast to the earlier formative /-s/:

- (16) a. [2, sg, pres.] ↔ /-s/
 b. [2, sg, pres., **indic.**] ↔ /-st/

- No counterexample to the BP: The change proceeded in accordance with the requirement that new inflectional formatives realize a greater subset of morphosyntactic features than their predecessors.
- In a later development, the new ending spread to all verb classes, tenses and verbal moods including the pres. subjunctive. This subsequent development blurred the original motivation for the change in question.

²⁰ Possibly on the model of the preterite-presents, which already showed /-st/ for the 2sg present indicative (*kanst* 'can', *tarst* 'dare', *muost* 'must', *weist* 'know' etc.), and the 2sg of 'be' *bist*, which resulted from an independent and earlier development (cf. Lühr 1984). The first instances of 2sg -st appear in Franconian and spread later to other OHG varieties. The early OHG manuscripts written in the monastery of Fulda show this change in the process of its development, cf. the *Hildebrandslied* (preserved in an early 9th century copy of the original text dating from the late 8th century), the *Basel Recipes* (around 800), or the *Tatian* (translated around 830-840. This translation was then copied in the second half of the 9th century). Furthermore, it can be shown that the change affected first the present indicative: in the OHG texts of Otfrid von Weißenburg, for example, 2sg -st appears frequently with present indicative verb forms, while past tense and subjunctive forms still exhibit the non-enlarged ending 2sg -s. See Brinkmann (1931), Moulton (1944), Sievers (1961), Sommer (1994) for details.

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