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Word-final t-deletion in Dutch dialects:

The roles of conceptual prominence, articulatory complexity, paradigmatic properties, token frequency and geographical distribution*

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6.1. Introduction

It is a well known fact of human language that word-final consonant clusters have a tendency to be simplified. The present study focuses on word-final [t] preceded by a plosive or a fricative in Dutch dialects. This [t] is frequently not articulated in variants of Dutch, just as it is in variants of English and of other languages. The rate of [t]-deletion in these final consonant clusters is at least partly determined by

(a) the conceptual prominence of the consonant cluster,
(b) the articulatory complexity of the consonant cluster,
(c) paradigmatic properties of final [t],
(d) token frequency and
(e) the geographical area in which the dialect is spoken.

The data on which the present study is based have been collected as part of the project "Phonology and Morphology of Dutch Dialects on the Basis of Field-work". The data available at this moment concerns the dialects spoken in an area ranging from the Betuwe (or River area) in the east to South Holland in the west of the Netherlands. For the names of the locations from which the data have been collected, see map 1 below.

Our general purpose is to contribute to the understanding of the process of sound deletion, specifically that of final consonants in word-final clusters. Our language-specific purpose is to supplement the results for Dutch as they are reported in De Vries et al. (1974) for Leiden, in Schouten (1982 and 1984) for the city of Utrecht and the area south of it, in Goeman (1983) for the east of the Betuwe and the Achterhoek, in Van Hout (1980 and 1981) for the Betuwe and Nijmegen, in Goeman & Van Reenen (1984) for the Betuwe and South Holland and in the RND atlas (1930-1982) for the whole area of the Netherlands. For other, mainly older literature on the subject we refer to these publications. The results we are reporting here confirm only in part those which have been mentioned elsewhere in the literature on the subject.

In paragraph 6.2 we present our data: the phonological and morphological categories we are distinguishing; the nature of our data base; and the results we have found. The general principles which account for variable sound deletion, hypotheses derived from these principles and the testing of our data is the subject of paragraph 6.3. In paragraph 6.4 some geographical and historical aspects of the data are treated. The general conclusion is to be found in paragraph 6.5.

The following abbreviations have been used:

dental = dental(s) or alveolar(s)
plos   = plosive(s)
son   = sonorant(s)
fric   = fricative(s)
[#]   = word final
V   = vowel
C   = -son consonant (unless otherwise stated)
P   = pause or silence

6.2. **Data**

In paragraph 6.2.1 we introduce the phonological and morphological categories we are distinguishing, while some observations are made about the nature of our data in paragraph 6.2.2. In paragraph 6.2.3 we present our results. On the basis of these results we will test the hypotheses we will propose in paragraph 6.3.

6.2.1. *Phonological and morphological categories*

Table 1 illustrates the kind of forms we have examined. The word-final consonant clusters we have been considering consist of a fricative followed by [t#] ([ft], [st] or [xt]) or a plosive followed by [t#], [pt] or [kt] (*[tt] or *[t:] does not occur in Dutch).[1]

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[1]   In Van Loey (1974, discussion; see also Goeman 1983), it is observed that some dialects in the River area have relics of dental geminates, originated by suffixation with [t#], realized as [tˑ], a monosegmental short palatal. Such forms do not occur in our data, however.

Table 1: Forms illustrating word-final [t#]-deletion in [-son] consonant clusters in Dutch (sg. = singular).

Dutch spelling	English gloss	IPA	part of speech	status of t
koo[pt]	"buy(s)"	[pt]	present 2nd/3rd sg.	suffix
gemaa[kt]	"made"	[kt]	past participle	suffix
wi[st]	"knew"	[st]	past tense sg.	part of stem
hel[ft]	"half"	[ft]	noun (nominal)	part of stem
sle[xt]	"bad"	[xt]	adjective (nominal)	part of stem
hee[tst]	"hottest"	[tst]	regular superlative	part of suffix

We are distinguishing six morphological categories.

The two present tense forms: 2nd and 3rd person singular
The 2nd and 3rd person singular present tense verb forms consist of the verb stem followed by the suffix [t#]: koop+t. When the subject precedes the verb, the 2nd and the 3rd person singular verb forms are the same: stem followed by variable suffix [t#]. However, when the subject follows the verb, the verb forms are different: verb stem plus variable [t#] for the 3rd person, verb stem plus obligatory zero suffix for the 2nd person, as illustrated in table 2. (In a small part of the dialect area we are considering the obligatory zero suffix does not occur. This will be discussed in paragraph 6.4.)

Table 2: Distribution of the variable 2nd and 3rd person singular present tense flexion marker [t#] and the obligatory zero marker in the unmarked subject-verb order and in the inverted verb-subject order.

UNMARKED ORDER: SUBJECT-VERB		INVERTED ORDER: VERB-SUBJECT	
hij klop(t)	"he knocks"	klop(t) hij	"does he knock?"
jij klop(t)	"you knock"	klop jij	"do you knock?"

We have included in this group the few verb stems in our data ending in [t#] of the type barst+t "(it) bursts", in which one [t] does not surface. We consider the [t#] of barst to be a flexion marker by analogy and we checked that the behavior of such forms is not deviant.

   We have also included forms such as denkt "(you/he) think(s)", in which [k] is frequently deleted, as long as [t#] is present: *de*[ŋt#] besides *de*[ŋkt#]. However, [k] always surfaces, as soon as [t#] is deleted. Therefore, we consider [k] present and underlying. By contrast, we have not included forms like *brengt* "(you/he) bring(s)", although we find both *bre*[ŋt#] and *bre*[ŋkt#], since [k] often disappears as soon as [t#] is deleted. We consider the presence of this [k] a case of epenthesis. Finally, the two present tense forms singular are the only categories in which inflected or derived forms, causing [t] to occur word-internally, do not always exist: *bar*[st]*e* occurs but not *loo*[pt]*e* and *koo*[pt]*e*. However, the latter types are in the minority.

The past participle

The regular past participle consists of a prefix *ge-* and a suffix [t#] (surface form) separated by the verb stem: *ge*+stem+[t]. The irregular past participle has other suffixes than [t#]. Some participles have irregular verb stems: instead of regular **ge+koop+*[t] (found in childrens speech) we have *ge+koch+*[t] "bought". When the irregularity concerns the verb stem, not the suffix, we consider the participles regular. Generally participles may be followed by [ə], so that [t] is followed by a vowel.

The past tense singular of irregular verbs

Past tenses of irregular verbs always end in [xt#] or [st#]. We view these forms as monomorphemic. Regular past tenses of strong verbs end in 0, of weak verbs in the suffix *de* or *te*, i.e. [t] is neither final nor a tense suffix. Apart from all singular types there always exists a past plural, making [t] word-internal: da[xt#] "thought" (singular) versus da[xt]ən "thought" (plural).

Nominals

The category of nominals we are distinguishing consists of nouns, adjectives and numerals. There is only one numeral in Dutch which ends in [-son] followed by [t]: *a*[xt] "eight". The nominals are all monomorphemic at least from a synchronic point of view. We have included in this category the three irregular superlatives *best* "best", *meest* "most" and *minst* "fewest", which we consider to be suppletive. Inflected and derived forms make it possible for [t] always to occur word-internally: *haa*[st#] - *haa*[st]*ig* "hurry - in a hurry", *e*[xt#] - *e*[xt]*e* "real", *a*[xt#] - *a*[xt]*en* "eight - eights".

Regular superlatives

Regular superlatives are formed by adding [st#] to the adjective stem: *arm*+*st* → *armst* "poor(est)". In *sle*[xtst] one or both [t]'s may be deleted. Yet we consider this form as a case of [tst#], since the adjective stem always has [t] when followed by the suffix [ə]: *sle*[xtə]. This is the only case in which a sequence of four [-son] consonants occurs in our data. The addition of *st* to the adjective stem *vals* gives *valst*, not **valsst*. Since **[ss] does not occur, only one [s] surfaces. We consider [st#] as the suffix however and checked that this form did not behave deviantly.

   Three irregular superlatives are not included in this category, they are considered more or less normal adjectives (see above: nominals). Since the great majority of regular superlatives consists of three or more final consonants, a separate analysis of the behavior of these consonant groups will be made; it will reveal tendencies which are absent or weak in other morphological categories.

   Finally, all superlatives have two forms. In one form [t] is final, in the other it is followed by [ə]. When [t] is not final it is always present: *hee*[tst] and *hee*[tstə].

6.2.2. *The nature of the data*

The data are culled from the data base "Phonological and morphological proper-
ties of Dutch dialects". The data presented here have been collected between
1980 and 1984. Informants generally were men of about 60 years old.[2] They
were presented with a reading list with about 1800 items and instructed to
translate the items in their dialect (eastern area) or in the vernacular (western
area). (Eastern speakers usually distinguish their dialect from the standard lan-
guage, whereas western speakers have the feeling that they do not speak dialect
but "plat" (vernacular) variants of the standard language.) The reading list was
composed of alphabetically ordered nouns, adjectives, verbs etc.

Informants may have been influenced by spelling as far as the group of nominals
was concerned and for the infinitive of the verbs, but present and past tense forms
and participles were not written out on the list.

Not all informants were able to read te list.[3] In these cases the linguist pro-
duced the tokens in the standard language and the informant "translated" them.
The reading list was organised in such a way that the great majority of items
occur before a pause. At the time of analysis, 52 dialect questionnaires were
available on computer, another 50 were in preparation. In the following three
years another 200 questionnaires were planned be entered into the computer.

The following details concern our way of counting. [t#]-deletion may be
partial or complete, so that three cases may be distinguished:
- t is present and released, either lenis (possibly voiced) or fortis (voiceless);
- t is present and not released;
- t is absent;
- d (released) occurs instead of t.

A. We have counted released [t] (and [d]) as 0, non-released t (occurring infre-
quently) as 1/2 and deleted [t] as 1. If two dialect tokens match the pattern (such
as [xt] in *speigt* and *spuugt* "(he) spits") for an item in a questionnaire they
maximally count as 1. If one of the two dialect tokens matches the pattern and
the other does not (such as [xt] in *bracht* not occurring in *brengde* "brought"), the
second form is not taken into account.

B. In the following cases we have not counted anything:
  a. accidental gaps in the data;
  b. tokens not matching the expected pattern: *brengde* instead of *bracht*
     "brought"; *spirtst* instead of *spuugt* "(he) spits"; [hoᵘt] instead of *hoofd*
     "head". Past tense forms instead of the present form *hij stak* instead of *hij
     steekt* "he sticks"; see, however, the forms discussed in paragraph 6.2.1
     above;
  c. tokens which did not occur utterance finally (*brachti) "brought he" in
     stead of "he brought"; in a few cases, explicitly mentioned, we examined
     the behavior of word final [t#] sentence internally;

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[2] But see also chapter 2.
[3] One analphabetic and one dyslectic informant.

    d.   present first person singular (*ik werkt* instead of *ik werk*) "I work", although these non standard forms are not infrequent in South Holland.

In Zoetermeer (see map 1 below) we had three speakers instead of one, in Gouda for part of the questionnaire, and in a few other localities we had two speakers. On the maps the averages of these speakers are presented, except in the case of Zoetermeer. In Zoetermeer the results of the three respondents are presented separately.

From the preceding it is clear that our data are subject to several limitations. In the first place, our data do hardly allow social differentiation.[4] Yet, it is beyond any doubt that social factors influence [t#]-deletion in Dutch. Another factor is spelling. Some items in the questionnaires were presented in Standard Dutch orthography, others were not. Spelling may have suggested the articulation of [t#] in the case of the nominals, but not in the case of verbs, participles and regular superlatives.[5] A third factor is the possible influence from education. Verbs and regular superlatives were elicited in more or less paradigmatic form, which may have reminded the respondents of school and standard language forms. Especially one group of verbs was elicited as the classic school paradigm. In this group - which has not been mixed with the other - [t#] might be expected to be deleted less frequently than elsewhere, so that we are able to check to what extent there is influence from formal education. We will be referring to these two groups of verbs as *verbs in paradigmatic elicitation condition* and *verbs in non-paradigmatic elicitation condition*.

Finally, the question may be asked whether our strategy of taking one informant per dialect has provided reliable results.[6] We believe that this is the case. Firstly, our results are in line with those of other dialectal surveys such as the RND-atlas (1930-1982). Secondly, they can be compared to the results of two sociolinguistic studies: Van Hout (1981) and Schouten (1984). The results found by Schouten (1984) concerning the southern part of the province of Utrecht continue the trends we found in the Western Betuwe area. In the case of Van Hout 1981 we may compare our Nijmegen results (no [t#]-deletion) directly with his results for reading lists. According to this study, Nijmegen is situated outside the [t#]-deletion area: only 6% of [t#]-deletion in obstruent clusters was found for Nijmegen, while 42% of the 143 informants did never delete any [t#]. Thirdly, although gathered by several field workers and more than fifty informants who usually did not know each other, our data provide results which form highly regular geographic patterns. Consequently we feel justified in assuming that our data are reliable and representative.

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[4]   But see also chapter 2.
[5]   See chapter 2 for the presentation of these non-lemma forms by + or -.
[6]   See chapter 3 on reliability and chapter 2 on validity.

6.2.3. *Results*

The percentage of [t#]-deletion in these different categories and the total numbers of forms are given in diagram 1 and table 3. The data consist in wordfinal [t#] 's after plosives from the fieldwork project.

Diagram 1: Percentage of [t]-deletion in word final consonant clusters for different morphological and phonological categories and speech conditions. All but the three top clusters occur before pause.
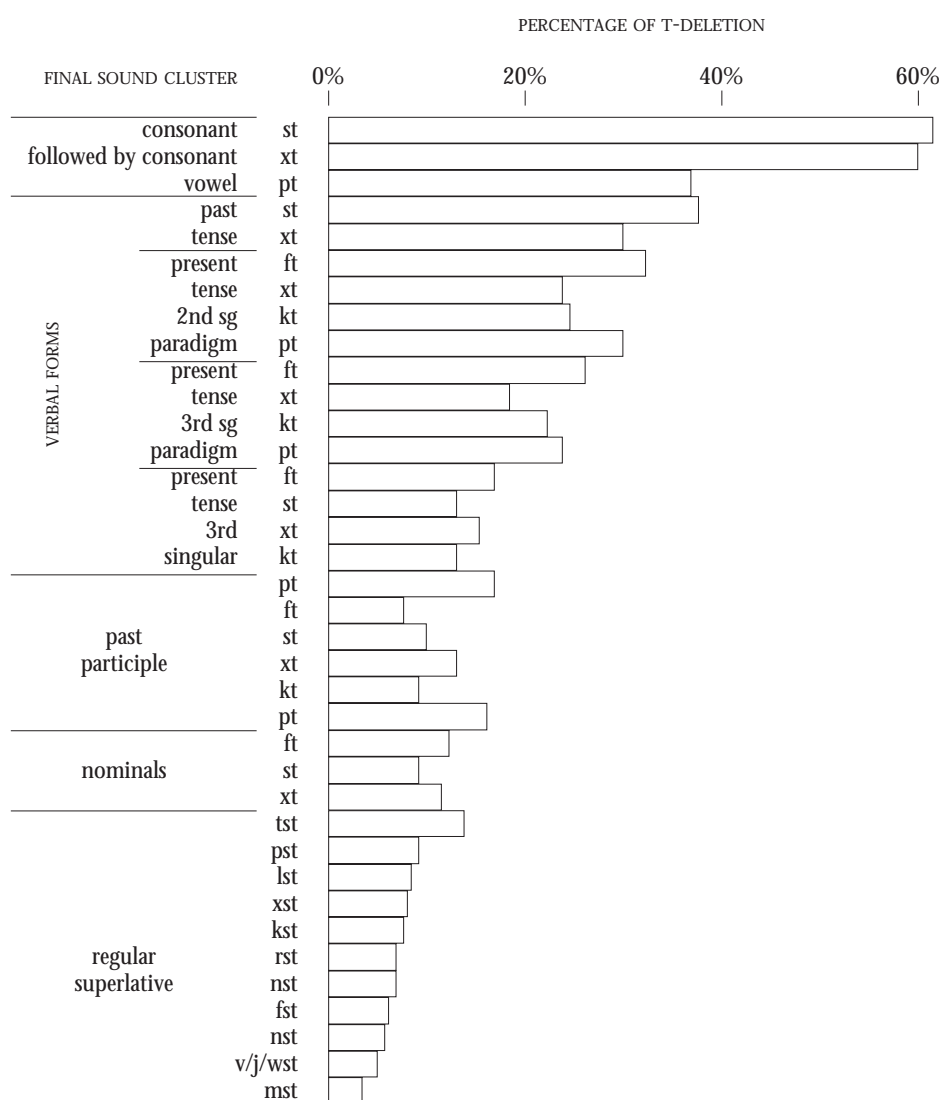
Table 3: [t#]-Deletion in different phonological and morphological categories and speech conditions. tot = the total number of forms, del = the number of forms deleted. %del = the percentage of forms in which [t#] = deleted. Forms in all categories and speech conditions occur in isolation (in a few cases utterance-finally) except in (7). (3) and (4) concern forms elicitated in the paradigmatic condition.

| | Flexional | | | | | |
| | (1) Past Participle | | | (2) Present 3rd | | |
	tot	del	%del	tot	del	%del
ft	191	13.5	7.07	530	92	17.36
st	88	8.5	9.66	86	50.5	13.08
xt	456	57.5	12.61	686	107.5	15.67
kt	229	21	9.17	560	76	13.57
pt	52	8.5	16.35	320	53.5	16.72
Tot	1016	109	10.73	2482	379.5	15.29
	Flexional					
	(3) Present 3rd par			(4) Present 2nd par		
	tot	del	%del	tot	del	%del
ft	50	13.5	27.00	51	17	33.33
st						
xt	50	9.5	19.00	48	12.5	25.00
kt	48	11	22.92	49	12.5	25.51
pt	51	16	24.51	52	16	30.77
Tot	199	50	25.13	200	58	29.00
	Not flexional					
	(5) Past tense			(6) Nominals		
	tot	del	%del	tot	del	%del
ft	95	12	12.63			
st	94	36	38.30	1238	112	9.05
xt	275	80	30.09	854	99.5	11.65
Tot	369	116	31.44	2187	223.5	10.22

	(7) Followed by vowel or consonant		
	tot	del	%del
st#C	52	33	63.46
xt#C	46	28.5	61.96
pt#V	50	19	38.00
Tot	148	80.5	54.39
	(8) Regular superlative		
	tot	del	%del
tst	653	87.75	13.44
pst	89	8	8.99
lst	163	14.5	8.90
xst	134	10.5	7.84
kst	83	6.5	7.83
rst	167	10.5	6.29
nst	259	16.25	6.27
fst	87	5	5.75
nst V	83	4.5	5.42
wst j	259	13	5.02
mst	81	2.5	3.09
Tot	2058	179	8.70
	Total number of tokens		
	tot	del	%del
	8659	1195.5	13.81

6.3. **Hypotheses**

Hypotheses concerning sound deletion can usually be traced back to three principles, which we label as prominence, complexity, and token frequency. Prominence and complexity may be both conceptual and phonic in nature.

Hypotheses referring to the prominence of a sound or morpheme treat the sound or morpheme which is being deleted or variable, in terms of its contribution to the understanding or perception of the utterances in which it occurs. The frequency of deletion of the sound or morpheme is inversely related to its perceptual prominence, while the perceptual prominence may be either conceptual or phonic in nature. More specific formulations of this principle are found in Naro and Lemle (1976: 228): "the loss of agreement markers ... diffuses through the morphology by affecting first and most frequently those forms in which the consequences are phonically least noticeable, from the point of view either of the listener or of the speaker monitoring his own speech", in more general form in

Labov (1982: 54): "the frequency of deletion of the morpheme is inversely related to its perceptual prominence". The two aspects of the principle of prominence may be described as follows:

The more the sound or morpheme which is being deleted or variable contributes to the morphological, syntactic or semantic prominence of a linguistic unit, the greater its *conceptual* prominence, and the less it will tend to be deleted.

The more the sound or morpheme which is being deleted or variable is phonically noticeable, the greater its *phonic* prominence, and the less it will tend to be deleted.

The next question to be asked is: what is conceptually or phonically prominent? Linguists have proposed hypotheses attaching special importance to the sound which functions as a morpheme as opposed to the sound which does not function as a morpheme. When the variable sound is a morpheme, this morpheme will resist deletion more than when the same sound is only part of a morpheme, because in this case it is more prominent, so it has been claimed. Labov (1982: 53) phrases this viewpoint as follows: "whenever a consonant was variably deleted, it would be deleted less often when it represented a distinct morpheme", while Guy (1980: 10) says: "Full morphemes are less likely to be deleted than parts of morphemes". Claims of this type presuppose that the conceptual prominence of a sound as a morpheme is a priori always higher than the conceptual prominence of a sound which does not function as a morpheme. However, such a presupposition is far from evident. Indeed, conceptually a morpheme may be completely redundant, whereas a part of a morpheme, i.e. a simple sound, may not.

Another kind of hypotheses proposed by linguists attach special importance to the morpheme in relation to the notion of disambiguating information. When the variable morpheme is accompanied by disambiguating information elsewhere in the utterance, it is less prominent and may more easily be deleted, so it is claimed more or less explicitly.

However, even if we replace the notion of variable morpheme by that of variable sound, we wonder whether it is possible to propose satisfactory hypotheses of this kind. The question remains why the disambiguating information should be morphological in nature and not, for example, semantic or situational. Also, it is not clear why the disambiguating information should occur elsewhere in the word (stem or suffix) and not elsewhere in the phrase, clause or sentence. The Dutch past participle, for instance, is characterized by the prefix *ge* and the suffix *t*.

The prefix *ge* disambiguates the past participle to some extent, but not completely since nouns may be preceded by *ge* as well, cf.

Hij heeft geluk   "he has luck"
het is geluk   "it is luck" and
het is geluk(t)   "it has succeeded"

However, generally (not always) the auxiliairy may provide the disambiguating information, so confusion between noun and participle in which [t#] is deleted

will be highly exceptional. There always seems to be disambiguating information present, on the level of the word, the phrase, the clause or the sentence, or even extra-linguistically. As a result, we are not able to propose plausible hypotheses in terms of disambiguating information which clearly differentiate our data. With respect to the role of disambiguating information, we conclude that this information either is difficult to measure or measured in too strict a manner to be sufficiently relevant.

We consider more promising an approach of the notion of conceptual prominence in terms of expressive or contrastive language use. We claim that the more inherently expressive or contrastive the variable sound or morpheme is, the more it will resist deletion. The flexion -*st#* of the superlative is such an expressive or contrastive morpheme.

The expressivity of both the comparative and the superlative has been observed by Kohler (1984: 167) who considers it the factor accounting for the peculiar distribution of phonemic tone accents in these forms as compared with the simple adjectives in Rhenish dialects, mentioned in Frings (1916: 26). We believe [t#] in the superlative suffix [-st#] to behave reluctantly against deletion because of its expressive function.

The suffix seems to behave as a phonaestheme in the sense of Samuels (1975: 45-48; the word has been coined by Firth), with a rather clear semantic function.

A second promising approach is the one in which the conceptual prominence of a flexion marker in its different paradigmatic functions is compared. When a variable sound having different functions as a flexion marker, is more solidly integrated in one of its functions than in the other(s), it is conceptually more prominent in the former function and will better resist deletion. Since variable [t#] 3rd person singular following the verb stem may be always present independently of the question whether the subject of the verb precedes or follows, it is perceptually more prominent than variable [t#] 2nd person singular following the verb stem. As we have seen above (table 2) this variable [t#] occurs only when the subject precedes the verb.

When a hypothesis takes into account the prominence of a sound or morpheme, it may concern not only its conceptual prominence but also its phonic prominence. By phonic prominence we understand the quantity of information a sound carries in its context. The more phonic similarities there are between the sounds of a cluster, the higher the rate of deletion of the variable sound in the cluster. Guy (1980: 10), for instance, observes that "the high rate of deletion from *st* clusters may well be partly accounted for by the spectral similarities of the [t] burst and the [s] noise". We interpret these "spectral similarities" as "phonic similarities" for the listener. From this interpretation it follows that phonic dissimilarities could partly account for a low rate of [t#]-deletion.

The *second* general principle which serves to account for sound deletion is articulatory complexity. The more complex a sound in its context, the less it resists deletion. Guy (1980: 9) has proposed a useful measure of articulatory complexity for consonant clusters:

The higher the number of changes in point of articulation required to execute the cluster, the more complex its production and the more the consonants in the cluster will tend to be deleted.

We add two other relevant measures:

- A word-final cluster of a sonorant consonant followed by two [-son] consonants is easier to produce than a cluster of three [-son] consonants, and deletion will occur more frequently in the latter cluster.
- Longer consonant cluster are more complex to produce than shorter ones and deletion will occur more frequently in the former clusters, other things being equal.

However, the translation of the notion articulatory complexity into concrete hypotheses is not always possible, for lack of our understanding of what is articulatorily complex.

Complexity may be conceptual instead of articulatory. Conceptual complexity may override articulatory complexity when deletion of a sound needs a conceptual effort greater than its non deletion. This occurs apparently in concordant series. In such series disambiguating information is present but it disfavors sound deletion instead of favoring it. A clear case is found in Puerto Rican Spanish, see Poplack (1980b: 377), where disambiguating information in terms of concord in the noun phrase disfavors word-final inflectional [s#]-deletion, whereas all other contexts favor it. Apparently, repetition of the variable suffix is conceptually easier than its deletion. Since such concordant series do not occur in Dutch, we will not insist on the notion of conceptual complexity, but its role cannot be neglected a priori.

The *third* general principle in attempts to account for sound deletion is the frequency of occurrence of a lexical or grammatical item as a a token. From a historical point of view frequent tokens often have special reduced forms. Therefore, the basic principle for token frequency is: the more frequently a type occurs as a token, the more it is shortened, i.e. the more frequently its sounds are deleted. The most outspoken supporter of this approach is certainly Man'czak (see, for instance, Man'czak 1975, 1978, 1984). Apparently, the frequent articulation and perception of these tokens results in the reinforcement of deletion tendencies already present and their conceptual or phonic prominence is lower than usual since they are so often heard. However, since they are produced and perceived rather automatically, outside their paradigmatic context, as quickly available units, it follows that they are not expressive or contrastive. Consequently, types with a high token frequency which are expressive and contrastive will not be reduced as easily as other frequent types.

We are not sure whether type frequency has been proposed as a cause of sound deletion in final consonant clusters. Van den Broecke (1975: 54) points out that type frequency is more important with respect to distributional principles in cluster formation of segments and features, and that token frequency is more informative on production and perception of clusters. If distributional principles in cluster formation may have to do something with [t#]-deletion, we do not

know whether it takes the form: the more types of a certain consonant cluster occur in a language the more frequently the cluster will reduce, or the less frequently the cluster will reduce. Later, in paragraph 6.3.3 below, we will show that in one case at least type frequency does not play a part, whatever interpretation is chosen.

From the preceding it follows that the principles of conceptual and phonic prominence, articulatory complexity and token frequency do not always reinforce each other. We have already pointed out that expressivity of contrastivity as a form of conceptual prominence will tend to neutralize the effects of token frequency. We may add that, while lack of phonic prominence favors [t#]-deletion in the complex consonant clusters of the regular superlative (*sle*[xtst]), conceptual prominence disfavors [t#]-deletion. In addition, phonic prominence and articulatory complexity may concern the same sounds. With respect to point of articulation they may lead to opposite hypotheses, at least in part. For instance, on the one hand, the constituents of the cluster [xk#] are perceptually rather similar, so sound deletion will be more likely. However, the cluster is easy to produce, since there hardly is any change in point of articulation and this will not favor sound deletion. On the other hand, the cluster [kf#] is perceptually dissimilar, so sound deletion will not be likely.[7] However, its articulation is relatively complex, since there occurs one change in point of articulation, which will favor deletion. Since phonic prominence and articulatory complexity almost always interfere with each other, they will be dealt with in combination in paragraph 6.3.2 below.

Hypotheses derived from the notion of conceptual prominence will be tested in paragraph 6.3.1, while in paragraph 6.3.3 we will discuss token frequency.

6.3.1. *Conceptual prominence*

We will test two types of hypotheses. First, hypotheses in which the morpheme is considered as a more prominent unit than the non morpheme, and hypotheses in which the rate of deletion of the morpheme is related to the presence of disambiguating information. Second, hypotheses in which the notions expressivity or contrastivity, on the one hand, and different conceptual prominence for the same flexion marker in a paradigm play a central part. As discussed already we consider confirmation of the first type of hypotheses not very plausible, confirmation of the second type more probable a priori.

6.3.1.1. THE MORPHEME

Hypotheses in which the sound which is a morpheme is considered as more prominent than the sound which is not, have generally not been confirmed for English and for Puerto Rican Spanish (cf. Labov 1982: 54, Poplack 1980a: 57 and 1980b: 373). They have not been confirmed for Dutch either.

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[7]   The clusters [xk#] and [kf#] do not exist in Dutch (dialects), they serve as examples.

For our Dutch data this view implies that [t#] as a suffix will be less frequently deleted than [t#] as part of a suffix. More specifically: since [t#] is a distinct morpheme in present tense singular verb forms, it is less frequently deleted than [t#] in other environments. This is neither confirmed by the results in De Vries et al. (1974: 244), nor by Schouten (1982: 286).[8] De Vries et al. have found that in their Leiden data present tense and past participle showed deletion of [t#] more frequently than the category "other". Schouten has found in his Utrecht data that in present tense [t#] was deleted more frequently than in the past participle (p < 0.01) and in the past participle more frequently than in the category "others" (p at 5% level). De Vries et al. and Schouten assign the past participle - in which, as we have shown in paragraph 6.1, [t#] is part of the discontinuous affix *ge*+stem +[t] - to a special category. In our own data we would have found the same result as Schouten if we had not divided the category "others" used by Schouten and De Vries et al. A further division of their category "others" in "past tense", "nominals" and "regular superlative" is necessary in our data, besides "present tense"[9] and past participle, as is shown by table 4:

Table 4: Difference in rate of [t#]-deletion in past tense, present tense, past participle, nominals and regular superlative

[t#] is deleted more frequently in	than in	x^2	p	N	hypothesis confirmed
past tense	prsnt tense	34.8710	<0.001	2851	yes
prsnt tense	past part.	12.4923	<0.001	3498	no
prsnt tense	nominals	26.5769	<0.001	4669	no
prsnt tense	reg.superl.	45.3217	<0.001	4540	no

Although they do not confirm the hypothesis of the prominence of the morpheme, our results seem to be different from what has been found by De Vries et al. and Schouten. This may be due to the fact that the data are not strictly comparable. For instance, in the Leiden and Utrecht studies [t#C], [t#V], [t#P] are grouped together, while deletion has been calculated on the basis of consonant clusters including [nt#] and [rt#], and different social classes were involved. Yet it would be interesting to know the results for the past tense, as compared with the nominals and the regular superlatives, in the data used by Schouten and De Vries et al.[10] Our results do not allow us to conclude that there is either a

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8 In Limburgian Rimburg, however, this is the case (see now Hinskens 1992: sections 6.3.1.4 and 9.2.1).

9 If we do not state otherwise, present tense refers to the non-paradigmatic elicitation condition (see paragraph 2.1 above): had we included present tense in the paradigmatic elicitation condition, the difference between past tense and present tense would have been smaller, but remains significant.

10 In the data used in Schouten (1984) concerning the region south of the city of Utrecht we have been able to check this point as far as the past tense and the nominals are concerned (regular

positive or a negative correlation between [t#] as a suffix or as a part of a suffix and its rate of [t#]-deletion. Later, in paragraph 6.3.3, we will see that the high frequency of [t#]-deletion in the past tense (and to some extent in the present tense) has to be accounted for in terms of token frequency, and has nothing to do with the alledged conceptual prominence of the [t#]-suffix in the present tense.

6.3.1.2. DISAMBIGUATING INFORMATION

It has been claimed that the conceptual prominence of [t#] may be smaller when disambiguating information is present elsewhere in the utterance. One form of this claim is often combined with the notion of the morpheme as a prominent unit of information. It has been suggested that [t#] as a flexion marker (a suffix) is more frequently deleted if disambiguating morphological information is already present elsewhere in the word. This view is expressed more or less explicitly in Du P. Scholz (1963: 243) for 17th Century Dutch. Guy (1980: 7) claims the same for English, and Goeman (1983: 187) for modern Dutch. This view would imply frequent deletion of [t#] in the Dutch past participle, since the participle is already characterized as such by the prefix *ge*.

If the vowel in the irregular past tense is viewed as a morpheme, this view also applies to forms such as *kocht* "bought". Since [t#] is part of the suffix [st#] in the regular superlative [t#], the disambiguating information is present elsewhere in the word (the very rare exceptions being some adjectives ending in [s], such as *vals(t)*, although this adjective does not behave differently from others).

The present singular verb forms and the nominals do not contain disambiguating morphological information elsewhere in the word. (Verbs and nouns may have the same form: BARST '(the) burst' and '(he) bursts'). By limiting our hypotheses to the disambiguating information elsewhere in the word - as a consequence of the nature of our data we have no other choice - we do not obtain satisfactory results. This is made clear by the testing of the following hypothesis: [t#] is deleted in the past participle, in the past tense singular and in the regular superlative more frequently than in the present tense singular and in the nominals. As we have already seen, past tenses in our data show deletion more frequently than all other tenses, but past participles do not. Though past participles show deletion of [t#] more frequently than nominals and regular superlatives, the difference is not significant:

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superlatives were almost absent). In these data as in ours [t#]-deletion in the past tense is considerably more frequent than in nominals. This confirmation is the more interesting since not only it comes from an area we have not worked in yet, but also Schoutens data concern normal, informal, unmonitored speech in which the great majority of variable [t#]-sounds did not occur utterance finally. We are grateful to Bert Schouten to have made available for us these data.

Table 5: [t#]-deletion in past participles, past tense and regular superlative as compared to present tense and nominals (prsnt=present, part.=participle, reg. superl.=regular superlative).

[t#] is deleted more frequently in	than in	x^2	p	N	hypothesis confirmed
prsnt tense	past part.	12.4923	p<0.001	3498	no
past part.	nominals	0.1931	ns	3203	no
past tense	prsnt tense	34.8710	p<0.001	2851	yes
past tense	nominals	123.3917	p<0.001	2556	yes
prsnt tense	reg.superl.	45.3217	p<0.001	4540	no
nominals	reg. superl.	2.8606	ns	4245	no

These results do not allow us to conclude that [t#], whether or not it is a suffix, is deleted more frequently when disambiguating morphological information is present elsewhere in the word. Twice the correlation is significant but in the opposite way. Twice it is not significant. And twice it is significant in the expected way. Later we will see that the high frequency of [t#]-deletion in the past tense (and to some extent in the present tense) has to be accounted for in terms of token frequency, and has nothing to do with the disambiguating information elsewhere in the word.

6.3.1.3. EXPRESSIVITY AND CONTRASTIVITY

We believe that the question whether [t#] or the linguistic unit to which it belongs has a contrastive or expressive function, is more important than the question whether or not [t#] is a morpheme, i.e. a suffix. The more contrastive or expressive the function of a linguistic unit is, the greater its conceptual prominence and the more its sounds will resist deletion. On the one hand, the lexical item *e*[xt] "really" is used in an expressive context systematically and [t#]-deletion hardly occurs. On the other hand, [t#] as a verb suffix only has a marginal contrastive or expressive function as does the [t#] in past participles, while the superlative suffix [st#] has a contrastive or expressive function almost by definition.

This expressive function of the superlative makes the rate of [t#]-deletion relatively low. Our hypothesis for [t#]-deletion in the superlative would, therefore, be as follows:

Since the superlative has a contrastive or expressive function, it will resist [t#]-deletion.

In our data this hypothesis is confirmed: [t#] in the [st#] suffix of the superlative is deleted significantly less frequently than [t#] in the [st#] ending in other categories (present tense, nominals and past tense; x^2=8.1728, p<0.005, N=7096). This result is obtained despite the fact that, on the whole, the articulatory complexity of the final cluster of the regular superlative (usually 3 or 4 consonants) is greater than in the other categories (usually 2 consonants) and despite the fact that the three irregular superlatives (*meest*, *minst* and *best*) count as nominals,

though within this group they show less [t#]-deletion than average. As we will argue later, though, the past tense on [st#] is subjected to a tendency which favors [t#]-deletion strongly and should be excluded. Testing the hypothesis again without the past tense [st#] cluster, but including the three suppletive superlatives into the group of regular superlatives, we find that the result is not entirely significant (x^2=2.7436 p=<0.10 (almost) N=6727). We guess that without this expressive function the articulatorily complex clusters of the regular superlative would show considerably more [t#]-deletion. The contrastive function of the superlative is also clear from the attitude of several of our informants. Speakers in [t#]-deleting areas (see below) apparently or explicitly do not like these forms. They sometimes deny their existence in the dialect or produce alternative forms with *nog* "still" followed by the comparative.[11]

6.3.1.4. A FLEXION MARKER WITH DIFFERENT FUNCTIONS IN THE PARADIGM

As we have observed in paragraph 6.2 above, we believe that [t#] in 2nd person singular present tense verb forms is less prominent than [t#] in 3rd person singular present tense verb forms, because 2nd person singular present as a morphological category has allomorphs with and without [t#], whereas 3rd person has always [t#].

In the subject verb and the inverted verb subject order 2nd person has:

jij loop(t) versus *loop jij* "you walk" versus "do you walk".

This second person suffix is really a zero suffix, at least synchronically, and not a case of assimilation between [t] and [j] (there are also historical indications for a zero suffix, but evidence is not uniformly one-directional in this case, cf. Goeman 1983: 197).

When a variable sound is a flexion marker with different functions in a paradigm, the flexion marker with the most outspoken function is most prominent. The association between 3rd person and [t#] as a suffix is stronger than the association between 2nd person and [t#] as a suffix. We posit the following hypothesis:

In present tense singular verb forms, [t#] as a 3rd person suffix is more prominent than [t#] as a 2nd person suffix, so the 2nd person suffix is more frequently deleted.

This hypothesis was tested on our data and [t#] as the 2nd person singular present tense marker was found to be deleted more frequently, but the difference is far from significant (x^2=0.7585, 0.50<p<0.70, N=399). We have only compared the verb forms elicited in the paradigmatic condition. If we had included

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[11]   Besides, [t#]-deletion always creates homonyms with a class of adverbs (e.g. *sle*[xts]), which are always disambiguated by the context:
het slechtst   superlative   "worst"
veel/wat/iets slechts adverb   "many/some/a few bad things"

the available 3rd person singular tense forms in non-paradigmatic condition, the result would have been significant. However, comparing 3rd person singular present forms from the two elicitation conditions, we observed that [t#]-deletion was considerably more frequent in the paradigmatic elicitation condition than in the other form. We will show in paragraph 6.4.1 that, in order to show that the difference in the rate of [t#]-deletion between 2nd and 3rd person singular is significant, it is necessary to take into account a dialectal difference we have neglected until now.

We do not believe that any other hypothesis is available to account for the difference between 2nd and 3rd person singular verb forms. Token frequency, for instance would predict the wrong result: both in written language and in spontaneous spoken language, the order is 3rd person is more frequent than 1st person, which in turn is more frequent than 2nd person (cf. Goeman 1983: 187 note 5). Consequently, on the basis of token frequency one might expect [t#] to be deleted more frequently in the 3rd than in the 2nd person. The different behavior of [t#] in the second and third person singular suffix is best accounted for in terms of conceptual prominence.

We conclude this paragraph with an observation of a different nature. In paragraph 6.2.2 we have observed that verb forms elicited in the paradigmatic condition may be influenced by education. Consequently, we expect less [t#]-deletion in these forms than in those elicitated in the non-paradigmatic condition. The fact that forms in the paradigmatic elicitation condition show deletion more frequently than forms in the non-paradigmatic elicitation condition is unexpected if we view the forms in the paradigmatic elicitation condition as a reminder of school.

Apparently, the paradigmatic elicitation condition has not influenced the speakers to the extent of providing answers in the direction of the standard language.

6.3.2. *Articulatory complexity and phonic prominence*

As we have pointed out earlier, phonic prominence and articulatory complexity may neutralize or reinforce each others' effects. The smaller the phonic prominence, or more articulatorily complex, a sound is in its context, the more frequently it will be deleted. For every consonant cluster under discussion we will consider both phonic prominence and articulatory complexity.

6.3.2.1. FOLLOWING SOUND

In terms of phonic prominence we expect [t#] in [Ct#C] to have a smaller perceptual prominence than [t#] in [Ct#V] and again less than [t#] in [Ct#P] (where P=pause). On the one hand, the central consonant in a sequence of three consonants usually will not have much phonic prominence. On the other hand, the phonic prominence of a sound is probably maximal when it is followed by silence or pause. In terms of articulatorily complexity we expect a partially different

order: [VCt#C] is more articulatorily complex than [VCt#P] and again more articulatorily complex than [VCt#V].

The reason for this difference is that a group of three consonants is more articulatorily complex than a group of two. In addition, [VCt#V] will tend to become [VC#tV] on the basis of resyllabification in Dutch, because in Dutch (as in many other languages) a consonant forms one syllable with a following vowel, especially in casual speech, so that the sequence of two consonants tends to be split up into the syllables [VC] and [CV]. Since this does not happen when a sound is followed by silence or a pause, we feel that [Ct] in [VCt#P] is more articulatorily complex than [Ct] in [VC][tV].

On the one hand, in terms of both phonic prominence and articulatory complexity, we expect that [t#] in [Ct#C] will be more frequently deleted than [t#] in [Ct#P] or [Ct#V]. On the other hand, because [Ct#P] has more phonic prominence than [Ct#V], whereas [Ct#P] is more articulatorily complex than [Ct#V], frequency differences between [t#]-deletion in [Ct#P] and [Ct#V] cannot be predicted. Our results confirm that [t#] in [Ct#C], where one of the second consonants is [l], the other [ʋ], is more frequently deleted than [t#] in [Ct#V] ($x2=8.1788$, $0.001<p<0.01$, N=148). With respect to [t#] in [Ct#V] it turns out that [t#] is more frequently deleted than it is in [Ct#P] ($x^2=24.5496$; $p<0.001$ N=6104; [Ct#P] concerns the past participles, the past tense, the present tense 3rd person and the nominals). De Vries et al. (1974: 242) have concluded the same for the Leiden data, and Van Hout (1981: 32) partly the same for the Nijmegen data, since in Nijmegen the following vowel has almost the same effect as pause. Apparently, in our analysis of the data as well as theirs, phonic prominence predominates. It might be supposed that resyllabification in Dutch is less important than we have assumed. A high amount of [t#]-deletion before vowel suggests that [t#]-deletion has become almost obligatory in current speech.

6.3.2.2. PRECEDING SOUND: PLOSIVES AND FRICATIVES

With respect to plosives and fricatives preceding [t#], we feel that the phonic prominence of [t#] in [kt#] and [pt#] will not be different from that of [t#] in [xt#] and [ft#]. As far as their complexity of articulation is concerned, we observe, following Guy's measure of complexity, that the four clusters are all formed with one change in point of articulation, so they are equally complex. Therefore we expect that:

The frequency of [t#]-deletion in [xt#] and [ft#] does not differ from the frequency of [t#]-deletion in [kt#] and [pt#].

We have examined these clusters in the past participle, present tense 3rd person (both paradigmatic and non-paradigmatic elicitation condition), present tense 2nd person, in other words, the categories in which they may be opposed to each other. We have not found any significant difference between the rates of [t#]-deletion after plosives and fricatives.

Table 6: Comparison of, on the one hand, the clusters [ft#] and [xt#], on the other hand [pt#] and [kt#], in the past participle, the 3rd person singular verb form (both paradigmatic and non-paradigmatic elicitation condition) and in 2rd person singular verb forms (non par.= non paradigmatic elicitation form; parad.= paradigmatic elicitation form).

xt+ft versus kt+pt in	x^2	p	N
past participle	x2=0.04653	0.70<p<0.90	928
present 3rd non par.	x2=1.10237	0.10<p<0.30	2096
present 3rd parad.	x2=0.48276	0.30<p<0.50	199
present 2nd	x2=0.06441	0.70<p<0.90	200
all tokens	x2=0.00572	0.90<p<0.95	3423

In table 6 x^2 values are extremely low. When x^2 values are extremely low, it is possible to confirm the null hypothesis (p>0.95), a result which can usually not be obtained for lack of sufficient data, whereas if sufficient data are available the x^2 test tends to become significant rather in the opposite way, by rejecting the null hypothesis. However, here we are very close to confirming the null hypothesis, because p is close to 0.95, especially when all our 3423 tokens are taken together. As a result, we conclude that the rate of [t#]-deletion in [kt#] and [pt#] is virtually the same as in [ft#] and [xt#]. Van Hout has found the same result for his reading list data in Nijmegen. However, de Vries et al. (1974: 243) and Schouten (1980: 290) have found more frequent [t#]-deletion in plosive clusters than for fricatives followed by [t#]. Neu (1980: 49) has done the same for English. There is a difference, though, between their results and ours. The results of Van Hout, De Vries et al., Schouten and Neu concern not only [xt#], [kt#] etc., but also [st#]. We believe their analysis not correct on this point, since the corresponding cluster [tt#] (or [t:#]) does not occur (see note 1 above). By including [st#] in their data, the rate of [t#]-deletion of the fricatives may have been lowered in Dutch (except in the Nijmegen case) and increased in English.[12]

  For this reason we have made a distinction between [st#] and the other fricatives followed by [t#], as Guy (1980: 10) has done for English.

6.3.2.3. PRECEDING SOUND: DENTAL AND NON-DENTAL CLUSTERS

Here we will compare the non-dental clusters with the dental cluster [st#]. This is a valid way of proceeding, especially in the light of the result presented in paragraph 6.4.2 above. Two opposite tendencies are apparent in our data. Since [t#] in the dental cluster [st#] has a smaller phonic prominence than [t#] in the non-dental clusters ([ft#,xt#,pt#,kt#]), [t#] in [st#] may be more frequently deleted (cf. Guy 1980: 10). On the other hand, since no changes in place of articulation are necessary in order to produce [st#], as opposed to [xt#,ft#,pt#,kt#], [t#] in

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[12]   In Limburgian Rimburg there is significantly more t-deletion after fricatives than after plosives (cfr. Hinskens 1992: section 6.3.14 and 9.2.9).

these latter clusters may be more frequently deleted than [t#] in [st#]. From our findings that [t#] in [st#] has less phonic prominence than [t#] in [ft#,xt#,pt#,kt#] and [ft#,xt#,pt#,kt#] is more articulatorily complex than [st#], it follows that these two processes tend to neutralize each other. Neu (1980: 50-51) and Guy (1980: 10) have found that in English [t#]-deletion is more frequent in [st#] than in the other relevant clusters. In our own data, though, [t#] in the non-dental clusters is deleted more frequently than [t#] in [st#] (x^2=10.6968; p=0.001 (almost); N=6054). We have tested this in the past participles, the present 3rd person verb forms (non-paradigmatic elicitation condition), the past tense and the nominals. The difference would have been greater if we had included the other present tense verb forms and the regular superlative. Apparently, articulatorily complexity is more important in Dutch than phonic prominence, while the reverse is true for English. This result is remarkable. [s] in [st#] in Dutch does not behave in the same manner as [s] in [st#] in English. We wonder whether the result is an artifact of our data. It would be interesting to know whether a reanalysis of the data used by of Schouten and De Vries et al. would confirm our results. We will return to this problem in paragraph 6.3.2.4.2 below.[13]

6.3.2.4. REGULAR SUPERLATIVE

In paragraph 6.3.1.3 we have shown that in regular superlatives as a group [t#] in [st#] is deleted less frequently than in other categories in which [st#] occurs while, at the same time, the articulatory complexity of the regular superlatives is greater, and that this effect is due to the inherent expressivity of the superlatives. Below we discuss results found *within* the category of the regular superlative.

6.3.2.4.1. Plosives and fricatives

For the regular superlative we have examined the nature of the sounds preceding the superlative suffix [st#]. Following the same reasoning as in paragraph 6.3.2.2, we expected that the phonic prominence of [t#] in [kst#] and [pst#] is equal to that of [t#] in [xst#] and [fst#]. The clusters are produced with the same number of articulatory movements (cf Guy 1980: 9), so we also expected these groups to be equally articulatorily complex. Consequently, we expect that the frequency of [t#]-deletion in [xst#] and [fst#] does not differ from that in [kst#] and [pst#]. This hypothesis might be confirmed by our data (cf. paragraph 6.3.2.2 above), because again the results tend towards a confirmation of the null hypothesis (x^2=0.2753; 0.50<p<0.70; N=393).

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[13]   We checked this point in the data of Schouten 1984. We found that, as in our data, in present tense verb forms [t#] deleted less frequently in [st#] than in the other obstruent clusters, but not his nominals. Schoutens nominals deleted [t#] in [st#] more frequently than [t#] in the other obstruent clusters, whereas in his past participles the degree of [t#]-deletion was almost the same in the two types of clusters. As has been observed earlier, the data of Schouten concern informal speech. We thank Bert Schouten to have made available his data for us.

We assume that with about 10 times more tokens than the 393 tokens we have used, the null hypothesis would have been close to confirmation.

If [tst#] had been included among the plosives, we would have found that in fricative clusters [t#] is deleted more frequently than in clusters beginning with a plosive (x^2=5.0506 0.02<p<0.05 N=1046). This would have been incorrect for the same reason as mentioned in 3.2.2 above.

6.3.2.4.2. Dental and non-dental clusters

[t#] in [tst#] has a smaller phonic prominence than [t#] in [fst#,xst#,pst#,kst#], so [t#] in [tst#] will be deleted more frequently. [t#] in the sequences [fst#,xst#,pst#,kst#] is more difficult to produce than in the sequence [tst#], so [t#] in [tst#] will be more frequently deleted. From the finding that [t#] in [tst#] has less phonic prominence than [t#] in [fst#,xst#,pst#,kst#] and [t#] in [fst#,xst#,pst#,kst#] is more articulatorily complex than [t#] in [tst#] it follows that the total result is unpredictable. In our data we have found that [t#] in [tst#] is deleted more frequently than [t#] in the other, non-dental, clusters (x^2=8.2742; 0.001<p<0.01; N=1046). In contrast to what we have described earlier, phonic prominence seems to dominate articulatory complexity in this case. This may lead to the conclusion that in relatively short final consonant clusters, as in paragraph 6.3.2.3 above, articulatory complexity is the more important factor while in relatively long consonant clusters phonic prominence is more important, at least as far as the final consonant is concerned.

There is a tendency in these long consonant clusters to reduce more than only the final consonant. We have already shown in paragraph 6.1 that *sle*[xtst] tends to be reduced to *sle*[xs(t)]. The same process takes place in the superlative of *laat* "late" yielding *laa*[s(t)] or *les*(t). The reduction applies to the sounds with the same articulatory location, giving rise to the question whether a group of three dentals is perceptually too long in Dutch, and whether a cluster of two alveolars or dentals is already perceptually too long in English.

In the regular superlative [st#] may be preceded by other sounds than plosives and fricatives, so that the role of the dental sound may be checked in [+son] consonants. Our data confirm once again that [t#] in dental cluster is more frequently deleted than [t#] in non-dental cluster, although the result is not significant (x^2=2.2414; 0.10<p<0.30; N=1012). We are uncertain whether this finding justifies the claim that phonic prominence is more important than articulatory complexity.

When we consider the articulation of these [+son] dentals, we see that they may all be realized as vowels and in fact they often are. When the consonant preceding [st#] is [r], it may either not be articulated or it may be realized as a uvular [ʀ, ʁ] or a semivowel [ə]. When the consonant preceding [st#] is [l], it may be produced as a velarized sound [ɫ] or even as a vowel. When [st#] is preceded by [n], this [n] may be realised as nasality on the preceding vowel: [də̃st] instead of [dənst]. Non-dentals are always realized as consonants, although the articulatory complexity of the cluster in *armst* should not be exaggerated, because

this form is usually realized in the dialects with an epenthetic vowel preceding the [m]: for instance [ɑrəmst].

The pattern of [t#]-deletion in the regular superlative differs from that in other morphological categories. Although plosive and fricative non-dentals whether in [Cst#] or in [Ct#] probably exhibit the same behavior with respect to each other, the dental fricative [s] in [st#] does not favor [t#]-deletion, while the dental plosive [t] in [tst#] does, and the same possibly holds with respect to the sonorants [l,n,r] in [lst#,nst#,rst#].

6.3.2.4.3. Sonorants and non-sonorants

In the regular superlative it is possible to trace the influence of sonorants and non-sonorants on [t#]-deletion. We assume that [t#] in a [-son][st#] cluster has less phonic prominence than [t#] in a [+son][st#] cluster, so that [t#] in [-son][st#] will be deleted more frequently. We also assume that the articulatory complexity of the [-son][st#] cluster is considerably greater than that of the [+son][st#] cluster, the more since the [+son] consonant is often realized as a vowel (see above paragraph 6.3.2.4.2) This implies that [t#] in the [-son] [st#] cluster will be deleted more frequently than [t#] in the [+son][st#] cluster. Both phonic prominence and, especially, articulatory complexity suggest the same results, so we expect that [t#] in [-son][st#] will be deleted more frequently than [t#] in [+son][st#].

We find this hypothesis confirmed convincingly (x^2=17.5445; p<0.001; N=2058).

6.3.2.5. Two unexplained cases: labials and velars before pause

In our results we have found two tendencies for which we cannot account in a satisfactory way. Still, we mention them here, because others may find an explanation for them or may prove them to be artefacts. In the first place, [t#]-deletion in [pt#] is always rather high, as compared with [xt#] and [kt#] (x^2=8.4361 0.001<p<0.01 N=2601). In the second place, [t#]-deletion in [pt#] and [ft#] is always rather high as compared with [xt#] and [kt#] in the present tense and in the nouns (x^2=13.3587 p<0.001 N=3423). It may be the case that it is easier to use the tongue as an articulator than the lips in these clusters, at least that would follow from the claim that a consonant-cluster produced by the tongue is more easily produced than a consonant-cluster produced by tongue and lips.

6.3.3. *Token frequency*

The role of token frequency has not been examined before in connection with [t#]-deletion. If it does play a part, we may expect that the more frequent a type occurs as a token, the more frequently it will show final [t#]-deletion. Our results are presented in table 7. These results were reached by testing the relationship between [t#]-deletion in 136 word forms (tokens of word forms from present

tense verbs, the past tense verbs, the past participles and the nominals) and their token frequency in two corpora of spoken language data. (Uit den Boogaart (1975) and De Jong (1979)). In accordance with the status of the speakers in our data base, only the token frequency of word forms in the subcorpora with speakers of low social status were counted. The two bodies of data are almost equal in size: De Jong contains 60,000 tokens from Amsterdam (a city dialect), while Uit den Bogaart contains data from more or less rural dialects from North and South Holland amounting to 55,725 tokens.[14]

As was to be expected with respect to the two corpora, Spearman Rank Correlation Coefficient did show significant results. This means that in all cases, even for all 136 word forms together, token frequency is substantially the same for the two corpora (see table 7abc).
   If we look at the relationship between [t#]-deletion and rank according to token frequency (table 7a), we see that there does exist a relationship between the rank orders, according to Kendall's W. But this is an effect due to the high correlation between the two corpora as regards token frequency. For all items there seems to exist a relationship between [t#]-deletion and token frequency and corpus UitdB. But the rs is very low, 0.17, so the relationship, although significantly different from 0 does not exist or is not monotonic.
   As we have already indicated, a positive relationship was found between token frequency and the rate of [t#]-deletion in the present tense (table 7b) and past tense verbs (table 7c; 61 word forms). Further analysis showed that this result specifically concerned the verbs ending in the clusters [st#] and [xt#] (32 word forms, which are presented separately in table 8).

For present tense, Kendall's W was significant for verbs ending in [st#]+[xt#]. This effect is also partly due to the high correlation as regards token frequency between the two corpora. Comparing rank on [t#]-deletion and rank on token frequency in the two corpora separately gives significant results only for verbs ending in [st#]+ [xt#] (see table 7b).
   For past tense ending in [st#]+[xt#], Kendall's W was also significant (see table 7c), the effect coming mainly from the correlation between the two corpora, and the correlation between [t#]-deletion and token frequency according to UitdB.

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[14]   The hypothesis was tested by means of the Kendall Coefficient of Concordance W which measures the relationship between several rankings of a number of objects, in this case three rankings: one ranking of word forms on rate of deletion and two rankings of these word forms on token frequency. Spearmans Rank Correlation Coefficient was used between every pair of rankings to test for agreement and to get a clear picture of the role of every pair in the overall concordance. These measures tell something about the nature of the relation found: if it does exist, it has to be a monotonic increasing or decreasing relationship; the relationship is not necessarily linear, but linearity is included among other possibilities. Small absolute values of rs (rs ranges between $-1 \leq rs \leq 1$) indicate that the two rankings are either not related at all, or do not show a monotonic relationship (Hays 1973: 788). Kendall's W ($0 \leq W \leq 1$) shows a linear relationship with the average rs of the pairs of rankings under consideration.

Table 7: Correlation between rate of [t#]-deletion and two scores on token frequency: Uit den Boogaart (1975) and De Jong (1979) (a) for all 136 types in our data; (b) for 3rd person singular present tense verbs; (c) for 3rd person singular irregular past verbs; (d) for [pt#] [kt#] [ft#] in 3rd person singular present and [st#] [xt#] in 3rd person singular past and present, and the two corpora combined. In (a), (b) and (c) the correlation between the token frequency in the two corpora is also given.

	rs	W	N	t	x^2	df	sign.
(a)							
deletion-DeJong	-0.033		136	-0.38		134	ns
deletion-UitdB	0.17		136	1.996		134	p<0.025
DeJong-UitdB	0.62		136	9.15		134	p<0.0005
deletion-DeJ-U		0.5	136		202.5	135	p<0.005
(b)							
deletion-DeJong							
pt	-0.234		9	table			ns
kt	-0.396		13	1.430		11	ns
ft	0.379		13	1.358		11	ns
st+xt	0.629		24	3.795		22	p<~0.0005
deletion-UitdB							
pt	-0.378		9	table			ns
kt	-0.146		13	0.489		11	ns
ft	0.320		13	1.120		11	ns
st+xt	0.508		24	2.766		22	p<0.01
DeJong-UitdB							
pt	0.924		9	table			p<0.01
kt	0.501		13	1.92		11	p<0.05
ft	0.796		13	4.361		11	p<0.005
st+xt	0.626		24	3.765		22	p<0.005
del-DeJ-UitdB							
pt		0.405	9		9.72	8	ns
kt		0.324	13		11.664	12	ns
ft		0.665	13		23.94	12	p<0.02
st+xt		0.725	24		50.02	23	p<0.001
(c)							
deletion-DeJong	0.571		8	table			ns
deletion-UitdB	0.736		8	table			p<0.05
DeJong-UitdB	0.912		8	table			p<0.01
del-DeJ-UitdB		0.826	8	17.346		7	p<0.02
(d)							
3rd person singular present							
pt+kt+ft	0.22		29	1.172		27	ns
3rd person singular pres + past							
st+xt	0.759		32	6.385		30	p<0.0005

Table 8: Token frequency in two corpora and percentage of [t#]-deletion in past tense and present tense on [st#] and [xt#]. Jong = De Jong 1979, subcorpus L(ow), number of tokens 60,000. UitdB=Uit den Boogaart (1975), subcorpus S2 (low classes), number of tokens 55,725. Since the number of tokens in the two corpora is almost equal, the results are summarized in the last column.

Present and Past tense forms: [xt] and [st] final clusters				
	% del	Jong	UitdB	Total
mocht	56	10	18	28
moest	42	45	160	205
wist	34	11	22	32
bracht	32	0	5	5
krijgt	30	20	3	23
dacht	29	76	36	112
zegt	27	127	122	249
zocht	24	0	1	1
kocht	19	0	2	2
legt	19	14	5	19
ligt	18	16	2	18
leest	18	0	0	0
buigt	17	0	0	0
vliegt	16	0	2	2
vraagt	16	0	0	0
weegt	16	1	0	1
blaast	16	0	0	0
vriest	15	0	0	0
jaagt	15	0	0	0
kiest	14	1	0	1
wast	14	0	2	2
vocht	13	0	0	0
lacht	13	0	0	0
dreigt	12	0	0	0
zwijgt	12	0	0	0
draagt	11	0	0	0
vecht	11	0	0	0
zucht	11	0	0	0
dorst	10	0	0	0
danst	9	0	0	0
spuugt	8	0	1	1
barst	3	0	0	0

The correlation between [t#]-deletion and token frequency according to DeJong is not significant. Apparently, the corpus UitdB is more concordant with our data base of rural dialect speakers mostly, at least in this respect (see also the minimal relationship with respect to all 136 items). This was to be expected since the corpus UitdB has partly been collected in the area under investigation, the corpus DeJong has not (see note 6 above).

As a result we conclude that for verbs ending in [st#] or [xt#], token frequency and amount of [t#]-deletion show a positively increasing relationship.

Strange as this result may seem at first sight, present tense verbs ending in [st#] or [xt#] have the same structure as the irregular suppletive verbs of which the consonant preceding [t#] is [s] or [x]. Mo[xt], moe[st], wi[st], da[xt] are the forms with the highest amount of [t#]-deletion and, at the same time, they have the highest token frequency.

If we consider the irregular past tenses *as such* (see table 7c), there is a significant correlation between token frequency and amount of [t#]-deletion for *mo*[xt], *moe*[st], *wi*[st], *bra*[xt], *da*[xt], *zo*[xt], *ko*[xt] en *vo*[xt] at least with respect to the corpus Uit den Boogaart.

If we take the irregular past tenses *together* with the 3rd person present verb forms with stem ending in [s] or [x] as in table 7d, they behave as a group. Since the correlations between the two bodies of data were high and significant, we have combined the token frequencies for De Jong and Uit den Boogaart. However, if we combine also the two corpora for 3rd present tense forms whose stems ends in [p], [t] or [k], the relationship between [t#]-deletion and token frequency remains not significant as it was: compare table 7d with table 7b. These results justify the conclusion that with respect to rank on a scale of [t#]-deletion and rank of token frequency, irregular past tenses and 3rd person singular present on [xt#] and [st#], but not on [pt#], [kt#], [ft#], form one scale. The behaviour of dialect speakers with respect to past tense and present tense verb forms on [st#] and [xt#] is highly remarkable and a strong case for the relevance of the approach of Man'czak.

Frequency has two aspects, type frequency and token frequency. It can be shown that the high rate of [t#]-deletion in the past and present tenses in our data has nothing to do with type frequency. Type frequency of [st#] and [xt#] is not extremely high or low in present and past tenses as can easily be checked. The most frequent final clusters occurring in Dutch are in fact [st#] and [kt#], as appears from diagram 2, in which type frequency in general, as calculated in Bakker (1971 tables 203-205), is made comparable to the token frequency of our past and present verb forms.

With respect to type frequency [st#] and [kt#] are singled out as more frequent types than [xt#], [pt#] and [ft#] are. However, as soon as we consider the token frequency of the clusters in our present and past verb forms, according to Uit den Boogaart (1975) and De Jong (1979), we observe a sharp distinction between [st#] and [xt#] on the one hand and [ft#], [pt#], [kt#] on the other.

Considering the token frequency in all our categories, we have observed that the only possible link between morphological categories and token frequency occurs in the combined past and present verb forms on [st#] and [xt#]. Elsewhere, isolated forms may be frequent, such as the participle *gemaakt* (40) and the adjective *echt* (134). This adjective is expressive in nature and rarely shows deletion, as is the case with superlatives. Apparently, [t#]-deletion in the past and present tenses is more or less a morphological process. Diachronically, their token frequency made this past tense an irregular group in Dutch.

Diagram 2: Left: type frequency of the word-final clusters [xt, st, tt, kt, pt] in
            Dutch monosyllables. (Source Bakker 1971). Right: token frequency
            (sources De Jong 1979 and Uit den Bogaart 1975) of irregular past
            tenses and 3rd person singular tense forms as it occurs in our own
            data.
            Left: | | | | and | | | represent CV-patterns of type VCC# and V(C)CCC#
            respectively. Right: | | | | and | | | concern the corpus Uit den Bogaart
            and the corpus De Jong respectively. The high token frequency comes
            from the first 6 to 8 verbs in table 8 above.
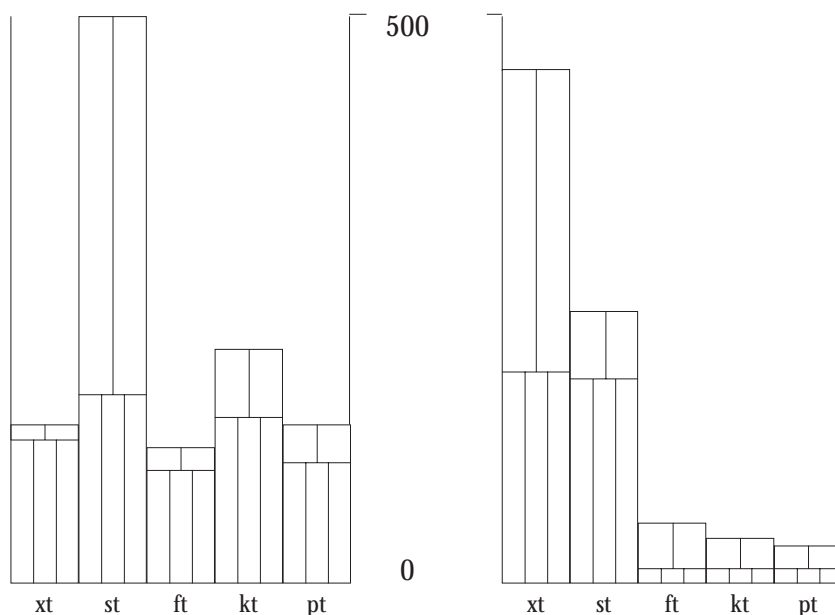
As a consequence of this behavior even the less frequent form *bracht* tends to
show deletion of [t#]. The present tense verbs also seem to conform nicely,
particularly because several of the relevant forms happen to have a high token
frequency.
     The question remains why a significant rank correlation has only been found
for verb forms on [st#] and [xt#]. We cannot argue that verb forms on the whole
may be associated less with their paradigm than nominals and past participles,
since this line of reasoning would apply to other verb forms than those on [st#]
and [xt#] as well. Consequently, we have no explanation to offer.

6.4. **Geographical aspects**

Until now we have considered the problem of [t#]-deletion without taking into account its spatial distribution. In this paragraph we will focus on this aspect. Map 1 shows the localities of which the dialects have been examined and provides a legend. Maps 2 through 9 are point symbol maps. They show the geographical distribution of [t#]-deletion as a percentage of the possible [t#]-deletions per dialect. The order of these point symbol maps follows the order in diagram 1 above from bottom to top. The map with percent deletion in the regular superlative (map 2) comes first, followed by those showing deletion in the other morphological categories (map 3 nominals, map 4 past participles, map 5 3rd singular present tense, map 6 the 2nd and 3rd singular present tense verbs together, which were elicited in the paradigmatic condition, map 7 irregular past tense singular and map 8 deletion in clause-internal word forms). These clause-internal word forms end in *fricative+t*, while the *following word begins with a consonant*. We also present a map (map 9) with the proportional difference between 2nd and 3rd person singular in the amount of [t#]-deletion in paradigm elicitation condition. The overall pattern is that of a concentration of of [t#]-deletion in the River area, more specifically in the region called the Betuwe between the rivers Waal, Rijn and Lek.

We know from Schouten (1982 and 1984) that our [t#]-deletion area extends to the region between Utrecht and the rivers Rijn and Lek south of the city. De Vries et al. (1974) mention Leiden as a city in South Holland where [t#] is frequently deleted. According to Schatz (1983) [t#] is not deleted, or nearly not, in Amsterdam. It follows from the table in Van Hout (1981: 24) that there is 6% [t#]-deletion for Nijmegen, while we have found no deletion. Older studies (Van Veen 1964) described the geographical spread of [t#]-deletion as comprising the Betuwe, the southern part of the province of Utrecht (not yet included in our study) and the cities in the province of South Holland. The rural areas in South Holland do not show [t#]-deletion. The older literature mainly concerns nouns, so our findings of [t#]-deletion in other morphological categories than nouns do not contradict the literature.

On the whole, the geographical spread confirms the conclusions we have reached in the previous paragraphs: in nearly every locality the percentage of deletion increases in the order of the morphological categories given in diagram 1 above.

The informant for the little town of Kuilenburg refused to give regular superlatives, because they sounded awful to him. The same occurred in Zetten, where the informant produced the superlative perfectly, but preferred periphrasis in all cases. It was precisely in this area - with the highest overall percentage of [t#]-deletion - that elicitation of regular superlative forms was often rather difficult. Speakers in the area may be reluctant to use these forms just because the process of [t#]-deletion is almost obligatory here. However, in Tiel, as well as Herewaarden and Grave, [t#]-deletion occurs more frequently with regular superlative than in other nominal categories.

Past participles - essentially a kind of nominals - behave with respect to t-deletion like the other nominal categories we labelled nominals (see maps 4 and 3 respectively). There is a certain tendency to delete [t#] in nominals in the province of South Holland, which is absent in the case of the past participles. In the Utrecht and Betuwe areas, there is a tendency to delete [t#] more frequently in past participles as compared to the other nominals. Exceptions to this tendency are the localities Buurmalsen, Dodewaard-Wely and Lent.

In present tense verb forms [t#]-deletion occurs considerably more frequently than in nominals. This tendency occurs across the whole area.

Deletion is more frequent in South Holland in the categories of present tense and irregular past tense than in nominals and past participles, while in a few localities it is even more frequent when the elicitation condition is paradigmatic. Druten, Herewaarden, Ooien and Grave, all in the River area (the Betuwe) but just outside the real [t#]-deleting area, show a contrary tendency with respect to the paradigmatic elicitation condition. Within the River area the localities Deil, Buurmalsen and Lent show less [t#]-deletion in verb forms than in nominals, but in the paradigmatic elicitation condition [t#]-deletion is more frequent, yielding the same tendency as the localities in South Holland (cf. maps 5 and 6).

The category of irregular past tense shows the highest percentage of deletion of all morphological categories. A remarkable exception is the locality of Kamerik. Ameide and Heikop show more frequent deletion here than with respect to the 3rd person singular present tense, but less frequent deletion than in the paradigm elicitation condition. The same applies mutatis mutandis also to Scheveningen, to the second informant for Zoetermeer, to De Lier and to Hellevoetsluis (map 7).

The point symbol map 8 gives an idea of the influence of the following consonant on [t#]-deletion. The map must be considered very cautiously, because per locality the number of cases is only two. In this condition the central area for the deletion process is again the East.

The preceding observations confirm and supplement our earlier findings. In the following we will discuss, separately, three aspects which ask for a more thorough discussion. In paragraph 6.4.1 the behavior of [t#] as a suffix of 2nd and 3rd person singular verbal forms. In paragraph 6.4.2 regional differences as opposed to local differences in terms of linear regression analysis. Finally, in paragraph 6.4.3 [t#]-deletion will be considered from a more historical perspective.

6.4.1. *Second and third person singular verb forms*

As we have found in paragraph 6.3.1.4 above, second person singular present tense verb forms show more [t#]-deletion than third person singular tense verb forms, but the difference is far from significant. Here we will show that, when we take into account a dialect difference neglected until now, the difference in amount of [t#]-deletion between 2nd and 3rd person is significant. In paragraph 6.2.1 we distinguished two orders:

UNMARKED ORDER: SUBJECT-VERB		INVERTED ORDER: VERB-SUBJECT	
hij klop(t)	"he knocks"	klop(t) hij	"does he knock?"
jij klop(t)	"you knock"	klop jij	"do you knock?"

We hypothesized that morphological alternants within one personal form of the same tense are more related to each other than 2nd person forms are to 3rd personal forms of the same tense and that, consequently, the existence of this zero allomorph favors [t#]-deletion in the 2nd person singular (unmarked subject verb order). However, in the south-eastern part of the area under consideration, a different system is used. This brabantic-flemish system uses a *resumptive* pronoun after a clitic in inverted position. The first pronoun is the clitic /e/, the second the full pronoun /gij/:

/kloptegij/ "do you you knock"
/hoordegij/ "do you you hear",

The [t] and [d] between the verb stem and the resumptive pronoun /e/ are in fact the suffix [t#] of the 2nd person singular, in spite of the inverted order. Consequently, in this region there is no difference between the two orders of the 2nd person singular verb forms. On map 9 we have indicated the northern limit of the region with this /t-e-gij/ system according to Weijnen (1966, general map). Having introduced the distinction between the two regions we phrase our hypothesis as: in the region with the zero suffix in the inverted verb subject order there is more [t#]-deletion in the uninverted subject verb order than in the 3rd person singular forms. Conversely, in the region with the suffix [t#] in the inverted verb subject order, there will not be a higher rate of [t#]-deletion in the 2nd person singular than in the 3rd person singular. Our hypothesis is tested for the region with the zero suffix by means of the sign test. The null-hypothesis is: the median of the differences is 0. That is, there are as many localities with more [t#]-deletion in the 2nd person singular present as there are localities with more or the same amount of [t#]-deletion in the 3rd person singular present. The alternative hypothesis is: the median of the differences is positive. This means that there are more localities with [t#]-deletion in the 2nd person singular present than in the 3rd person singular present. We expect that the null-hypothesis cannot be rejected for the "brabantic-flemish area", but must be rejected for the regions outside this area where the suffix in the inverted verb subject order is zero. The alternative hypothesis predicts the direction of the differences.[15]

For each locality the scores of [t#]-deletion for the 2nd and 3rd person singular present were compared.[16] For the areas in which the zero suffix occurs in the

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[15] Since the direction of the difference is predicted for the region in which the null-hypothesis should be rejected, the test is one tailed.

[16] Possible fluctuations due to chance by low raw values per locality may reverse orders, so that ordered metric strength (cf. Siegel 1956, 76 note 1) may not be reliable. For this reason we preferred the sign test over the Wilcoxon matched pairs sign test. Under the stronger assump-

inverted verb subject order, we are justified to reject the null-hypothesis in favor of the alternative hypothesis (the number of localities in which a difference occurs N=10, the number of localities in which the difference is reversed x=1; the binomial distribution gives the probability p=0.011 for the null-hypothesis, which means that p>~alpha=0.01 and p<alpha=0.05. Since p is less than alpha=0.05). We conclude that in the zero suffix area [t#] is deleted significantly more frequently in the 2nd than in the 3rd person singular present tense.

For the 16 localities in the area where the suffix is present in the inverted verb subject order, we expect that the null hypothesis cannot be rejected because there is no zero alternant for the 2nd person suffix. Testing this hypothesis is not possible, though, because the number of localities N=3 and x=1 and this is well below the lowest range of the significance tables for observed values of x in the binomial test (Siegel 1956, table D). We feel that the null-hypothesis cannot be rejected, but we can only be more certain, if we consider the data in both areas in terms of localities, as in table 9. The table shows that the differences in proportions are strictly inverted (in parentheses raw frequencies).

Table 9: Proportional differences in two regions between [t#]-deletion in the 2nd person and the 3rd person singular.

region with	[t#]-deletion in the 2nd person > in the 3rd person		[t#]-deletion in the 2nd person in the 3rd person			N
zero suffix /t-e-gij/ system	0.25 0.125	(9) (2)	0.75 0.875	(27) (14)	1.00 1.00	(36) (16)
Difference	0.125		-0.125			

Proportional (or percentual) differences in 2x2 tables can be seen as a regression coefficient between two dichotomous variables, in this case regions. Changing from one region to the other is a unit change in the independent variable. This unit change causes a 0.125 change in the first column (Reynolds 1977, 20). Thus, going from the region with zero suffix to the region with the /t-e-gij/ system results in a lower proportion of cases where in the 2nd person singular more [t#] is deleted than in 3rd person singular. Correspondingly, passing from the region with /t-e-gij/ system to the region with the zero suffix results in a negative proportional difference, meaning that in the region with the /t-e-gij/ system there are proportionally more cases in which [t#]-deletion in 2nd person singular is less frequent than, or equally frequent as, [t#]-deletion in the 3rd

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tions for this last test the null-hypothesis must also be rejected: N=10, T=4, E(T)=27.5, sigmaT=9.81, z=(T-E(T)): sigmaT=-2.395 one sided for this z, p=0.0084 and this is less than alpha=0.01. Therefore we accept the alternative hypothesis: more [t#]-deletion in the 2nd person than in the 3rd person.

person. We may conclude that in the region with the /t-e-gij/ suffix there is less [t#]-deletion in the 2nd than in the 3rd person singular present forms. Consequently, the zero suffix in the 2nd person singular present tense verb forms promotes [t#]-deletion in the uninverted subject verb order.

6.4.2. *Regional and local factors*

Besides the regional difference in [t#]-deletion of the 2nd person singular, there are other clear regional differences. We want to be sure that the results found for the whole area remain valid for a more restricted and homogeneous area. This will be the subject of paragraph 6.4.2.1. In addition, we want to distinguish regional from local trends in the whole area by means of linear regression analysis in paragraph 6.4.2.2.

6.4.2.1. AREAS WITH HIGH AND AREAS WITH LOW [T#]-DELETION RATES

Considering localities with a deletion rate of 6% and over, yields a relatively compact region, situated in the River area, Koudekerk (9%) being the only exception. The localities are Ingen, Dodewaard-Wely, Heteren, Buurmalsen, Lent, Deil, Druten, Kuilenburg, Tiel, Zetten, Renkum, Kamerik, Ameide, Achterberg, Kedichem, Heikop and Noordeloos.

These 17 localities could distort the results, because the other 35 (except one) show rates below 6%. However, the results we have obtained in the non-geographic part of our study remain valid when we confine ourselves to this area with a high rate of [t#]-deletion. See the results in table 10 for significance of morphological factors in high rate t-deletion localities and in table 11 significance of preceding consonant within different morphological contexts in high rate t-deletion localities and lower rate t-deletion localities. Table 10: no effect of suffix-satus nor of disambiguating information elsewhere in the word; high deletion rates in irregular past, and similarity of participles and nominals. As to preceding consonant we find a significant effect in high rate deletion localities for [x] versus [f] in participles and in 2nd and 3rd person present tense in paradigm condition.

Table 10: Deletion of [t#] in morphological categories in 17 localities with a high
rate of [t#]-deletion

[t#]-deletion	N	x^2	df	p	odds ratio alpha^
(1)	2004	0.83	1	>0.50	
(2)	1877	0.00	1	>0.95	
(3)	2004	12.51	1	<0.001 *	
(4)	2004	57.32	1	<0.001 *	4.07 &
(5)	451	41.65	1	<0.001 *	4.12 &
(6)	975	2.62	1	>0.10	

(1) as a suffix versus non-suffix;
(2) accompanied by other disambiguating information in the word
    (irregular pas tense not included);
(3) idem but irregular past tense included;
(4) in the irregular past tense versus the nominals;
(5) in the irregular past tense versus the participles;
(6) in participles versus nominals;
* = significant; & = not independent (independence = 1).

6.4.2.2. STRICTLY LOCAL CHARACTERISTICS AND OVERALL TREND

In order to separate specific *local* characteristics more clearly from the general
regional trend, we calculated the linear trend surface, with percentage of [t#]-
deletion over all categories as the dependent variable (except for regular superla-
tives, verbs in paradigmatic elicitation condition and forms embedded in clauses).[17]
The geographic coordinates north-south and west-east according to the basic
map of Grootaers and Kloeke were taken as the independent variables.

   Many statisticians consider linear regression, the most restrictive model, as
rather robust when some of its assumptions are violated; and since we are inter-
ested here in a separation of regional and local tendencies, and in an indication of
the relative importance of the geographic factor, the choice of the most restrictive
model has much to recommend itself. Non linear surfaces of a higher order will
certainly result in better fittings, but are less restricted. The residuals from the
linear trend, in this case deviations from the fitted plane, are seen as consisting of

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[17] Linear trend fitting is a regression and correlation analysis. Regression and correlation analysis
      are methods which, according to Goebl (1982: 789), have not been used until now in quantita-
      tive geographic dialectology.
      Linear trend fitting was chosen while higher order quadratic or cubic surfaces generally do not
      improve much in the explanation of geographically determined variances and while residuals
      from linear surfaces may show more clearly the strictly local phenomena than a higher order
      trend surface may do (Haggett 1970: 274). In Goeman (1987a, here in chapter 4) the conse-
      quences of departures from linearity for our data are traced, as well as the results of violating the
      assumption that the variances remain constant ("homoscedasticity"). In fact the variances do
      not remain constant, they tend to increase from West to East. Therefore no significance tests
      on the coefficients were carried out.

Table 11: [t#]-deletion: influence of preceding consonant in different morpho-
logical categories

[t#]-deletion	odds ratio N	x²	df	p	alpha^
(1)	651	5.35	2	>0.05, <0.10	s/x 0.61 s/f 0.91
(2)	127	0.23	1	>0.50	s/x 1.35
(3)	231	6.26	2	>0.02, <0.05 *	s/f 1.49 x/f 2.30 &
(4)	324	8.85	4	>0.05, <0.10	s/p 0.49 x/p 0.76 f/p 0.14 ! k/p 0.18 !
(5)	591	5.59	2	>0.05, <0.10	s/f 0.70 x/f 0.64
(6)	902	7.40	4	>0.10, <0.20	s/p 0.03 ! x/p 0.78 f/p 0.21 ! k/p 0.75
(7)	64,5				p/x 2.10 f/x 4.80 & k/x 1.84
(8)	61,5				p/x 1.30 f/x 2.24 & k/x 1.60
(9)	135				p/x 0.94 f/x 0.70 k/x 0.47
(10)	136				p/x 2.06 f/x 1.55 k/x 1.03

A. 17 localities with a high rate of [t#]-deletion:
    (1) nominals, s versus x versus f;
    (2) irregular past, s versus x;
    (3) participles, s versus x versus f;
    (4) participles, s versus x versus f versus k versus p;
    (5) present tense, s versus x versus f;
    (6) present tense, s versus x versus f versus k, versus p;
    (7) 2nd person present tense paradigm, p versus f versus k versus x;
    (8) 3rd person present tense paradigm, p versus f versus k versus x;
B. The other 35 localities:
    (9) 2nd person present tense paradigm, rest of localities, p versus f versus k versus x;
    (10)3rd person present tense paradigm, rest of localities, p versus f versus k versus x.
* = significant; & = not independent (independence = 1); ! = inversely dependent.

an error component *and* of a strictly local component for a certain locality not explained by the general regional trend. As far as these residuals - which are either positive or negative - are local components, they must be caused by other variables which are not known or not included in the analysis.

Such variables may be (a) language internal, like the phonological and morpological categories tested in paragraph 6.3 above and (b) language external, like aspects of geography which are not taken care of by simple geographic location: changes in communication patterns and in the environment over time.

Map 10 gives the general trend for the whole region: predicted percentage of [t#]-deletion in distances of 10 percent. The local component is represented on map 11. Localities with positive residuals from the regional trend are situated in the Betuwe in the East, between the rivers Rhine and Waal. The result for the southern border of the [t#]-deletion area is in keeping with Van Hout (1980), who has found an equally sharp border along the river Waal. For the region around Kuilenburg we predict on the basis of the trend surface analysis that the area extends into the province of Utrecht to the North, which is confirmed by the findings of Schouten (1982 and 1984).

We will discuss here neither the language internal factors constituting the positive residuals in the River area, which were already discussed in paragraph 6.4.2.1. nor the positive residuals in the western part of the region, along the coast, since they are caused by the predicted negative values in that region: these residuals have no meaning but are an artefact of the method used.

With respect to the language external factor we conclude that the most important geographic dimension is the axis west-east. The high residuals in the Betuwe area must come from other than geographic factors which are particular for that region. We shall elaborate on these in a more speculative way in the following paragraph.[18]

6.4.3. *Language external regional and historical factors*

In this paragraph we present some observations about origins of [t#]-deletion in Dutch, and about its increase and its decrease. The observations we present are of a speculative nature, since the data we have available are scarce and indirect.

As far as its origins are concerned, [t#]-deletion as a form of consonant cluster reduction belongs typically to the kind of changes occurring in language or

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[18] Some statistical details. The regression equation for both geographical axes is: $z=-5.359-1.726x+3.845y$, z being the percent deletion, x the nort-south coordinate, and y the west-east coordinate. The multiple correlation coefficient $R=0.236$, the coefficient of determination $R^2=0.056$, so only 5.6% of the variance is explained by the geographical coordinates together. If the west-east dimension is considered separately, the regression equation is: $z=-13.461+3.682y$. The correlation coefficient $r_{zy}=0.476$, the coefficient of determination $r^2_{xy}=0.227$, so 23% of the variance is explained and 77% of the variance has to be explained by other factors. The r_{zy} is significantly different from 0: $t=3.828$, df 50, $p<0.01$. The correlation coefficient $r_{zx}=0.003$ and is not significant. The correlation between the two geographic dimensions is low as expected: $r_{xy}=0.2098$ and it is not significant either.

dialect contact situations. We will consider the questions where and when such dialect or language contact situations occurred in the history of Dutch and consider the possibility that they have been at the base of [t#]-deletion. In this connexion [t#]-deletion in Afrikaans is shortly discussed as well.

6.4.3.1. AREAS AND PERIODS OF DIALECT CONTACT

1. *The reclaimed area between dunes at the coast and the inland higher grounds*
The Dutch speaking countries, from Groningen in the north to France in the south form one system which is characterized by a division into three parts: seen from the sea, there first is a landscape of dunes and stream ridges sometimes forming islands, then comes an in majority reclaimed area with peat bogs, and then the higher sand ridges of the inland (the river area of the Betuwe, the sands of Drente, the higher sandsoils of the East of West Flanders and East Flanders). The reclaimed area has been colonized at different medieval periods: In West Flanders the reclamation of the wastelands occurred first. Reclamation in Holland began between 1000 and 1100, of Groningen in the north during the 14th century.

For the north Schmitt (1942) has outlined the relationship between language, reclamation and colonization. He shows that in the reclaimed area a totally new dialect, different from those surrounding it in phonic, morphological and lexical respects, develops by an intense process of dialect contact having as a consequence the disappearance of Frisian in Groningen. According to him, the same processes of language and dialect contact were operative in Holland, the mid western parts of the Netherlands (Schmitt 1942: 170). In the western coastal area the dialect spoken originally was a dialect of the Frisian language. This Frisian dialect disappeared in the 11th century (see Goeman 1984, and the references quoted there) under circumstances comparable to those in Groningen, albeit much earlier than there. It is the period of the first reclamation of peat bogs on a very large scale in this area. The reclaimed area between the dunes and the higher grounds is an area of colonization with, in the Middle Ages, multiple dialect contacts, both with the coastal dunes and the inland higher sands, while these two latter areas have dialect contacts across the peat bogs. The result of all this is new dialect formation in the reclaimed area which, at its turn, expands both to the coastal area and to the inland.

2. *The period of city formation especially in Holland*
City formation in the Low Countries begins after the period of the first reclamations. Since the time of city formation in the Middle Ages the cities have recruited their population from outside their immediate surroundings. In the beginning they relied heavily on the neighboring countryside, but even then the relatively great number of cities in a rather small area promoted considerable contacts between them and Flanders, England, Lower Germany and even Scandinavia. Dordrecht, a city of the counts of Holland and a centre of commerce of importance, was situated at the crossroads from Utrecht, Gelderland

and Brabant. In this city the influence of Flanders was particularly strong up to the late Middle Ages according to recent excavations (results not yet published). After the revolt against Spain during the 16th century a great number of, mainly Flemish, refugees came to Holland: for example, in the 17th century the city population of Leiden consisted of 67% immigrants, 68,5% of whom were Flemish (Briels 1978: 21-22). Other cities show equally high numbers of immigrants.

Here again multiple dialect and language contacts occurred at least in the cities, resulting in new city dialects.

3. *The River area*

We know that the River area was inhabited continually from pre-Roman times (Blok 1975). In the Middle Ages (about the 11th century) there have been relations between the Western River area around Kuilenburg (see map 1) and Holland and Utrecht, as appears from field names in the area of Kuilenburg. Somewhat later, dialect influence from the East: Gelre played a part in the River area. For medieval times the relationship of the River area with North Brabant was also very clearly one of dialect contact (see Blok 1975). As an example of dialect contact between North Brabant and the River area we mention the introduction of the /t-e-gij/ system we discussed earlier, which stems from these times (see also chapter 9). Traditionally, communication took place by boat, and by sand roads. In both cases communication ran east west, also with Holland. It is possible to get a glimpse of the population movements if we look at the distribution of family names based on place names. For the period before and after 1800 we can use this distribution of family names based on place names. For the period around 1850 and after we have more social historic information about communication patterns.

Family names were fixed with the introduction of civil registration in the beginning of the 19th century by Napoleon. Family names based on place names show a remarkable geographic distribution. They are concentrated in and around the River area. Generally it makes only sense to be called after a placename where one is coming from, but where one is not living anymore.

Migration over *short* distances has been substantial inside the western part of the River area (the Betuwe), according to Keij (1982, 350-367). Of the migrants coming from the north-western part according to their names, 83.5% went to the south. Inversely, of the southern migrants 60.5% went to the north. Migrants coming from the south-eastern part of the neighboring province of South Holland went to the south-western part of the Betuwe in comparable numbers: 61.7% (see map 12). In the Betuwe, these family names based on place of origin are concentrated in the western part (see map Heeroma and Ebeling 1971, 61 and our map 13).

For the province of Utrecht Buitenhuis (1967, 36-37; 1977, 26-27) has found that these names of origin are concentrated in the southern part of the province of Utrecht, 90% of them are migrant names, not from the province itself.

The River area and the province of Brabant provided 30.5% of the migrant names, Holland 23.8% and the northern parts of the Netherlands 5.4%. In the

Netherlands, the province of North Brabant is the nuclear area for names of origin.

Between the provinces Utrecht, Gelderland and North Brabant, the last one has the highest percentage of migrant names from the province itself: 17.62%. In effect, the migration took place across very short distances according to two case studies of migration into the brabantic cities of Tilburg and Eindhoven by name type (Buitenhuis 1977, 43).

Over *long* distance, brabantic names of origin reflect east-west migration (Buitenhuis 1977, 43), while the Gelderlandic names of origin in Utrecht reflect a migration from south east to north west (Heeroma and Ebeling 1971, 63). For the whole area of South Holland 23.78% of the names of origin come from the province itself (Buitenhuis 1983,22).

The overall insight gained from these migration patterns in and around the River area is the general south easterly to north westerly direction of *long* distance migration with an undercurrent of considerable migration across *short* distances.

The numbers given by Keij (1982) point in the direction of migration on an *intermediate* scale from Holland, and from the River area into southern Utrecht. *Long* distance migration correlates with a language/dialect contact situation, while migration on *short* and *intermediate* scale favors group consolidation which, in turn, favors conservative language behavior. The long distance migration possibly explains the increase in [t#]-deletion in the River area, whereas short and intermediate migration may explain why [t#]-deletion is still common here.

Up into the 1850's rivers in the River area were not barriers but communication channels.[19] In the 19th century there were steam boat services on both sides, many ferries and innumerable landings. This pattern of communication also remained after 1850.

Migration and communication by road and river point to a situation where dialects remained permanently in contact in this region. Also in the agrarian sector in this area there are indications for this contact situation. Where, up to 1750, migration was a long distance phenomenon, after 1750 laborers in the Betuwe travelled around, hiring themselves out and living without a fixed dwelling place. In the second half of the past century this system of seasonal migrant labor came to an end and was replaced by the 19th and early 20th century system of regular servants with a fixed dwelling place of their own.

Paradoxically enough, the region became more isolated around World War II. Since the 1930's bridges were constructed, after the war the land was redivided and in the 1960's motorways were constructed throughout the area. These undertakings were partly motivated by the need to open up the region, but at the same time the old communication patterns and networks were destroyed, while currently traffic is mainly transitory.

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[19]   The facts about economic and social history were communicated to us by the State Archivist of Gelderland, Mr G.J. Mentink. We thank him for his kind letter. The interpretations here are, of course, not his responsibility, but remain ours.

All circumstances point to a situation where there is contact within the River area between dialects with a southern Brabantic flavor, dialects from Gelderland, and from Utrecht, Utrecht being more Hollandic in orientation (although Van Veen (1964) places it as an intermediary dialect between Holland and Gelderland).

We may conclude that the River area was far from expansive, though not isolated. The migration patterns point in the direction of intense dialect contacts between rather different dialects in the period before 1800. Short distance migration patterns were confined to the Betuwe itself during the past two centuries. These patterns may explain why the high rate of [t#]-deletion is confined to the region between the rivers. The intense long distance dialect contacts of the earlier period may explain the height of the rate of [t#]-deletion in the River area.

6.4.3.2. [T#]-DELETION AND DIALECT CONTACT

We hypothesize that the spread of [t#]-deletion started in the Middle Ages as a consequence of dialect contact in the sense of Schmitt: the same social circumstances were present in Flanders, in Holland and the Betuwe as in the north of the Netherlands: in the Middle Ages, and anew - at least in the cities - during the time of city formation. The regions about which [t#]-deletion is reported in the past are Flanders, Holland, Utrecht and Limburg (see Goeman (1983) for details and references).

1. *Flanders*

There are indications for a reduction of [t#]-deletion in Flanders, where in the Middle Ages [t#]-deletion was a general rule, which is now restricted to verb suffixes ending in [t#] and in nominal words to roots ending in [t#] before certain suffixes beginning with [s]. The verb suffixes are deleted only before consonant (Goeman 1983, Taeldeman 1979). The region ranges from the Belgian coast to the central parts of East Flanders. But see now here chapter 11 for early Middle Dutch and the present situation.

2. *Holland*

There are indications for an increase of [t#]-deletion in the later stages of city formation in Holland and after 1600 (Van den Berg 1965). This last period is the same as wherein the massive migration from Flanders took place.[20]

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[20]   A striking parallel is found in Norwich. There, immigration of Flemish into the city of Norwich (more than 30% of the total population of Norwich) made it the biggest Flemish colony of all cities in England. This resulted in the acceptation of 3rd singular present ending in -ø which was added by the Flemish to the existing pool of alternating variation between the older ending -th that was in the proces of being ousted by northern -s (Trudgill 1996, 1998). See also chapter 7, sections 7.3.1 and 7.4.4; chapter 8.12 for contact and competition between suffix alternants. The Early Middle Dutch 3rd singular ø-system and the present Flemish situation are elaborated upon in chapter 11.

Besides that, Stoops (1980) presents evidence that already earlier, in the 16th century, in Haarlem [t#]-deletion was probably normal among the higher social classes. Snyman (1979), taking also into account the results of Raidt (1974), says that in the 17th century [t#]-deletion was rather general in the received pronunciation of Holland, including Haarlem and Amsterdam, as well as in the language spoken in the Dutch East Indies. Raidt (1974) concludes that in the 18th century [t#]-deletion in the northern part of South Holland is disappearing from the language of the upper classes. This process must have been completed in the upper classes of Amsterdam at the end of the 18th century. At this time [t#]-deletion is still present in the language of the lower classes. In the southern part of the province of South Holland, [t#]-deletion remains present in educated speech, for example, in Rotterdam. Unfortunately, these studies mainly consider the positive cases of [t#]-deletion and only in a few instances and for some words the cases where [t#] remained. In this way, it is impossible to gain insight in the relative importance of the phenomenon and its relative spread across phonological and morphological categories in time and space.[21]

3. *Groningen*
There are also attestations of [t#]-deletion in Groningen at the border of the peat-bog area and the higher sands in Drente.

4. *The Betuwe*
We assume that in the Western Betuwe [t#]-deletion started in the period of frequent dialect contacts long before 1800. During the 19th century it spread to the east during the period of agricultural migration in this area. Since the Betuwe is rather isolated now, it does not follow the recent trend of restauring [t#] again. This trend is, however, observable in the south of the province of Utrecht (see Schouten 1984).

The overall impression for the Netherlands we retain, is that probably [t#]-deletion in the past two centuries has disappeared from what was then considered Standard Dutch pronunciation and has been retained in socially as well as geographically determined dialects.

6.4.3.3. SOUTH AFRICA

Our hypothesis that [t#]-deletion is a process of which the frequency is caused by language and dialect contact situations is corroborated by the development in the language of the Cape Colony. In Afrikaans, there is a remarkable increase in [t#]-deletion in the 18th and 19th centuries, according to the well documented and detailed study of Conradie (1981, 1982). On the Cape speakers of Dutch, Low German, Flemish and other languages came into contact. And this created the

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[21]   For an approach in which both positive and negative evidence is taken into account see Dees et al. 1980.

circumstances necessary for the rapid increase in frequency of [t#]-deletion there. Kloeke (1950) defends the claim that Afrikaans has been influenced especially by rural dialects of the eastern part of South Holland. However, as far as [t#]-deletion is concerned, it seems more plausible to suggest the influence of the cities this area. Yet, we we believe there is even a better suggestion. Just east of South Holland the real [t#]-deletiion area begins in Kuilenburg.

Kloeke argues that the language of Jan van Riebeek, first governor of the Cape Colony, and his friends may have had a strong influence on Afrikaans. Jan van Riebeek was born and lived in Kuilenburg as a child and several of his relatives and friends lived there even longer before they went to the Cape, as Kloeke mentions. The chancery at the Cape was managed by two of Jan van Riebeek's relatives from Kuilenburg. Going a step further than Kloeke, we wonder why he did not examine the possibility that Kuilenburg has played a part in the formation of Afrikaans on this score. This is a supplementary reason why it would be interesting to examine [t#]-deletion in Kuilenburg and in the rest of the area from a historical point of view.

6.5. **Conclusion**

In the preceding paragraphs we have described [t#]-deletion in obstruent consonant groups in a number of Dutch dialects. We have attempted to provide a framework in which at least some of the behavior of [t#] can be accounted for. Quite a number of questions have not been answered. For instance, what is the interrelation between the different factors which account for [t#]-deletion or [t#]-retention?

And what explains the differences in [t#]-deletion found between the morphological categories? We do not know of any framework in terms of which such questions can be satisfactorily answered. It is the general purpose of this study to contribute to the understanding of the process of sound deletion, specifically that of final consonants in word-final consonant clusters. Three aspects of this general purpose will be briefly discussed.

6.5.1. *Factors favoring or disfavoring [t#]-deletion*

From a geographical point of view [t#]-deletion appears as a rather coherent, highly predictable process in Dutch dialects. Yet, as many as five causal factors were found to be operative to account for the process. They are summarised in table 12.

Table 12: Factors accounting for [t#]-deletion in Dutch

Factor	[t#]-deletion favored	section	restrictions
1. Expressivity	-	3.1	applies to superlatives and words like /echt/ ("really") and /biecht/ (ecclesiastical sphere)
2. Overall function of t as flexion marker	-	3.1	applies to 2nd and 3rd person markers
3. Token frequency (whole range from high to low)	+	3.4	only [xt#] and [st#] in past tense and present tense
4. Phonic prominence (acoustic dissimilarity)	-	3.2	absent with: a. [Ct#C] b. dentals in superlatives compared to other nominals c. [-son][st#] in superlatives d. [Ct#V]
5. Articulatory complexity	+	3.2	a. [st#] versus [-dent] [t#] b. [-son][st#] in superlatives c. [Ct#C]

The interrelations between these five factors result in a geographical distribution which is highly coherent. What is the mechanism which explains this coherence? It may be attempted to reduce these five factors to three: complexity, token frequency and expressivity or contrastivity. [t#]-deletion is favored by token frequency and complexity, either conceptually or articulatorily; [t#]-deletion is disfavored by expressivity or contrastivity. Further reduction of factors is not possible. And it leaves us with the problem of the interrelations between them as before.

6.5.2. *[t#]-deletion as opposed to other potential consonant deletions*

Although several factors have been discovered which favor or disfavor [t#]-deletion, we have not raised the question why, among all possible final consonants, it is [t#] that is deleted. We cannot attribute the tendency of [t#] to delete to its special position in the syllable, position which it shares with [s#], referring to, for instance, theories of the syllable as found in Fujimura and Lovins (1978) or in Halle and Vergnaud (1980). The weakening theory of Lass does not function either in Dutch. Lass (1984, 334-335) posits a process in two stages as a sort of

weakening of complex articulations, first de-oralization and then de-laryngalization: [t#] > [?t#] > [?#] > 0. In this view, [t#] in [?t#] may be unreleased. Since unreleased [t#] is very exceptional in our pre-pausal data, we cannot refer to the process proposed by Lass (but see chapter 11 for realizations in sentence context).

### 6.5.3. **The stability of [t#]-deletion**

The language external factors point to dialectal differences, with a clear geographic distribution. The regions with a surplus of t-deletion (as indicated by the pattern of residuals) where regions with intense dialect contact. Although the historical records are defective on this point, there are indications that the process is on its way back. This is not contradicted by the conservative and passive character of the Betuwe area which we found on the basis of demographic considerations. For the future we may expect that, if something of [t#]-deletion will remain definitely in the language, it will concern the items of the present verb tense and the past verb tense with a high token frequency.

Legend point symbol maps and codes of localities

○   0 percent
◐
◔
◑
◗
◕
◒
●
●   100 percent
⊕   No response in this category
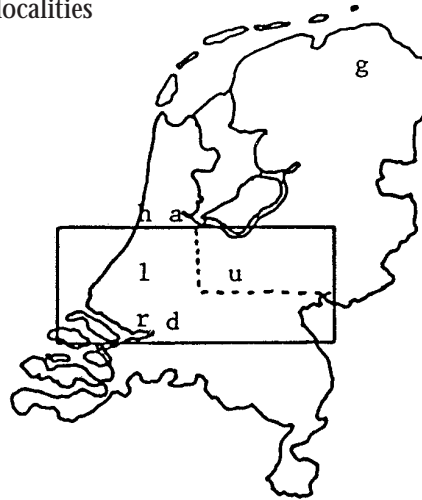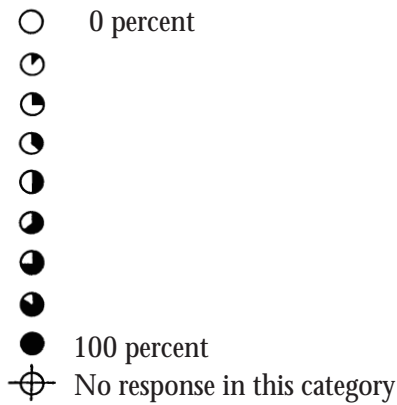
D1	Scheveningen	K69	Schelluinen	a	Amsterdam
D6	Wateringen	K74	Kedichem	d	Dordrecht
E117	Aalsmeer	K78	Deil	g	Groningen
E 173	Koudekerk	K79	Buurmalsen	h	Haarlem
E178	Aarlanderveen	K87	Klaaswaal	l	Leiden
E181	Zegveld	K92	Puttershoek	r	Rotterdam
E183	Kamerik	K94a	Papendrecht	u	Utrecht
E200	Zoetermeer (3)	K98b	Hardingsveld		
E209	Gouda	K101	Almkerk		
E211	Driebruggen	K108	Poederooien		
I4	De Lier	K120a	Velddriel		
I9	Den Briel	L5	Ingen		
I19	Ouddorp	L8a	Achterberg		
I21	Hellevoetsluis	L14	Renkum		
I25	Middelharnis	L20	Zetten		
I29	Piershil	L21	Heteren		
K8	Berkel	L44	Tiel		
K14	Gouderak	L52-w	Dodewaard-Wely		
K16	Stolwijk	L54	Druten		
K27	Ameide	L68	Lent		
K35	Heikop	L71	Nijmegen		
K39	Kuilenburg	L88	Herewaarden		
K54	Lekkerkerk	L95	Ooien		
K60	Bleskensgraaf	L110	Grave		
K64	Noordeloos	L119	Groesbeek		

Map 1: Location and codes of localities according to Grootaers-Kloeke
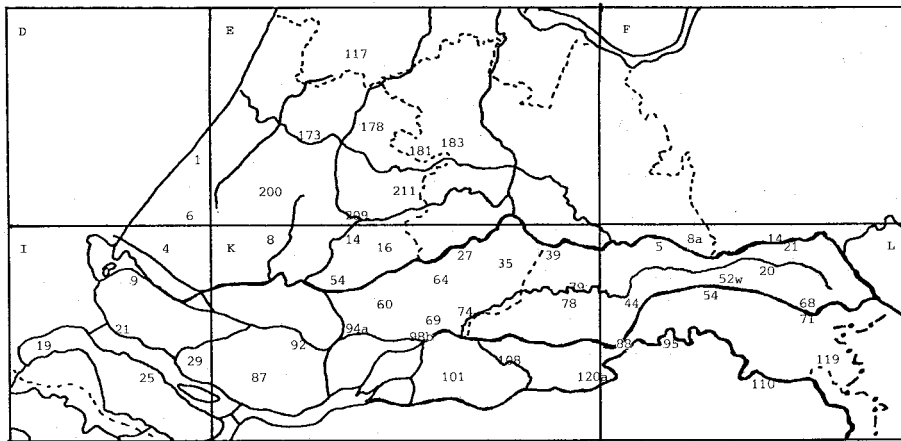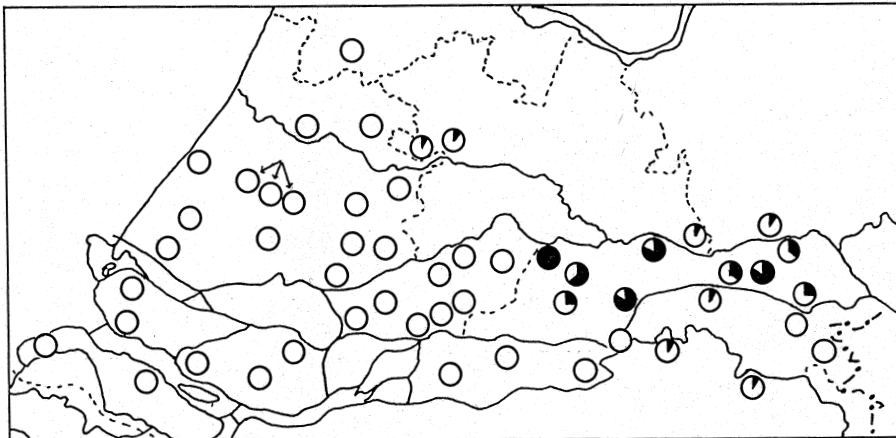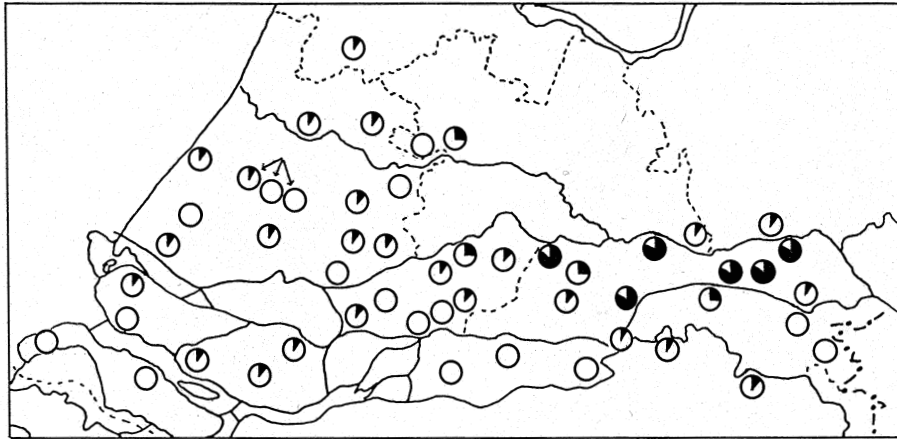

Map 2: Percent deletion in superlatives
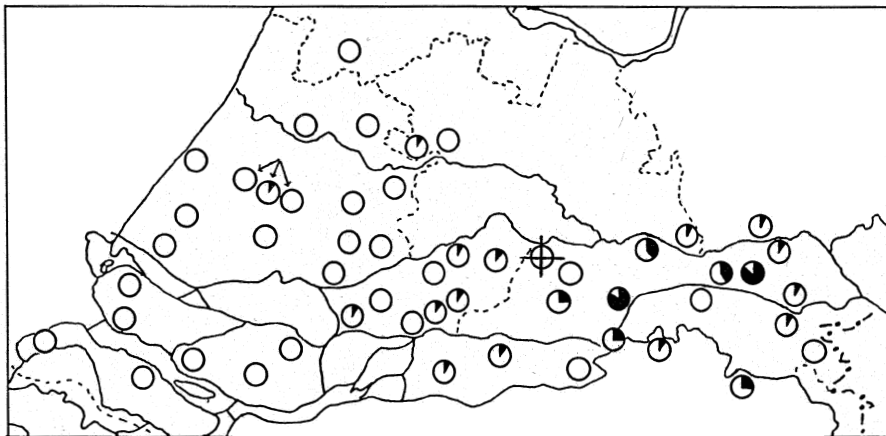
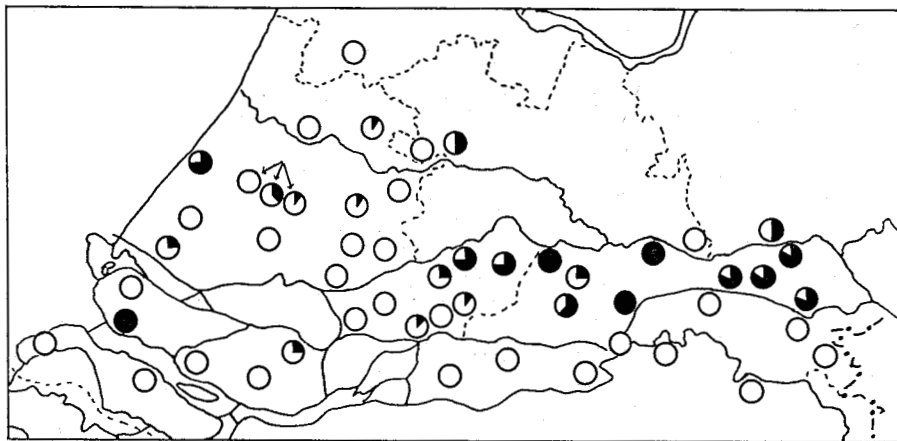Map 3: Percent deletion in nouns, adjectives and numerals
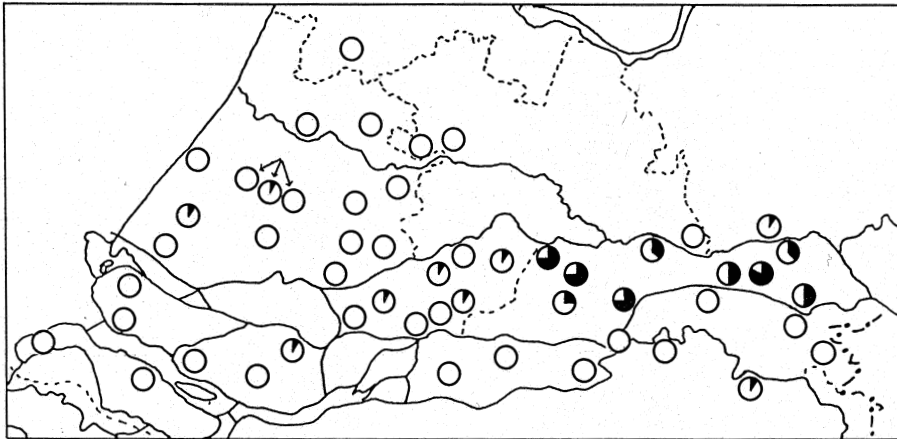
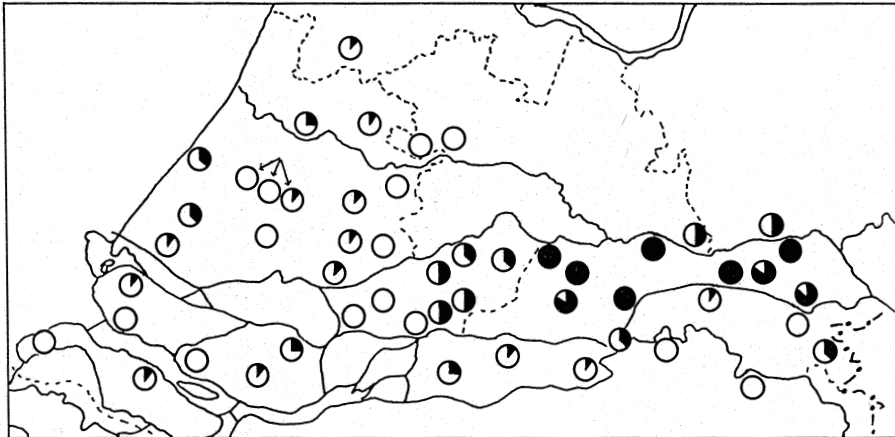Map 4: Percent deletion in past participles

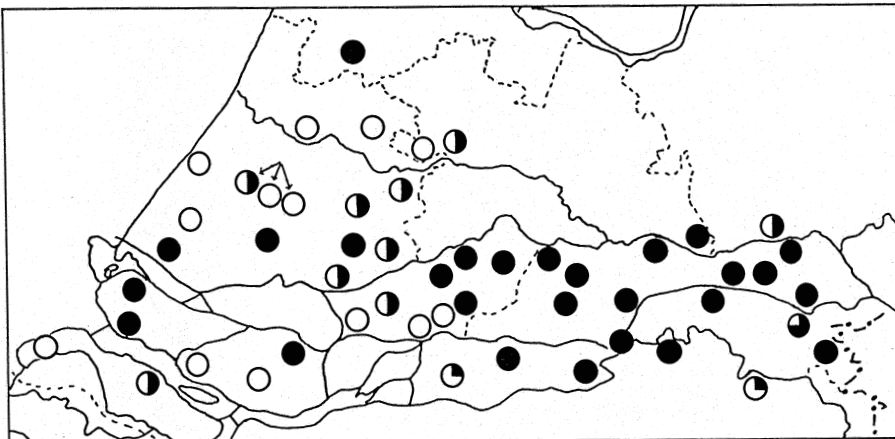Map 5: Percent deletion in 3rd person singular present tense

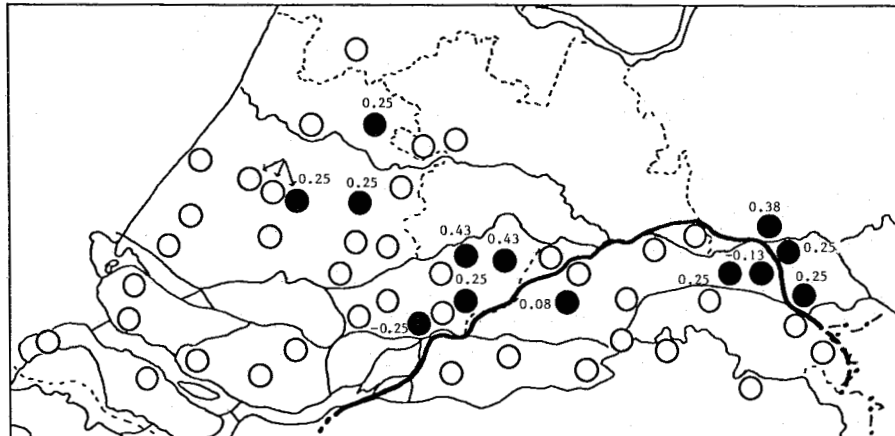Map 6: Percent deletion in paradigm forms, 2nd and 3rd person singular present tense

Map 7: Percent deletion in irregular past tense

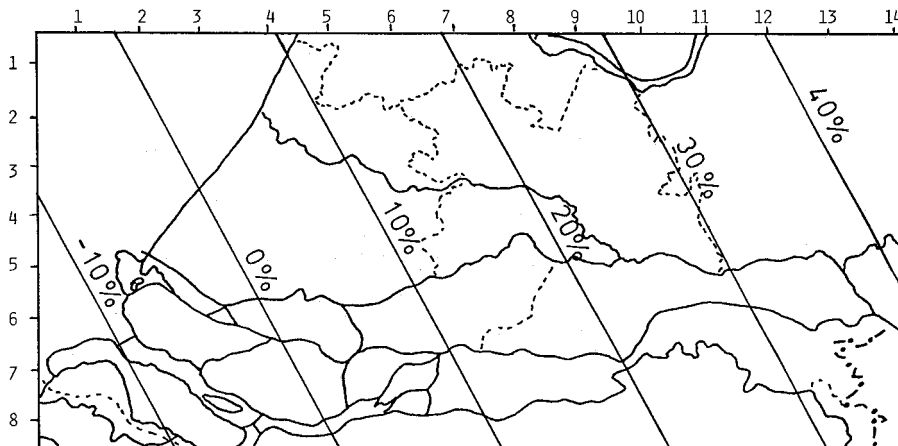Map 8: Percent deletion wordforms in clauses: fricatives + t before ##consonant

Map 9: Difference in proportions (2nd person deletion minus 3rd person
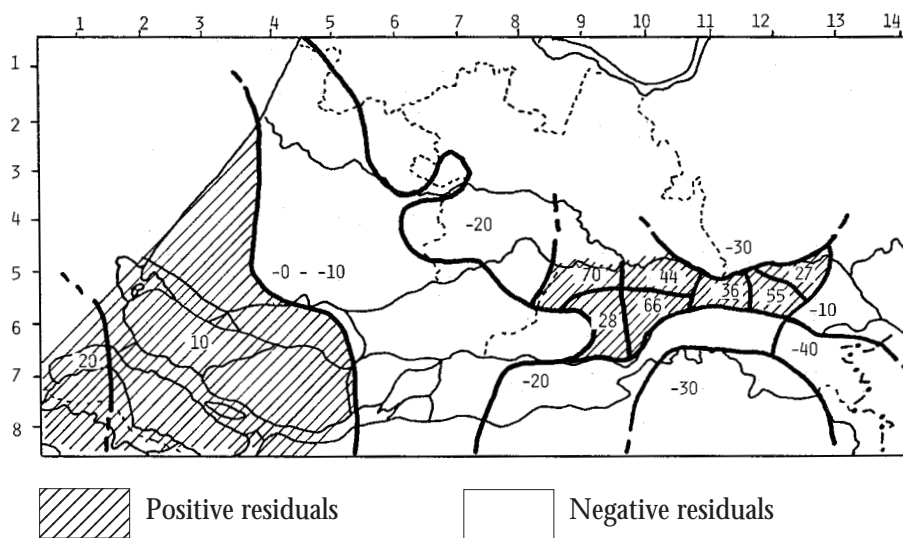   deletion)

———————————   northern limit of -de, -te area (t suffix followed by clitic)

Map 10: Linear surface

Map 11: Residuals from linear surface

| Positive residuals | Negative residuals |

Map 12: Family names based on place names: names coming from the province itself

Gelderland: > 16% (whole province)

North Brabant: > 3% (north east)

Gelderland: 10-16%

North Brabant: 2-3%

Percent of the whole population of family names per province

Map 13: Family names based on place names: percent migration from → to