Frequencies of form function correlates in the Dutch verb inflection system

Heuven, V.J.J.P. van; Krauwer, S.

Citation

Heuven, V. J. J. P. van, & Krauwer, S. (1977). Frequencies of form function correlates in the Dutch verb inflection system. Retrieved from https://hdl.handle.net/1887/2542

FREQUENCIES OF FORM-FUNCTION CORRELATES IN THE DUTCH VERB INFLECTION SYSTEM

V.J.J.P. van Heuven[1] and S. Krauwer[2]
Instituut De Groot voor Algemene Taalwetenschap
Utrecht

Introduction

Within the framework of a larger investigation carried out
by the first author, concerning the role of morphological
characteristics in the reading process, the need arose for
statistical data on the frequencies of occurrence of the
various verb inflections in Dutch.
It is supposed that suffixes and other types of inflections
exert a facilitating influence on the psychological proces-
sing of coherent written material. Investigation of the
Anglo-American literature reveals that such an effect is
most likely to be expected with inflections of verbs
(Gladney and Kralee 1967; Greenberg 1970; Wanat 1971), and
that verb inflections may operate as perceptually isolatable
units (Gibson and Guinet 1971). As in the case of words it
has been claimed for inflections that their recognizability
is partly dependent on the frequency of occurrence in
language use (Murrell and Morton 1974).
Verb inflections are usually related to other elements in the
sentence by such linguistic phenomena as tense concord,
person and number concord, auxiliary-participle dependence.
This implies redundancy/predictability on both syntactic
and semantic levels. It is a well documented fact that the
more redundant structures are, the more easily they are
processed by human beings.
Morphemes, and by implication verb inflections, are the
smallest linguistic units combining syntactic and semantic

information. For lack of a better theory we have limited
ourselves to identifying grammatical meanings of morphemes
with such traditional concepts as person, number, tense,
mood, voice, etc., which are called "notions" (Lyons, 1968:
174).

In the present investigation we have tried to answer the
following questions :

(1) what inflectional categories (in the taxonomic sense
    of the word) can be distinguished in the Dutch verb
    system (*forms*)

(2) what are the grammatical meanings (*functions*) that can
    be carried by verb inflections

(3) *how many* different functions are carried per inflectional
    category (theoretical redundancy)

(4) *how often* does a particular inflection carry a particular
    function (empirical redundancy).

1. Inventory of verb inflections

We have mechanistically defined a verb inflection form as
any letter combination that remains of a verb form after the
verb stem has been deleted. In principle a verb stem is a
set of letter strings obtained by removing -EN from a Dutch
infinitive[3], and possibly one derived string.

This derivation process is mediated by three ordered rules,
which draw on orthographic and phonological information :

(1) a single stressed vowel is geminated before maximally
    one consonant symbol

(2) one of two identical final consonant symbols is deleted

(3) Z → S and V → F in final position

Any regular form of a Dutch verb may be described as an
appropriate concatenation of an element in the stem set and
one or more elements in the affix set.

In an attempt to keep the number of inflectional types to
be counted within reasonable bounds we have restricted the
inventory to only those affixes that can in principle signal
the *verbal* use of a weak verb. By this token GE-DSTE is not

a relevant affix, even if the verb form GE*LIEF*DSTE (most
beloved) exists, as the form itself can only be used ad-
jectivally or nominally. Similarly the suffix -END is
excluded, because it only signals the present participle,
which can only be used as an adjective.
On the basis of the criteria 13 suffixes or combinations of
prefix, infix[4] and/or suffix have been identified, and are
given in table I.

number	specification	examples	analysis	gloss
(1)	---$\emptyset$	loop	loop+$\emptyset$	walk
(2)	---e	leve	leef+e	live
(3)	---n	zien	zie+n	see
(4)	---en	leven	leef+en	live
(5)	---t	leeft	leet+t	lives
(6)	---d	beloofd	beloof+d	promised
(7)	---te	maakte	maak+te	made
(8)	---de	vreesde	vrees+de	feared
(9)	---ten	maakten	maak+ten	made
(10)	---den	vreesden	vrees+den	feared
(11)	ge---$\emptyset$	gezwicht	ge+zwicht+$\emptyset$	yielded
(12)	ge---t	gekucht	ge+kuch+t	coughed
(13)	ge---d	gevreesd	ge+vrees+d	feared

TABLE I· REGULAR FORM CLASSES

Ambiguous affix combinations may arise in two fundamentally
different ways :
(1) two different stems collocated with two different
    affixes may yield identical surface forms :
KRUIDEN (to season) GE + *KRUID* + $\emptyset$ GEKRUID (a.o. past partc.)
KRUIEN (to push a wheel barrow) GE + *KRUI* + D GEKRUID (past partc.)
(2) two different affixes collocated with two different spellings
    of the same stem may yield identical surface forms :

BEZETTEN (to occupy) *BEZET* + TEN [5] (past tense)
BEZETT + EN (a.o. present plural)

To accomodate most of these phenomena 9 ambiguous affix
classes were introduced, each being the intersection of two
regular form classes (Table II). For the sake of conciseness
we have avoided the inclusion of form classes involving inter-
sections of three or more regular affix classes. In order

34

to obtain an estimate of the proportion of regular forms as
opposed to irregular forms, a rest category was added
comprising strong and irregular uses of verbs.

number	specification	examples
(14)	---e/---te	bezette
(15)	---e/---de	verwedde
(16)	---en/---ten	zetten
(17)	---en/---den	schudden
(18)	---∅/---t	dorst
(19)	---∅/---d	verspeld
(20)	---∅/ge---∅	getroost
(21)	---t/ge---t	geraakt
(22)	---d/ge---d	gebaard
(23)	ge---∅/ge---t	gedorst
(24)	ge---∅/ge---d	gespeld

analysis (1)	gloss (1)
bezett + e	occupied (adj)
verwedd + e	bet (adj)
zett + en	put (inf)
schudd + en	shake
dorst + ∅	thirsts
verspeld + ∅	pinned on in a different place
getroost + ∅	spared
geraak + t	gets
gebaar + d	gesticulated
ge + dorst + ∅	thirsted
ge + speld + ∅	pinned

analysis (2)	gloss (2)
bezet + te	occupied (pret)
verwed + de	bet (pret)
zet + ten	put (pret)
schud + den	shook
dors + t	threshes
verspel + d	spelled wrongly
ge + troost + ∅	comforted
ge + raak + t	hit (partc)
ge + baar + d	given birth
ge + dors + t	threshed
ge + spel + d	spelled

TABLE II: AMBIGUOUS FORM CLASSES

2. Inventory of grammatical meanings

It was decided that the function category was to be ex-
haustive in the sense that every traditionally known
grammatical meaning that can be carried by the set of affixes
defined above had to be incorporated. Finite and non-finite
functions will be dealt with separately.
The notions applicable to Dutch finites are : *person* (1st,
2nd, 3rd), *number* (sing., plur.), *tense* (present, past) and
mood (ind., imp., opt.).
A full specification of these notions is given in table III.

number	function	abbreviation
(1)	1st person singular present tense	1 pres sing
(2)	2nd person singular present tense	2 pres sing
(3)	3rd person singular present tense	3 pres sing
(4)	1st person plural present tense	1 pres plur
(5)	2nd person plural present tense	2 pres plur
(6)	3rd person plural present tense	3 pres plur
(7)	1st person singular past tense	1 past sing
(8)	2nd person singular past tense	2 past sing
(9)	3rd person singular past tense	3 past sing
(10)	1st person plural past tense	1 past plur
(11)	2nd person plural past tense	2 past plur
(12)	3rd person plural past tense	3 past plur
(19)	imperative singular	imp sing
(20)	imperative plural	imp plur

TABLE III: GRAMMATICAL FUNCTIONS FOR FINITES[10]

There is a certain amount of redundancy in the notion system :
for instance, an imperative is unmarked for tense and is
always second person. Optatives will always be considered
as present tenses, ignoring such archaic past tense optative
as WARE (were).
It is characteristic of non-finites that they can appear as
various parts of speech : within the limitations imposed in
section I we distinguish verbal, adjectival, nominal and
adverbial use of past participles. Infinitives are divided
into a verbal and a nominal category (Table IV). At the
side of the nominal infinitive the iterative nominal was in-

corporated in the inventory : LOPEN (walking), GELOOP (the
repeated act of walking).

number	function			abbreviation
(21)	infinitive	verbally	used	inf verb
(22)	infinitive	nominally	used	inf nom
(24)	past participle	verbally	used	partc verb
(25)	past participle	adjectivally	used	partc adj
(26)	past participle	nominally	used	partc nom
(27)	past participle	adverbially	used	partc adv

TABLE IV: GRAMMATICAL FUNCTIONS FOR NON-FINITES[10]

3. The number of form-function correlates

For reasons to be explained later, function classes 13-18
(the optatives) and 23 (iterative) have been left out of
further consideration. We shall now examine the theoretical
distribution of form-function correlates, i.e. which of the
20 relevant functions can theoretically be expressed by each
of the 25 form classes. These data are given in table V^6.
The table contains 25 subtables, one for each form class,
and specifies among other things the functions applicable
and their number. Within the regular form classes the
number of functions performed ranges between 2 and 9. The
ambiguous form classes cover (as a consequence of their
definition) the union of the functions carried by their
constituent form classes.
The rest category has 16 functions. It may perhaps strike
the reader that certain functions must always be expressed
by a regular form class. The explanation, however, is quite
simple : the regular form classes are based on the verb stem
which in turn is defined as infinitive minus -(E)N. Infini-
tives will therefore always be regular. 1 and 3 pres. plur.
are characterised by the same formal means as infinitives.

formclass (1): –∅

functions	absfr	relfr
1 pres sing	2327	2.23
2 pres sing	812	.78
3 pres sing	1583	1.51
2 pres plur	0	.00
imp sing	693	.66
imp plur	0	.00
partc verb	366	.35
partc adj	27	.03
partc adv	10	.01
	5818	5.57

formclass (2): –E

functions	absfr	relfr
partc adj	65	.06
partc nom	6	.01
	71	.07

formclass (3): –N

functions	absfr	relfr
1 pres plur	330	.32
2 pres plur	16	.02
3 pres plur	2420	2.32
imp plur	0	.00
inf verb	3064	2.93
inf nom	119	.11
	5949	5.69

formclass (4): –EN

functions	absfr	relfr
1 pres plur	1382	1.32
2 pres plur	58	.06
3 pres plur	5550	5.33
imp plur	3	.00
inf verb	16885	16.15
inf nom	1195	1.14
	25083	24.00

formclass (5): –T

functions	absfr	relfr
2 pres sing	995	.95
3 pres sing	10987	10.51
2 pres plur	0	.00
imp plur	101	.10
partc verb	445	.43
partc adj	27	.03
partc adv	66	.06
	12621	12.07

formclass (6): –D

functions	absfr	relfr
partc verb	1432	1.37
partc adj	123	.12
partc adv	119	.11
	1674	1.60

formclass (7): –TE

functions	absfr	relfr
1 past sing	95	.09
2 past sing	12	.01
3 past sing	1047	1.00
2 past plur	0	.00
partc adj	78	.07
partc nom	4	.00
	1236	1.18

formclass (8): –DE

functions	absfr	relfr
1 past sing	299	.29
2 past sing	50	.05
3 past sing	2583	2.47
2 past plur	0	.00
partc adj	341	.33
partc nom	30	.03
	3303	3.16

formclass (9): —TEN

functions	absfr	relfr
1 past plur	48	.05
2 past plur	0	.00
3 past plur	284	.27
	332	.32

formclass (10): —DEN

functions	absfr	relfr
1 past plur	66	.06
2 past plur	0	.00
3 past plur	609	.58
	675	.65

formclass (11): CE—∅

functions	absfr	relfr
partc verb	716	.68
partc adj	55	.05
partc adv	18	.02
	789	.75

formclass (12): GE—T

functions	absfr	relfr
partc verb	936	.90
partc adj	46	.04
partc adv	8	.01
	990	.95

formclass (13): GE—D

functions	absfr	relfr
partc verb	3353	3.21
partc adj	197	.19
partc adv	65	.06
	3615	3.46

formclass (14): —E/—TE

functions	absfr	relfr
1 past sing	5	.00
2 past sing	2	.00
3 past sing	71	.07
2 past plur	0	.00
partc adj	13	.01
partc nom	1	.00
	92	.09

formclass (15): —E/—DE

functions	absfr	relfr
1 past sing	0	.00
2 past sing	0	.00
3 past sing	22	.02
2 past plur	0	.00
partc adj	12	.01
partc nom	0	.00
	34	.03

formclass (16): —EN/—TEN

functions	absfr	relfr
1 pres plur	22	.02
2 pres plur	2	.00
3 pres plur	124	.12
1 past plur	2	.00
2 past plur	0	.00
3 past plur	12	.01
inf verb	344	.33
inf nom	16	.02
	522	.50

formclass (17): —EN/—DEN

functions	absfr	relfr
1 pres plur	2	.00
2 pres plur	0	.00
3 pres plur	3	.00
1 past plur	0	.00
2 past plur	0	.00
3 past plur	1	.00
inf verb	49	.05
inf nom	1	.00
	56	.05

formclass (18): —∅/—T

functions	absfr	relfr
1 pres sing	0	.00
2 pres sing	37	.04
3 pres sing	238	.23
2 pres plur	0	.00
imp sing	0	.00
imp plur	2	.00
partc verb	6	.01
partc adj	0	.00
partc adv	0	.00
	283	.27

formclass (19): —∅/—D

functions	absfr	relfr
1 pres sing	0	.00
2 pres sing	0	.00
partc verb	37	.04
partc adj	2	.00
partc adv	3	.00
	42	.04

formclass (20): —∅/GE—∅

functions	absfr	relfr
1 pres sing	1	.00
2 pres sing	0	.00
3 pres sing	6	.01
2 pres plur	0	.00
imp sing	1	.00
imp plur	0	.00
partc verb	4	.00
partc adj	0	.00
partc adv	1	.00
	13	.01

formclass (21): —T/GE—T

functions	absfr	relfr
2 pres sing	0	.00
3 pres sing	2	.00
2 pres plur	0	.00
imp plur	0	.00
partc verb	35	.03
partc adj	0	.00
partc adv	0	.00
	37	.04

formclass (22): —D/GE—D

functions	absfr	relfr
partc verb	91	.09
partc adj	1	.00
partc adv	0	.00
	92	.09

formclass (23): GE—∅/GE—T

functions	absfr	relfr
partc verb	26	.02
partc adj	2	.00
partc adv	0	.00
	28	.03

formclass (24): GE—∅/GE—D

functions	absfr	relfr
partc verb	76	.07
partc adj	10	.01
partc adv	0	.00
	86	.08

formclass (25): strong and/or irregular

functions	absfr	relfr
1 pres sing	701	.67
2 pres sing	349	.33
3 pres sing	13131[11]	12.56[11]
1 pres plur	2[11]	.00[11]
3 pres plur	4[11]	.00[11]
1 past sing	1592	1.52
2 past sing	384	.37
3 past sing	13433	12.58
1 past plur	358	.34
2 past plur	11	.01
3 past plur	3039	2.91
imp sing	38	.04
imp plur	3[11]	.00[11]
inf verb	15[11]	.01[11]
inf nom	13[11]	.01[11]
partc verb	6102	5.84
partc adj	1764	1.67
partc nom	104	1.67
partc adv	44	.04
	41087	39.27

TABLE V: ABSOLUTE AND RELATIVE FREQUENCIES OF FORM FUNCTION CORRELATES

4. Frequencies of the form-function correlates

4.0. Introduction

Our next step was to determine how often each of the affix combinations signals a particular function. The actual frequencies of occurrence of elements in language use cannot be established. It is possible, however, to perform frequency counts on a sample taken from language use. The largest accessible sample was the corpus that has been collected and coded by the "Werkgroep Frequentieonderzoek van het Nederlands" (Uit Den Boogaart 1975), which contains 720.000 words taken from written and oral language in a 5:1 proportion. In the remainder of this article we shall describe how we have analysed and quantified the written language part of this corpus (600.000 words) in terms of form-function correlates. We received two magnetic tapes[7], the first of which contained the complete, coded, original

corpus; the second was an alphabetically ordered list con-
taining each different combination of word + code and its
absolute frequencies of occurrence. Naturally the frequency
count would be based on the list rather than on the corpus
itself. Although the problem can in principle be approached
from two different angles we decided to assign the function
classes first after which the verbs could be analysed into
stem and affixes, using the notional information to reduce
the number of alternatives.

4.1. Function class assignment

By means of a 3-digit code Uit Den Boogaart specifies for
each word in the corpus to what syntactic category and sub-
category it belongs. The coding system is based partly on
grammatical (notional) and partly on formal criteria (Uit
Den Boogaart 1974).
At some stage in the investigation seven of the function
classes had to be discarded as it did not seem worthwhile
to go to great pains to construct algorithms to detect them.
The functions concerned were the six optatives (13-18:1st,
2nd and 3rd person singular and plural), and the iterative
nominal (23). The latter turned out to have been coded as
a noun, which meant that in a great many cases the distinction
of verb and noun could not be made, cf. the homonym GEVAL
(1) : the repeated act of falling, and (2) : the case.
Singular optatives were coded together with archaic present
indicative form (like ZEGGE EN SCHRIJVE; I say and write),
which do not formally differ from optatives. Plural optatives
were always coded as indicatives so that the proper distinction
can only be made on intuitive semantic criteria. These
exclusions imposed the necessity to introduce some slight
modifications into the form class analysis as certain am-
biguities have now disappeared. This problem will be dealt
with more extensively later.
Of the remaining 20 functions 6 could be derived from the code
immediately : 1st, 2nd and 3rd persons in indicative present
singular (1-2-3), verbal and nominal infinitives (21-22) and
the adverbally used past participle (27). In the other 14

cases the code narrowed down the number of relevant alterna-
tives to two or three functions.
In one case (concerning two functions) the decision could
be made on the basis of the formal characteristics of the
verb itself, which meant that the tape containing the list
could still be used. In the three other decisions (assign-
ment of grammatical person, verbal/adjectival use and ad-
jectival/nominal use of past participle) it was necessary to
take the original context into account.

function	absfr	relfr	function	absfr	relfr
1 pres sing	3029	.67	2 past plur	11	.01
2 pres sing	2193	2.10	3 past plur	3945	3.77
3 pres sing	25947	24.82	imp sing	732	.70
1 pres plur	1738	1.66	imp plur	109	.10
2 pres plur	76	.07	inf verb	20357	19.48
3 pres plur	8111	7.76	inf nom	1344	1.29
1 past sing	1991	1.90	partc verb	13625	13.03
2 past sing	448	.43	partc adj	2763	2.64
3 past sing	17156	16.41	partc nom	145	.14
1 past plur	474	.45	partc adv	334	.32
				104528	100.00

TABLE VI: MARGINAL TOTALS FOR FUNCTIONS

4.1.1. Number assignment for imperatives

Imperatives have been given a separate code by Uit Den
Boogaart, but the code does not express number i.e. singular/
plural. On the basis of form analysis procedures, which
will be dealt with later, it could be determined whether
an imperative had the formal characteristics of an infinitive
(-N or -EN), a non-inverted 2nd pers. pres. sing. (-T) or
only a verb stem (-∅). In the former two cases the verb
form was recoded as plural imperative, in the latter as
singular. In cases where the choice between stem and stem
+ T could not be made, as e.g. VERGAST (VERGAS + T or
VERGAST + ∅), plural was assigned on arbitrary grounds. It
should be noted that theoretically speaking plurally used
imperatives are erroneously marked for singular when the

verb stem itself ends in -T. As the subject of an imperative
sentence is usually absent, correct automatic assignment would
require an analysis of preceding or following sentences,
which was beyond the sense of our project (cf. elliptical
constructions in 4.1.2.).

1.2. Assignment of grammatical person for finites

Forms coded as finites by Uit Den Boogaart have been given
an additional specification for tense and number, but except
in the case of present singular information regarding gram-
matical person is absent. Therefore an algorithm was developed
to supply this information for finites in the present plural,
and both singular and plural past tenses. In these cases
grammatical person is not formally expressed in the verb it-
self and has to be derived from the subject, i.e. in a context-
sensitive way. Since there are at most one subject and one
finite verb per clause, the matching task is relatively easy
once a sentence is properly segmented into its constituent
clauses. For this purpose a recursive procedure was adopted
which starts a new cycle when a subordinator (an element from
a closed set of grammatical words such as hypotactic con-
junctions and relative pronouns) was met and leaves that cycle
as soon as every finite at that level has been assigned a
grammatical person. In each cycle the context is scanned for
a first or second person pronoun in its nominative form, either
singular or plural. When such a personal pronoun is found,
the associated grammatical person is assigned to the finite
in that clause. When no recognizable pronoun is encountered
third person is chosen as a default value.
Within this restricted framework errors cannot be avoided
in elliptical constructions in which either the subject or
the finite is missing and has to be suppleted from the con-
text. (Reduction with NP or VP deletion : JIJ LACHT EN
HUILT (you laugh and cry) and JIJ EN HIJ LACHEN (you and he
laugh). Nevertheless the procedure proved adequate in well
over 99 % of the 600 cases tested.

1.3. Verbal/adjectival/nominal use of past participles

In the Uit Den Boogaart coding system past participles are

divided into four categories : (1) undeclined, (2) declined, (3) plural nominal, (4) adverbially used.

In our functions system verbal, nominal and adverbial use of past participles were distinguished. It should be obvious that only part of this information could be directly translated from the Uit Den Boogaart code. More particularly, the following two decisions remained : undeclined past participles can be either verbally or adjectivally used, and declined participles are either adjectival or nominal.

In the first decision verbal interpretation is opted for unless the participle is followed by either an undeclined past participle or a nominal entity (nouns, nominally used adjectives etc.), or preceded by a word which requires an undeclined adjective (indefinite article, indefinite pronouns, certain interrogative pronouns etc.). The procedure yielded a rather high error rate, about 20 %, but we have abstained from further refinements, as we saw no means to resolve this problem on short notice.

In the second decision, concerning declined participles, adjectival status is decided upon if the participles occur in one of the contexts conventionally abbreviated in the following scheme :

$$\underline{\hspace{2cm}} \; ((\text{paratactic conjunction}) \left\{ \begin{array}{c} \text{adjective} \\ \text{participle} \\ \text{+ adj} \end{array} \right\} * \left\{ \begin{array}{c} \text{nominal} \\ \text{participle} \\ \text{+ nom} \end{array} \right\}$$

In all other cases the participle is formally nominal. We have allowed for the possibility that indefinitely many conjoint adjectives precede the final nominal (as expressed by the asterisk).

It should be apparent from this rule, that the context is scanned, and decisions are taken from right to left. The number of errors found in the cases tested amounted to less than 1 %.

4.2. Form analysis

The input for the form analysis were two tapes : (I) a selection from the complete alphabetic Uit Den Boogaert list

containing only the verb forms whose functions could be immediately recovered from the code, (II) a complementary tape containing the results of the function class assign-ment (4.1.) in a format compatible with tape I.
The principle underlying the algorithm is, that every given verb form is split up into all admissible combinations of stem and affix(es). This means that no *a priori* dependency of form and function is assumed, so that e.g. GENIET from an original context IK GENIET (I enjoy) should be analysed as both GENIET + Ø (enjoy) and GE + NIET + Ø (stapled; past part. of the verb NIETEN).
In practice, however, this orthogonality of forms and functions could be dealt with by considering only those form categories that can be associated with the function given and applying some minor alterations later.
As should be apparent from §3., each function is characterized by a particular set of form classes, e.g. infinitive verbal is carried by -N, -EN, -EN/-TEN and -EN/-DEN. A number of functions share the same set of form classes, e.g. infinitive verbal, infinitive nominal, 1st and 3rd persons present plural. Moreover, certain functions are signalled by the combined sets of form classes of two functions, e.g. 2nd person plural may be both expressed by the 'infinitive set' (jullie lopen; you walk) and the 'third person set' (U beiden loopt; You walk).
Of each form under analysis the relevant set or sets of form classes is determined. In the case of more than one set of form classes the possibilities are further narrowed down by means of appropriate formal tests. Then a more detailed decision procedure applies in order to single out the only appropriate possibility within the set. Once a particular set is selected function class information is no longer relevant.
Not in all cases could the decisions be taken exclusively on formal grounds.
All potential cases in which such formal rules would yield unwanted results were collected and listed, and whenever the

need arose the relevant lists were searched. In 4.2.7. we
shall discuss these loop-up lists in greater detail. The
lists are numbered and included in appendix I.

4.2.1. Infinitives

Verbal and nominal infinitives are inflectionally identical.
Infinitives regularly have the -EN suffix, except the group
(listed in list 5) ZIJN (to be), GAAN (to go), STAAN (to
stand), SLAAN (to hit), ZIEN (to see), DOEN (to do) and their
compounds, which forms are analysed as stem + N.
(Compounds of) JUDOEN (to jiujitsu) and RUZIEN (to quarrel),
however, belong to the -EN group (see also Van De Craen
1971). Ambiguous form classes (-EN/-DEN or -EN/-TEN) are
assigned if the verb ends in -DDEN or -TTEN, immediately
preceded by one vowel symbol[8]).

4.2.2. Present singular

A number of present tense forms and their compounds are con-
sidered irregular, as they cannot be derived mechanically
from an existing infinitive (list 9) : e.g. BEN (am), BENT
(are), KOM (come) etc.
Within the system the following formally undecidable situa-
tions occur :
(a) a -T or -D may or may not be considered to be a suffix
    and in either case the form is (a derivation of) the
    stem of an existing Dutch verb, e.g. VERGAST (=VERGAS
    + T (kills with gas) or =VERGAST + Ø (treats) and
    VOORSPELD (=VOORSPELD + Ø (pin in front of someone) or
    =VOORSPEL + D (predicted)).
(b) GE- may or may not be considered as a past participle
    marking prefix provided that the form ends in -T or -D
    in a way compatible with the past participle formation
    rules; example : GETROOST (= GE + TROOST + Ø (comforted)
    or =GETROOST + Ø (spare)), but not GELEIDT (conducts),
    as -DT is not an admissible past participle ending.
In order to obtain a reasonably efficient decision procedure
we adopted the principle that a -T or -D immediately prece-
ded by H, J or a 2-symbol vowel belongs to the stem, and

constitutes an affix if preceded by any other symbol. There
are many exceptions to this rule of thumb, which were incor-
porated in lists in which ambiguous forms were additionally
marked. One group of verb forms remained which could not be
analysed automatically. These forms that end in an ambiguous
-D and of which it could bot be decided whether or not they
would get GE- in the past participle were analysed by hand,
e.g. VOORSPELD, which would be past participle when stressed
on the second syllable : VOOR'SPEL + D (predicted), or first
person singular when stressed on the first syllable :
'VOOSPELD (pin on in front of someone). To determine the
status of initial GE- relevant forms were temporarily treated
as past participles.

'.3. Present plural.

Present plural forms that end in -N, except KAN (can), are
further analysed as infinitives; any other present plural
is further analysed as present singular.

'.4. Imperative.

If an imperative ends in -N list 5 is searched to see if it
belongs to the GAAN, STAAN etc. category (stem + N). Any
remaining form not ending in -EN is a stem. Forms on -EN
are looked up in list 4 to see whether the form is a stem
(BEKEN (confess)). If not, the form is further analysed
as an infinitive. Any other form is further analysed as
present singular.

'.5. Past tense singular.

Singular weak preterites regularly end in -DE or -TE. Forms
ending in any other way are strong. Form class analysis
normally took place on the basis of the last two letters.
Ambiguous status was given to forms ending in -TTE or -DDE,
immediately preceded by one vowel symbol : BEZETTE = BEZETT +
E (occupied) or BEZET + TE (occupied), BEKLADDE = BEKLADD +
E (smeared) or BEKLAD + DE (smeared). These forms are am-
biguous insofar as the -E reading charecterizes a past
participle which does not take a prefix GE-, and the -DE

or -TE form class signals a preterite. Unfortunately forms
like ZETTE (put) or KLADDE (smeared) are also considered
as ambiguous. Originally the -E reading also stood for
singular optative and the algorithm was not properly adapted
when the optatives were dropped from the function system
(cf. 4.1.).

4.2.6. Past tense plural.

Plural past tense formation normally consists in adding
-DEN or -TEN to the verb stem. Second person plural, how-
ever, especially when a polite form of address is used (U),
may also be inflected as in the singular. Any 2nd person
plural preterite not ending in -N is further analysed as
a singular.

The detection of strong forms is relatively problematic in
the plural as a number of strong plurals exist which end in
-DEN or -TEN. The majority of the strong -TEN forms can be
identified because they violate phonotactic constraints
which are always observed in weak past tenses. As an
example we mention the process of voice assimilation which
excludes -TEN after a voiced segment; therefore LIETEN (let)
and ZATEN (sat) can never be regular weak forms. However
a number of cases remained that could not be singled out in
this way. The forms concerned were listed (list 10) and
are looked up whenever the need arises.

Forms containing geminate D or T after a single vowel symbol
are further analysed as if they were infinites, except
HADDEN (had), which is strong.

Forms ending in -DEN immediately preceded by a true vowel
(1 or 2 but not 3[9] vowel symbols) are provisionally considered
as strong formations because it is abnormal for a Dutch verb
stem to end in a vowel (cf. 4.2.2.). This decision is re-
voked if such a form is found in list 3, which contains
verb stems ending in a vowel.

When -DEN was preceded by a consonant symbol no rules for
strong form detection could be given; in these cases strong
forms are simply found by reference to a list (list 11).

.7. Past participle.

Past participle formation takes place along the following
lines : the verb stem is preceded by GE- and followed by
either -Ø, -D, -EN or -T. -EN exclusively occurs with
strong verbs, weak verbs take the -Ø suffix if the stem
itself ends in -T or -D, -T if the last letter of the stem
corresponds to a voiceless sound and -D in all other cases.
There are only a few strong verbs not taking -EN. GE-
is normally prohibited when the verb stem begins with BE-,
-GE-, HER-, ER-, VER-, ONT- or with a non-divisible (non
stressed) preposition (but cf. Schultink, 1973).
Past participles may be used as adjectives and the adjectives
as nominals. In such cases the inflectional paradigm is
identical to that of non verb-derived adjectives, the con-
sequence of this being weak past participles ending in -DEN
or -TEN.
First of all adjectival and nominal inflections are traced,
administrated and removed. Any (truncated) participle not
ending in -T or -D is strong. The next step is to see if
the form contains the sequence -GE- (not necessarily in
initial position) and if so whether or not a true, i.e. a
past participle marking, prefix is concerned. The prefix
status is decided upon in two discrete steps :
(1) GE- is provisionally true when followed by at least one
    vowel, not preceded by initial VER-, and not part of
    one of the following letter sequences : GEREED, GERUST,
    GERING, GELIJK, GEVANGEN, GEKS, TEGEN, BEGE, ONTGE;
    any GE- which is not a true prefix according to (1) is
    left out of further consideration; however, the occur-
    rence of yet another GE- is allowed for and condition
    (1) is tested repeatedly.
(2) any form with a provisionally true GE- is matched with
    list 8, which contains all remaining verb stems begin-
    ning with GE-. Ambiguities occur when two verb stems
    exist, one with and one without GE-, both of which are
    compatible with the form at hand; these stems are
    specially marked in the list. When true GE- is concluded

to, its presence is registered after which the letters GE
are removed from the string, enabling look up procedures
in lists, which contain non-prefixed forms only.
With regard to (truncated) forms ending in -T, the forms
GEWEEST (been), GEBRACHT(brought), GEDACHT (thought),
GEKOCHT (bought), GEZOCHT (sought) and their compounds are
classified as strong. If the -T immediately follows a
vowel symbol, it must be part of the stem. The question
whether the -T in the remaining cases belongs to the stem,
constitutes a suffix, or possibly both, has now been re-
duced to the problem of the present singular form analysis
(cf. 4.2.2.).
As far as (truncated) forms on -D are concerned, GEHAD (had)
and its compounds are classified as irregular. In forms
ending in one vowel symbol + D the D is always part of the
stem. A -D preceded by three or more vowel symbols is
always a suffix. When preceded by a two symbol vowel -D
belongs to the stem unless the (truncated) form is found
in list 3, and is ambiguous if a marking to that effect is
found in the list. In the forms not yet covered, in which
the potential suffix is preceded by a consonant (other than
J), the -D is considered to be a suffix unless the form is
incorporated in list 7 and ambiguous if marked as such in
the list.
On the basis of this information concerning the stem or
suffix status of GE-, -T and -D, as well as the adjectival
or nominal specifications the final form class assignment
is arrived at by the application of simple boolean opera-
tions.

4.2.8. Exception lists.

In the form class analysis recourse is made to eleven ex-
ception lists. An item in an exception list has the
following general form :
(a) a number indicating which list the item belongs to;
(b) ambiguity markers;
(c) an instruction as to whether a form found in (or
    derived from) the text has to be identical to the

listed form or whether it is sufficient if the text
form can be written as a concatenation of two sub-
strings, the latter of which is identical to the listed
form;

(d) the listed form, consisting of a string of letters.

Exception lists needed for decisions concerning suffixes
were drawn up with the aid of Nieuwborg (1969), a retrograde
version of the largest complete dictionary of Dutch
(Kruyskamp, 1961), which contains 192,000 words. This
dictionary itself was made use of whenever the beginning
of the word was relevant. For the inventory of strong
preterites not involving consonant alternations Eeckhout
(1968) was used; the list was supplemented to the best of
our knowledge with verbs additionally exhibiting consonant
changes.

In the lists verb forms are always specified with the in-
clusion of a potential suffix. In the majority of cases
a list is used in only one type of decision. In two
instances however a list served in two decisions, in which
case a suffix listed may be replaced by another suffix.
An item is marked ambiguous if both the listed form without
the potential affix and the form concatenated with the
affix constitute an existing Dutch verb stem.
We shall now discuss the various lists one by one.

<u>list 1</u>. contents. Stems ending in a consonant ≠H,
≠J, followed by -T.

function: A -T after a consonant ≠H, ≠J is a
suffix unless the form is found in
this list. If the -T can be both
the final letter of a stem and a
suffix, the form is marked as ambiguous.

examples: PEST (teases)
GIST (amb.: guesses, ferments)

<u>list 2</u>: contents: Stem + T of verbs whose stems end
in -CH.

function: -T after -CH- is part of the stem
unless the form is listed here.

example: LACHT (laughs)

<u>list 3</u>: contents Stem + T of verb stems ending in
a tense vowel (a 2 symbol vowel).

function: (1) -T after tense vowel belongs
to the stem unless the form is
listed here. If the -T can be
both a suffix and part of a stem,
the form is marked as ambiguous.

(2) Final -D after a tense vowel
belongs to the stem unless the
form, after substitution of -T
for -D, is found in this list.
In principle ambiguities are
dealt with as under (1). The two
kinds of ambiguity are differently
marked.

examples: VLEIT (flatters); this list form also
corresponds to GEVLEID (flattered).
SPUIT (amb. according to (1): sluices;
sprouts);
this form also corresponds to GESPUID
(not amb.: sluiced)

.

KRUIT (carts with wheel barrow);
the form also corresponds to GEKRUID
(amb. acc. to (2): carted with a
wheel barrow; seasoned)

list 4: contents: Stems whose last letters are -EN
        function: Imperatives ending in -EN are
                  treated as infinitives unless found
                  in this list.
        example: REKEN (calculate)

list 5: contents: Infinitive forms with suffix -N.
        function: (1) Infinitives found in this list
                      have no suffix -EN.
                  (2) A -T after a tense vowel in a
                      present singular, replaced by
                      -N belongs to the stem unless
                      the form is found in the list.
        example: GAAN (to go); the form also corresponds
                  to GAAT (goes)

list 6: contents: Strong past participles that do not
                  end in -EN.
        function: Participles that are found in this
                  list are strong.
        examples: GEWEEST (been)
                  GEHAD (had)

list 7: contents: Weak past pariciples whose stems
                  end in consonant + D.
        function: The -D after a consonant $\neq$J constitutes
                  a suffix unless the text form is found
                  in the list; a -D is ambiguous if a
                  form is marked to that effect.
        examples: GEROND (rounded)
                  GESPELD (amb.: pinned or spelled)

list 8: contents: Past participles derived from stems
                  containing a non past participle
                  marking prefix GE-.
        function: GE- is ultimately a participle marking
                  prefix unless a form is found in
                  this list. If a verb stem exists
                  with and without GE- the form is
                  marked as ambiguous.
        examples: GEBRUIKT (used)
                  GETROOST (amb.: comforted or spared)

list 9: contents: Irregular present tenses.
        function: Forms found in this list are irregular.
        examples: BEN (am)
                  KOM (come)

list 10: contents: Strong plural preterites which end
                   in -TEN and are compatible with the
                   phonotactic constraints on preterite
                   formation.
         function: Preterites on -TEN after a voiceless
                   sound are regular unless found in
                   this list.
         examples: DACHTEN (thought)
                   KOCHTEN (bought)

list 11: contents: Strong plural preterites ending in
                   -DEN after a voiced consonant ≠D.
         function: Preterites on -DEN after a voiced
                   consonant ≠D are regular unless found
                   in this list.
         example: KONDEN (could)

4.3. Results.

After the analysis of each text form the absolute frequen-
cies of the resulting form-function correlates are ad-
ministrated in a 20 by 25 matrix in which cells are reserved
for each of the possible 500 combinations of forms and
grammatical functions.
On completion of the analysis of all the verbs in the corpus
marginal totals and frequencies relative to row total and
grand total were calculated. In table V (1) to (25) the
functional possibilities are given per form class. Their
absolute frequencies of occurrence as well as their frequen-
cies relative to the grand total (104,528) are specified.
The subtotals indicated in these tables represent the abso-
lute and relative frequencies of occurrence of each form
class. The subtotalled frequencies for functions are given
in table VI.
We shall now summarize the most important frequency charac-
teristics of the form-function correlate system.
It appears that about 40 % of the Dutch verb forms as used
in texts are strong and/or irregular. The most frequent
regular form class is -EN (25 %), followed by -T (12 %).
The remaining 23 % is spread over the other 22 form classes.
Within the group of ambiguous form classes none is more
frequent than 0.5 %. The most frequent function in texts
is 3 pres sing (25 %), the second place is taken by the
infinitives (21 %), third is 3 past sing (17 %), and past
participles constitute the fourth most frequent class (16 %).
The most frequent form-function correlates are -T; 3 pres
sing (87%/11%) and -EN : (72%/17%).

5. Conclusions and prospects.

In a later stage of the investigation the results obtained
above will be applied to two problems. The first application
has already been mentioned in the introduction, and involves
a correlation of the objective frequency data with the
results of psycholinguistic reading experiments conducted

by the first author, in an attempt to explain certain aspects
of reading behaviour in terms of linguistic expectancy
(e.g. Van Heuven, 1976a). As a second application attempts
have been made to estimate the consequences of certain
spelling reform proposals in terms of reduction of informative-
ness of verb suffixes. For this purpose all verbs whose
suffixes could possibly be affected by spelling reforms
were identified and additionally counted, so that now the
data of three form-function correlate systems are available
(Van Heuven, 1976b).

REFERENCES

Uit Den Boogaart, P.C. (1974) : Voorschriften lexicale
    codering in het systeem C3C, stencil, TH-Eindhoven.

Uit Den Boogaart, P.C. (1975) · Woordfrequenties van ge-
    schreven en gesproken Nederlands, Oosthoek, Scheltema
    en Holkema, Utrecht.

Van de Craen, P. (1973) · The automatic conjugation of Dutch
    verbs in the simple present, ITL-review of applied
    Linguistics, 20 45-60.

Eeckhout, R. (1968) : De werkwoorden met vocaalwisseling in
    het Nederlands, ITL-review of applied linguistics,
    1/23-32.

Gibson, E J. and L Guinet (1971) · The perception of in-
    flections in brief visual presentations of words,
    Journal of verbal learning and verbal behavior, 10:
    182-189.

Gladney, T.A., and E.E Kralee (1969) · The influence of
    syntactic errors on sentence recognition. Journal of
    verbal learning and verbal behavior, 6·692-698.

Greenberg, D. (1970) : Preferential attention to grammatical
    units, unpublished paper, Dept. of Psychology, Cornell
    University.

Van Heuven, V.J.J.P (1976a) · Effects of person marking
    suffixes in the present singular in Dutch, obtained
    from oral and silent reading tasks, PRIPU, 1(2):26-35.

Van Heuven, V.J.J.P (1976b) . An estimation of the effects
    of some Dutch spelling reform proposals in terms of
    reduction of transmitted information in verb inflections,
    PRIPU, 1(2)·61-72.

Kruyskamp, C. (1961) · Van Dale, Groot woordenboek der Ne-

derlandse Taal, Nijhoff, Den Haag.

Lyons, J. (1968) : Introduction to theoretical linguistics, Cambridge University Press, Cambridge.

Murrell, G.A. and J. Morton (1974) : Word recognition and morpheme structure, Journal of experimental psychology, 102:963-986.

Nieuwborg, E.R. (1969) . Retrograde woordenboek der Nederlandse taal, Plantyn, Antwerpen.

Wanat, S. (1971) : Linguistics structure and visual attention in reading, unpublished doctoral diss., Cornell University.

NOTES
_____

1) Department of Phonetics, R.E. Utrecht, (Z.W.O. contract).

2) Department of General Linguistics, R.U Utrecht.

3) Not concerning separable adverbial or prepositional elements such as WEG in WEGGAAN (to go away).

4) Prefix GE- may show up as an infix in compound words such as OVERSCHILDEREN (to paint again) OVERGESCHILDERD (painted again).

5) This analysis is imperative if it is assumed that -TEN and -DEN are the only weak verb plural past tense morphemes.

6) The classes left out of consideration are vacuously numbered in the tables, mainly for our own convenience.

7) We thank P.C. Uit den Boogaart of Eindhoven Technical University for putting material at our disposal before its official release was due.

8) Unfortunately ZITTEN (to sit) and BIDDEN (to pray) were found ambiguous.

9) The third element in a sequence of three vowel symbols fulfills a consonant function.

10) Function classes 13-18 and 23 are left out for reasons explained under § 4, p. 41.

11) Presence due to coding errors in the Uit Den Boogaart (1975) corpus.

APPENDIX : LOOK-UP LISTS

Word				Word				Word				Word				Word		
01 AANHEFT		T	*	01 DOORBERST	S	T		01 KIST	S	T		01 PARLEMENT	S	T		01 TOERUST	S	T
01 AANHORT	S	T		01 DOORMEST	S	T		01 KLUFT	S	T		01 PART	S			01 TOETAST	S	T
01 AANRIST	S	T	*	01 DOORTAST	S	T		01 KNOERT	S	T		01 PAST	S	T		01 TOOST	S	T
01 AANROEST	S	T		01 DOORZULT	S	T		01 KORST	S	T		01 PERMANENT	S	T		01 TRAMMELANT	S	T
01 AANSTAART		T	*	01 DORST		T	*	01 KORTSTAART		T	*	01 PEST	S			01 TRANT	S	T
01 AANTAST	S	T	*	01 DRIFT		T		01 KORT		T	*	01 PINT		T		01 TROOST	S	T
01 AFBAST	S	T	*	01 DRUIPSTAART		T		01 KOST		T		01 PLANT		T		01 TRUNT	S	T
01 AFBERST	S	T		01 EEST	S	T		01 KRENT		T		01 POEST	S			01 TRUST	S	
01 AFGEEST	S	T		01 ELUST		T		01 KROONENT	S	T		01 POLIJST	S	T		01 TWIST		T
01 AFHEFT		T	*	01 ENBERST		T		01 KWAST	S			01 POST	S			01 UITBERST	S	T
01 AFKIST	S	T		01 ENT	S	T		01 KWEEST	S	T		01 PRENT		T		01 UITENT		T
01 AFKORT	S	T		01 FEEST	S	T		01 KWIKSTAART	S	T		01 PROEST	S			01 UITGAST	S	T	*
01 AFKWAST	S	T		01 FLIRT	S	T		01 KWIST	S	T		01 PUNT	S			01 UITGIST	S	T
01 AFLAST	S	T		01 FLORT	S	T		01 LANTERFANT	S	T		01 RAMENT	S	T		01 UITMEST	S	T
01 AFMEST	S	T		01 GARST	S	T		01 LAST	S	T	*	01 REDETWIST	S	T		01 UITPOEST	S	T	*
01 AFMLST	S	T	*	01 GAST	S	T		01 LIFT		T	*	01 RENT		T	*	01 UITSPANT	S	T
01 AFRIST	S	T	*	01 GEERT	S	T	*	01 LIJST		T	*	01 REST		T		01 UITTART		T	*
01 AFROEST	S	T		01 GELAST	S	T		01 LUST	S			01 RIST		T	*	01 UITVENT	S	T
01 AFSCHAFT		T	*	01 GERST	S	T		01 MARKT	S	T		01 ROEST		T	*	01 VAALT		T	*
01 AFSCHART	S	T	*	01 GEST	S			01 MAST	S			01 RONDTAST	S	T		01 VALT		T
01 AFSTAART		T		01 GETROOST		T		01 MEST	S			01 RONDVENT	S	T		01 VAST	S	T
01 AFTAST	S	T		01 GIST	S		*	01 MISTAST	S		*	01 ROOST		T	*	01 VEEST	S	T	*
01 AFVENT	S	T		01 GNORT	S		*	01 MIST	S		*	01 RUST		T	*	01 VELT	S	T
01 BALLAST	S			01 GRINT	S	T		01 MUNT				01 SCHAFT		T		01 VENT	S	T
01 BARST	S			01 HAAST	S			01 MYST				01 SCHART		T		01 VERBEEST	S	T
01 BEANGST	S	T		01 HARST	S	T		01 NAAST				01 SCHEFT		T		01 VERBEURT		T
01 BEKIST	S	T		01 HART	S			01 NAGIST			*	01 SCHENDEVENT		T		01 VERDORST	S	T
01 BEKORT	S			01 HEFT	S	T		01 NEST				01 SCHIFT	S	T		01 VEREELT	S	T
01 BELAST	S	T		01 HENGST	S	T		01 OMENT	S			01 SCHOFT	S	T		01 VERGAST	S	T
01 BELAST	S	T		01 HOEST	S	T		01 OMLIJST	S			01 SCHORT	S	T		01 VERGIFT	S	T
01 BEMAST	S	T		01 HOPPEKEEST	S			01 OMTAST	S			01 SEXT	S	T		01 VERGIST	S	T	*
01 BEMEST	S	T		01 HORST	S	T		01 OMVENT	S			01 SHUNT	S			01 VERHAAST	S	
01 BEPORT	S																		

Column 1

Mark	No.	Word
T*	01	BERENT
T*	01	BERST
S T	01	BERUST
S T	01	BETAST
S T	01	BETWIST
T	01	BEVERSTAART
T	01	BEZWELT
S T	01	BIJTINT
S T	01	BILJART
	01	BLOKSTAART
T*	01	BOERT
S T	01	BOFKONT
S T	01	BONT
S T	01	BRULLOFT
S	01	BULT
T*	01	BUURT
S T	01	CEMENT
S T	01	WEGROEST
S	01	WHIST
S T	01	WISPELSTAART
S T	01	WORTELENT
S	01	ZANT
S	01	ZIFT
S	01	ZILT
S T	01	ZOOGENT
S T*	01	ZULT
T	01	ZWALUWSTAART
S	01	ZWART
S T	02	ALACHT
S T	02	COACHT
S T	02	DLACHT
S T	02	DOUCHT
S	02	ELACHT
S	02	FLACHT
S	02	GRIJNSLACHT

Column 2

Mark	No.	Word
T*	01	HORT
T*	01	INENT
S T	01	INGAST
S T	01	INKORT
S T	01	INKT
T	01	INLIJST
T	01	INPRENT
S T	01	INROEST
S T	01	INZULT
T*	01	KAART
S T	01	KAFT
S T	01	KANT
S T	01	KARST
S T	01	KAST
T*	01	KEEST
S T	01	KERST
S T	01	KIFT
S T	03	BRANIET
S T	03	BREIT
S	03	BRIJT
S T	03	BRUIT
S T	03	BUIT
S	03	CORVEET
S	03	DIJT
S T	03	DOET
S T*	03	DOMINEET
T	03	DOORBREIT
	03	DOORSPUIT
S	03	ECHOOT
S T	03	ELIET
S	03	FARIZEET
S T	03	GAAT
S	03	GEIT
S	03	GLEET
S	03	GREIT

Column 3

Mark	No.	Word
T*	01	ONTBAST
S T	01	ONTKIST
S T	01	ONTLAST
S T	01	ONTMAST
T*	01	ONTSTAART
S T	01	OOGST
S T	01	OOST
S T	01	OPENT
T	01	OPGIST
S	01	OPKORT
T*	01	OPSCHAFT
S	01	OVERLEST
S T	01	OVERENT
T*	01	OVERKIST
T*	01	OVERLAST
S T	01	OVERTAST
S T	01	PAART
S T	03	OPLUIT
T	03	OPRUIT
S T	03	ORIET #
S	03	OVERLUIT
T*	03	PEET
S T	03	PEUT
S	03	PLEIT
S	03	REIT
S T	03	RIJT
S	03	ROEKOET
T*	03	RUIT
S T	03	SCHREIT
S T	03	SHAMPOOT
S T	03	SKIET
S T	03	SPIET
S T*	03	SPREIT
S	03	SPUIT #
S T	03	STAAT

Column 4

Mark	No.	Word
T	01	SLAPSTAART
T*	01	SLIERT
T*	01	SMALHART
S T	01	SMART
T	01	SMELT
S T	01	SPEELTENT
S	01	SPRINT
S T*	01	SPURT
T*	01	START
S	01	STORT
T*	01	STUNT
T*	01	TART
T	01	TAST
T*	01	TEMPEEST
S	01	TENT
T*	01	TEST
T	01	TINT
T	04	BEJEGEN
T	04	BEKEN
S	04	BEOEFEN #
T*	04	BEREN
T	04	BEROKKEN
T	04	DOORPEN
	04	DOORREN
S	04	DTEKEN
T	04	EFFEN
T	04	EIGEN
S	04	EREKEN
	04	ERKEN #
	04	ERREKEN # #
	04	ETEKEN
	04	FTEKEN
	04	GEILIKEN
T	04	GEWEN
T	04	GOEDKEN

Column 5

Mark	No.	Word
S T	01	VERINTEREST
S T	01	VERINTREST
S T	01	VERKORT
T*	01	VERLEEST
S	01	VERMEST
S T	01	VERROEST
S T*	01	VERTAST
T	01	VERTROOST
S T	01	VERVILT
S T	01	VEST
S T	01	VETMEST
T *	01	VIJST
T *	01	VILT
S T	01	VOORTHAAST
S T	01	VOORTTWIST
T *	01	WANT
S T	01	WEGHAAST
T	04	OMREKEN
T	04	OMREN
T	04	ONDERKEN
T	04	ONTCHRISTEN
T	04	ONTEIGEN
T	04	ONTKEN
T	04	ONTKERSTEN
T	04	ONTPEN
T *	04	ONTWEN
T	04	OPKLJUWEN
T	04	OPPEN
T	04	OPREKEN
T	04	OPREN
T	04	OPROKKEN
T	04	ORDEN
T	04	OVEN
T	04	PEN
S	04	PTEKEN

Code	Word	Flags
02	JOECHJACHT	S T
02	JUICHT	S T
02	KROCHT	S T
02	KUCHT	S T
02	LACHT	T
02	LLACHT	S
02	LUNCHT	S T
02	LYNCHT	S T
02	MATCHT	S T
02	MLACHT	S
02	NLACHT	S
02	POCHT	S
02	PRACHT	S T
02	RACHT	T
02	RLACHT	S
02	SPEECHT	S T
02	TLACHT	S
02	VERINDISCHT	S T
03	AANBREIT	S
03	AAT	T
03	AFBUIT	T
03	AFLUIT	T
03	AFRUIT	T *
03	AFSPUIT	T *
03	ALIET	S T
03	ARIET	S
03	AUTOOT	S T
03	BAKKELEIT	S T
03	BEIT	S T
03	BELUIT	T
03	BETIJT	S T
04	VRIJKEN	T
04	WEN	T
04	WIELPEN	T
04	ZEGEN	S

Code	Word	Flags
03	HEIT	S T
03	HEROOT	S T
03	HOET	S T
03	HOEZELT	S T *
03	ILIET	T
03	INLUIT	S T
03	JIJT	S T
03	JUDOOT	S T
03	KARWEIT	S T
03	KEUT	S
03	KLAPPEIT	S T
03	KLEIT	S T
03	KNIET	S
03	KRUIT	S T
03	KUKELEKUUT	S *
03	LAAT	S T
03	LANTERLUIT	S
03	LAVEIT	T
03	LEIT	S
03	LUIT	T
03	MANDIET	T T
03	MEIT	S T
03	MENIET	S
03	MIET	S
03	NALUIT	T T
03	NEIT	S T
03	NEURIET	S
03	OLIET	S
03	OMLUIT	S T
03	ONTTUIT	S T
03	ONTWEIT	S T
07	HARD	S
07	HORD	S T
07	INWEND	T
07	KAARD	S

Code	Word	Flags
03	SUIT	S
03	TAXIET	S
03	TEAT	S T
03	THEET	S T
03	TLIT	S T
03	TUIT	# T *
03	UITBUIT	T *
03	UITLUIT	S T
03	UITRUIT	S T
03	UITSPUIT	S T
03	VERLEIT	S T
03	VERTUIT	S T
03	VLEIT	S
03	VLIJT	S T *
03	VRIJT	S T
03	ZIET	# S S
03	ZIJT	T
03	ZUIT	S
03	ZWEIT	# # S T
04	AANPEN	T T
04	AANSCHEN	T
04	AANKEN	S
04	AFMEN	S
04	AFPEN	S
04	AFREKEN	# T
04	AFREN	T T
04	AFWEN	S
04	ALKEN	S
04	ARMPEN	#
04	AUTOREN	T T
04	BAKEN	S T
07	VERMOORD	S T
07	VERSCHULD	S T
07	VERSPELD	S T
07	VOLEIND	S

Code	Word	Flags
04	GTEKEN	S
04	HAVEN	T
04	HERKEN	T
04	HERSEN	S
04	HOOFDREKEN	T
04	INMEN	T *
04	JEN	T *
04	JTEKEN	# T
04	KEN	T
04	KERSTEN	S T
04	KETEN	# T *
04	KLUWEN	T
04	KRUISSCHEN	S
04	KTEKEN	S
04	LIJKEN	# T
04	LOOCHEN	S
04	LTEKEN	S
04	MEN	S T
04	MISKEN	S T
04	MISTEKEN	T
04	MORGEN	T
04	MOTORREN	T
04	NAREKEN	T
04	NAREN	T
04	NATEKEN	T
04	NEERPEN	T
04	NKETEN	T
04	NREKEN	T
04	NREN	T
04	NTEKEN	T
04	OEFEN	S
10	DACHTEN	S T
10	KOCHTEN	S T
10	MOESTEN	S T
10	SMOLTEN	S

Code	Word	Flags
04	REGEN	S
04	REKEN	T
04	REN	T
04	ROKKEN	T
04	RONTGEN	T
04	RTEKEN	T
04	RUFEN	T
04	SASKEN	T
04	SCHEN	T
04	SREKEN	S T *
04	STEVEN	S T *
04	TEKEN	T
04	TKETEN	S
04	TOEEIGEN	T
04	TOEKEN	T
04	TOEPEN	S T *
04	TREKEN	S
04	TREN	S
04	TTEKEN	S
04	UITOEFEN	T
04	UITPEN	T
04	VARKEN	T
04	VASTPEN	T
04	VEREFFEN	T
04	VEREVEN	T
04	VERKEN	T
04	VERORDEN	S
04	VERREN	T
04	VERWEN	T
04	VIGGEN	T
04	VOORBIJREN	T