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A set of 57 line drawings standardized for Dutch: Norms for name agreement and picture-name agreement

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& Jónsson, 2000). When available, the normative studies have been useful in many fields of psychology, including memory and language. Concerning the study of language for instance, these databases have been used to study the processes involved in picture naming, and more generally in speech production (e.g., Levelt, Schriefers, Vorberg, Meyer, Pechmann, & Havinga, 1991). These normative data have also been very useful in the field of perceptual identification and recognition, and implicit memory. The picture sets can be of service to a variety of paradigms and experiments, each with its specific requirements. And as specified pictures become increasingly available, experimenters can select or adjust pictures more successfully and carry out additional standardizing if necessary.

This article will present 57 black and white line drawings, all but nine newly created for experimental purposes. Nine drawings stem from the existing Snodgrass and Vanderwart (1980) set, but, as all drawings, received new ratings by Dutch-speaking young adults. The ratings are to provide a normative database of original pictorial material useful for future studies with Dutch-speaking young adults. Originally, the drawings served as stimuli in psycholinguistic priming experiments, and therefore the reported study determined basic naming characteristics of the drawings. The remainder of this section will introduce variables retrieved for the submitted picture set.

First, name agreement refers to the degree to which participants agree on the name of the picture. Name agreement is specified by the proportion of participants selecting the particular name, and more precisely by the H-statistic described further on. When measuring name agreement, participants assign the name that first comes to mind. Pictures that elicit many different names have a lower name agreement than those eliciting a single name. Thus the number of different names given to a particular picture across subjects (i.e. the name response rate) can be taken as a rudimentary measure of the picture's unequivocality. The H-statistic includes the naming proportions and the name response rate, as shown below. Generally, one wants to establish pictures with relatively common names (as preferred by most participants) and with as few competing names as possible. Name agreement is a robust predictor of naming difficulty (independently of the word frequency effect). Spontaneously, pictures with a single or a dominant response are named more quickly and accurately than those with multiple likely responses. Name agreement information is important for naming latency studies, picture-name matching studies, recall memory studies and studies in which verbal encoding is manipulated.

Second, picture-name agreement refers to the degree of resemblance participants estimate between the actual picture and the way they would expect the depicted object to look. Participants are allowed to visualize the label read aloud by the experimenter, although not explicitly instructed to do so. Picture-name agreement can be seen as a variation of the image agreement task (Snodgrass & Vanderwart, 1980), in which subjects are explicitly instructed to form a 'mental image' of the label, and compare it to the subsequently presented picture. Roughly, both tasks amount to a measure of the match between a picture and its target name.

Third, the frequency of a word is an important factor in word recognition. Picture naming latencies decrease as name frequency increases (and increase as age of word acquisition increases). In other words, commonly used words are easier to recognize and are responded to more quickly than less common words (see Carroll & White, 1973; Jescheniak & Levelt, 1994; Oldfield & Wingfield, 1965). Possibly the influence of word frequency on learning, memory and perception depends on another attribute such as the

age at which the particular word was first learned (see for instance Brysbaert, Lange, & Van Wijnendaele, 2000). Also, the effect of frequency is not just due to differences between frequent and very frequent words (e.g., 'year' versus 'hermeneutic') where you would obviously expect a difference, but also between common and slightly less common words (e.g., 'rain' versus 'puddle'). It is therefore important to control for frequency in psycholinguistic experiments, ensuring that different conditions are matched (Harley, 2001).

METHOD

Participants. A total of 18 students from introductory courses in Psychology at the University of Leuven and four non-student adults participated in the study. All participants were native Dutch speakers and participated voluntarily. All students were run together in a classroom after a course activity. All four adult non-students participated together in a living room clearly separated from one another. Every participants had to complete all items of the study.

Materials. Fifty-seven black and white line drawings were prepared as targets (Appendix A). Each drawing represented a disyllabic word with syllables of equal graphemic size, amounting to 4-, 6-, or 8-letter words (Appendix B). These words were singled out in the the Dutch component of the CELEX lexical database (Baayen, Piepenbrock, & Van Rijn, 1993; Burnage, 1990). Compound words were avoided as much as possible and target words referred to such objects or scenes that naming responses would be singular nouns. The available subset of disyllabic words was sampled for the most depictable, familiar, and concrete target words to avoid naming ambiguity as much as possible. Several sources of naming ambiguity were taken into account: the represented concept, the picture's composition and complexity, the number of potential names for the depicted object and sub-objects, and the average participant's knowledge of concepts and accessibility of the corresponding names. Some concepts are, by their very nature, not ambiguously depictable, for instance concepts of relationship ('sister', 'daughter', 'uncle'), mass nouns ('air', 'water', 'wood') and abstract concepts such as 'liberty', 'time', 'honesty' (Snodgrass & Vanderwart, 1980). Also, some concepts can be referred to by more than one name, whereas for unfamiliar concepts no name is retrieved even when recognized as exemplars of a particular category (e.g.,, the vegetable 'artichoke').

The drawings were found in Microsoft Clip Gallery ©, Corel Clipart ©, and the Snodgrass and Vanderwart (1980) set (numbers 48, 67, 88, 100, 131, 172, 221, 233, and 251). The Snodgrass and Vanderwart pictures were found highly appropriate for the originally intended priming studies, and they were therefore included in the Dutch-language ratings. The other drawings were edited and standardized using Adobe Photoshop© and Adobe Streamline©. Colored drawings were rendered black and white, and filled surfaces were reduced to their contours in order to obtain lines and line drawings. Sometimes part of a drawing was erased and often lines were added. Edge width was frequently adjusted and edges were accented, sharpened, brightened, or smoothened. All drawings were centered on a 16.12 x 12.09 cm. white canvas with 72 pixels per inch at a screen resolution of 1024 x 768 pixels. At a viewing distance of 80 cm. and at the same resolution, the pictures subtended visual angles between 2.15° and 7.88° horizontally and 2.87° and 7.16° vertically. The image files were saved in .psd (original version), .jpeg (compressed version), and .bmp (stimulus version) file-formats. The line drawings were printed on transparent slides to be projected in front of the participants.

Procedure. First, participants were read the instructions and were introduced to the purpose of the task: providing

normative measures for line drawings and their corresponding names to obtain a pictorial database useful for future studies. The experimenter pointed at the non-evaluative nature of this collective test and complete anonymity was ensured. Participants were encouraged to answer attentively and consistently and were gently required not to skip any item or picture. A second set of instructions informed the participants about the general nature of the pictures and the task at hand, illustrated by an non-experimental example. Individual answer sheets were handed out together with a copy of the instructions. Participants were given a 5-min period to read these and had ample opportunity to voice any difficulties.

Fifty-seven pictures were then projected in randomized order on a large white screen at the front of a slightly darkened room using an overhead projector. Each slide was presented for a period of approximately 5 s after which participants could write down the required ratings. Participants had been instructed to identify the drawing with the first name that came to mind and to write the name on the answer sheet. The name should consist of one single word only, and it should reflect the entire picture, not part of it. If the drawing represented a scene, participants had to name the scene on the whole and not every constituting object. If impossible to name, participants indicated the exact reason for the naming failure. Possible reasons are not knowing the object, knowing the object but not its name, and knowing the object and its name but it's left on the tip of the tongue. An additional column was provided for other names that came to mind. This naming task was alternated with the picture-name agreement task. As soon as the naming task had been completed for a particular picture, participants were read the target name while the projected picture remained on screen. Participants judged how closely each picture matched the way they expected the object to look (they were not explicitly instructed to form a mental image of the mentioned name). The degree of agreement between the picture and its name was rated on a 5-point scale from 1 signifying 'no match at all' to 5 indicating 'a strong match' with 3 meaning 'don't know' (also applicable in case of naming failure). In all, the assignment took about 30 min.

RESULTS AND DISCUSSION

The data analysis roughly follows the approach taken by Snodgrass and Vanderwart (1980). Derivatives such as misspellings, unconventional abbreviations (e.g., 'coff.-can' for 'coffee-can'), and diminutives were categorized as the name they stem from. Conventional abbreviations (e.g., 'wc' for 'toilet'), as well as elaborations and compounds were counted separately (even when containing words mentioned as names, e.g., 'index finger' for 'finger'). When a participant provided two or more names, only the first name was counted (e.g., 'car' for 'car, automobile'), and no quantifiers, prefixes, or suffixes accompanying a name were retained.

Two scores for name agreement were computed for each picture. The proportion of name agreement reports what proportion of a picture's naming responses the most frequent name represents. A higher number signifies greater name agreement. Only responses constituting dominant names add to the score. A second and more strict measure, the H-statistic, is a generally used measure of entrophy, and captures information about the distribution of naming responses. As the H-value decreases, name agreement increases. The H- statistic of a picture was calculated by the formula

$$H = \sum_{i=1}^{k} p_i \log_2 (1 / p_i)$$

It includes the name agreement proportion p_i for every different naming response i

(i.e. not only for the most frequent name) and also the number of different names given to the picture across subjects (i.e. the name response rate k). The summation and the H value become larger as more different names are assigned to a picture whereas an increase in the name agreement proportion for a particular response leads to a logarithmic decrease with an increased weight. The two factors level off so that pictures with a dominant response receive a lower H-value (a higher name agreement) than pictures with multiple responses each about just as likely, or than pictures with an equally likely response but a larger amount of competing responses (pictures eliciting the same naming reponse in all participants receive an H value of .00). Thus the dominant response is defined by the number of competing responses and the number of participants preferring the particular response compared to other responses.

General descriptive statistics were calculated for both measures of name agreement, the name response rate, and the picture-name agreement ratings (see Table 1). Appendix B summarizes this information for each picture separately and includes word frequency. The INL lemma frequency was derived from the Dutch component of the CELEX lexical database, in counts per million (Baayen, Piepenbrock, & Van Rijn, 1993). The entire dataset is available upon request. Appendix C lists the naming failures, if any, for each picture; the naming failures are discussed there.

Ten of the 57 drawings receive an H value of 0.00 (perfect name agreement), and another eight drawings have an H value smaller than 0.33. However, name agreement is not always striking; some line drawings (e.g., 'muslim') were named without any agreement. Such outliers explain the large range in name agreement and name response rate (as well as the relatively high standard deviation). The negative skew of the H distribution (name agreement proportion and name response rate are distributed symmetrically) indicates the number of outlying high H values (low name agreement) is relatively limited. The interquartile range is unaffected by outliers and considerably smaller: the 25th and 75th percentile are relatively close to the median. Hence, the mean and median can be considered representative for most drawings. In general, participants gave an average of 3.42 names to each picture, of whom the dominant name was mentioned three out of four times (agreement proportion of 0.73). This corresponds to a mean H value of 1.00. Furthermore, in nine drawings, the most frequently mentioned name differed from the intended name, that is the target naming response required in the planned psycholinguistic priming experiments (see Appendix C). Nevertheless, these drawings are reported as they remain useful for experiments in which their most frequent name suffices. The rating study originally served for stimulus selection as required by the planned experiments, but drawings or names undesired in one experimental setting may still suit another well. Actually, when an introduction of the target names is allowed to precede the experiment, every more frequent name may be eligible as target name. This is for instance common practice in the picture-word interference paradigm (e.g., Lupker, 1982; Posnansky & Rayner, 1978).

The rating-study was aimed at selecting useful picture stimuli for psycholinguistic experiments, and therefore started out with a limited subset of words optimalized for several linguistic characteristics (number of syllables, syllable size, and especially allowing for all possible prosodic patterns to occur among the selected target words) and for the experiments at hand (avoiding words that were already selected as primes, or that related to prime words in an undesired fashion). Only then could drawings be constructed and could the selected target words be searched for depictable, familiar, concrete words. This explains why name

agreement is only fairly high, and why other than target names can be most frequent. However, competing naming responses show that in case of a lesser name agreement, participants still agree on the concept of the drawing. The other names represent sub-objects or (near-) synonyms, or they stem from another level of categorisation, or at least indicate the participant grasps the drawing's meaning (except for 'duikbril' perhaps; see Appendix C). For instance one participant says 'knife' instead of 'pocket knife' and another participant prefers 'tool'. Structurally, these drawings appear to be clear, but they have many possible names.

All target names, also when not most frequent, score high on picture-name agreement. Mostly, the participants' expectation of the word's appearance matches the presented picture. Mean, median, 25th percentile, and 75th percentile are all well above 4, and the minimum score is only slightly below 4 (4 indicating 'a match' on the 5-point scale). Standard deviation and range are limited. Seven drawings score between 3.5 and 4 indicating some doubt about their picture-name agreement, but not enough to consistently abstain (3 on the scale) or decide against a match (2 on the scale). Notice picture-name agreement has been measured for the target names, and Appendix B shows the most frequent names only. Refer to Appendix C for the words the agreement ratings apply to: it displays target names (and their frequency) if different from the most frequent names.

Insert Table 1 here

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Authors Note

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The 57 line drawings are freely available upon request. They can be used, adjusted, and further standardized as required, for noncommercial research involving Dutch-speaking participants. Experimenters are kindly requested to properly refer to this paper.

Table 1

Summary statistics for name agreement of most frequent name, picture-name agreement of target name, and name response rate

	Name Agreement		Picture-name Agreement	Name Response Rate
	H	p_i		
Mean	1.00	0.73	4.59	3.42
SD	0.74	0.21	0.42	2.23
Median	0.99	0.75	4.75	3.00
Minimum	0.00	0.18	3.61	1.00
Maximum	3.05	1.00	5.00	13.00
Range	3.05	0.82	1.39	12.00
Q1	0.31	0.56	4.33	2.00
Q2	1.54	0.94	4.94	4.00
IQR	1.23	0.38	0.61	2.00
Skew	0.81	1,00	0.45	1.00

Note. H = name agreement H-statistic (increasing H values indicate decreasing name agreement); p_i = name agreement proportion of most frequent name; SD = standard deviation; Q1 = 25th percentile; Q3 = 75th percentile; IQR = interquartile range; Skew = (Q3 - Mdn) / (Mdn - Q1) ; <1 is negatively skewed.

APPENDIX A

The 57 pictures numbered and ordered alphabetically according to the most frequent names assigned to them by the participants. The corresponding picture names and norms are listed in appendix B.

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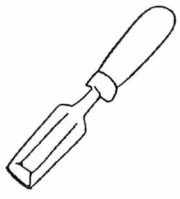

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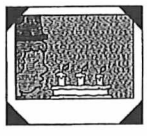

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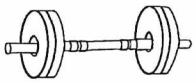

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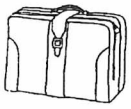

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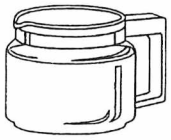

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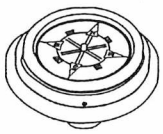

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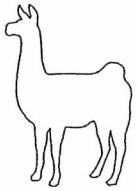

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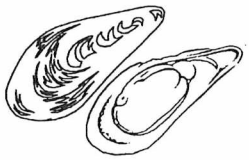

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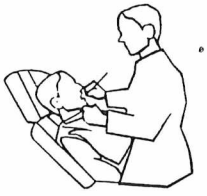

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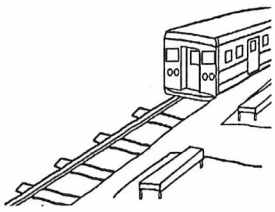

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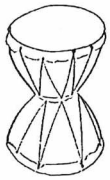

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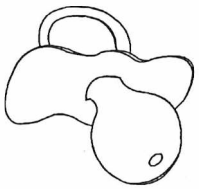

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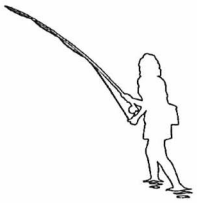

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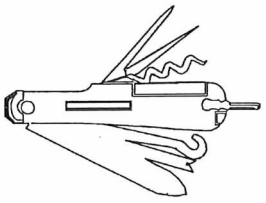

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APPENDIX B

Most frequent names and norms for the pictures, referred to by their identifying number in Appendix A. The following information is displayed: (1) the identifying number of each picture; (2) most common name (i.e. the naming response that was elicited most frequently) in Dutch and (translated into) English; (3) two measures of name agreement, H and proportion agreement; (4) the mean and standard deviation for ratings of image agreement; (5) name response rate (the number of different names that came up first); (6) and CELEX frequency counts of the most frequent name (n / million).

	Most frequent name (in Dutch)	Most frequent name (in English)	name agree		picture-name agree		Name response	Word frequency
			H	*Proportion*	*M*	*SD*		
1.	Auto	Car	0,00	1,00	4,94	0,24	1	208
2.	Baby	Baby	0,31	0,94	4,89	0,32	2	79
3.	Bakker	Baker	0,00	1,00	5,00	0,00	1	13
4.	Balkon	Balcony	0,99	0,81	4,17	1,10	4	17
5.	Ballet	Ballet	1,79	0,61	4,78	0,43	6	4
6.	Ballon	Balloon	0,00	1,00	5,00	0,00	1	6
7.	Balpen	Ball-pen	1,50	0,61	4,44	1,04	4	2
8.	Beitel	Chisel	1,77	0,53	4,22	0,32	5	3
9.	Beker [a]	Cup	0,65	0,83	4,44	0,51	2	15
10.	Bijbel	Bible	0,00	1,00	4,89	0,47	1	25
11.	Bloem [a]	Flower	1,29	0,44	3,94	1,06	4	94
12.	Boeddhist [a]	Buddhist	2,18	0,41	3,61	1,04	6	2
13.	Boerin	Farmer's wife	1,94	0,61	4,33	0,97	7	11
14.	Bonsai	Bonsai	1,17	0,65	4,94	0,24	3	0
15.	Cactus	Cactus	0,00	1,00	4,89	0,32	1	3
16.	Dollar	Dollar	2,12	0,44	4,67	0,49	7	43
17.	Duikbril	Diving-glasses	1,49	0,64	3,67	1,57	4	0
18.	Fakkel	Torch	1,46	0,56	4,61	0,24	4	5
19.	Fondue	Fondue	1,90	0,50	4,17	1,20	8	0
20.	Foto	Picture	1,71	0,44	4,00	1,14	4	107
21.	Gieter	Watering-can	0,00	1,00	5,00	0,24	1	1
22.	Halter	Bar-bell	1,53	0,44	4,44	0,00	3	1
23.	Handdoek	Towel	1,34	0,67	4,72	0,46	4	16
24.	Judo	Judo	0,81	0,75	5,00	0,00	2	1
25.	Kikker	Frog	1,00	0,00	4,94	0,24	1	9
26.	Kiwi	Kiwi	0,81	0,75	4,75	1,20	2	2
27.	Koffer	Handbag	1,40	0,67	4,83	0,24	4	49
28.	Koffiepot [a]	Coffee-can	1,23	0,56	3,89	0,83	3	1
29.	Kompas	Compass	0,61	0,89	5,00	0,00	3	4
30.	Krokus	Crocus	0,81	0,75	4,50	0,84	2	1
31.	Kuiken	Chick	0,00	1,00	5,00	1,26	1	3
32.	Ladder	Ladder	0,31	0,94	4,72	0,51	2	14
33.	Lama	Lama	0,32	0,94	4,78	0,65	2	2

34.	Melkboer	Milkman	0,50	0,89	5,00	0,00	2	2
35.	Moslim	Muslim	3,05	0,18	3,61	1,20	13	9
36.	Mossel	Mussel	0,80	0,83	4,67	1,06	3	4
37.	Oorbel	Earring	1,31	0,75	3,83	1,50	5	2
38.	Paleis [a]	Palace	1,98	0,35	4,00	0,77	5	32
39.	Parfum	Perfume	2,17	0,53	4,17	1,25	7	15
40.	Passer	Compasses	0,31	0,94	4,83	0,00	2	1
41.	Perzik	Peach	1,40	0,67	4,67	0,49	4	4
42.	Rugzak	Rucksack	0,31	0,94	4,94	0,24	2	8
43.	Snavel	Beak	1,95	0,56	4,56	0,51	6	10
44.	Tandarts	Dentist	0,31	0,94	4,94	0,24	2	13
45.	Tijger	Tiger	1,00	0,00	5,00	0,00	1	7
46.	Toilet	Toilet	0,99	0,56	4,89	0,32	2	19
47.	Trein [a]	Train	1,56	0,67	3,78	0,65	5	81
48.	Trommel [a]	Drum	1,30	0,55	4,39	0,70	4	20
49.	Tutter	Dummy	1,61	0,50	4,78	0,61	4	0
50.	Varken	Pig	0,31	0,94	5,00	0,57	2	23
51.	Vinger	Finger	0,99	0,56	4,89	1,04	2	157
52.	Visser	Angler	0,91	0,83	4,94	0,51	4	21
53.	Vogel [a]	Bird	1,62	0,56	4,22	0,88	4	96
54.	Walvis	Wale	0,31	0,94	4,94	0,24	2	3
55.	Wortel	Carrot	0,00	1,00	4,94	0,00	1	37
56.	Zakmes	Pocket-knife	0,61	0,89	4,89	0,32	3	2
57.	Zetel [a]	Seat	1,21	0,78	4,56	0,62	5	15

[a] Notice picture-name agreement has been measured for the target names, and this appendix shows the most frequent names only. For the names marked with [a], target names are not the most frequent names; refer to Appendix C for the target names and their word frequency.

APPENDIX C

Listing of five kinds of naming failures for each picture, referred to by its identifying number in Appendix A. Naming failure categories are: DKO (don't know the object), DKN (know the object, but don't know its name), TOT (know the object and its name but tip of the tongue), NA (no answer), and NE (non-existing word or dialect word). In case the most frequently assigned name differed from the target name, the two utter right columns display the target name, its translation, and its word frequency (between bracket).

Naming failure occurred sporadic. Two pictures show a frequent naming failure. Six participants did not recognize the object in the 'duikbril' picture. This picture was unclear to these participants, although they did see the diving glasses when mentioned afterwards. Also, the 'trommel' picture was assigned the same non-existing name by six participants: 'djembe' (though popular, an unofficial loan word) in all kinds of spelling variations. The naming failure does not point to a pictorial problem but is rather an organisational matter. Especially the 'duikbril' picture is preferably not used unless introduced by a target name beforehand (depending on the experimental requirements, this may or may not be possible). As naming failures were excluded when computing naming proportions and the H-statistic, the name agreement measures for 'duikbril' and 'trommel' are considered less indicative because six datapoints were left out.

	Most frequent name		**Naming failures**					**Target name (if different)**	
	in Dutch	**English translation**	DKO	DKN	TOT	NA	NE	in Dutch	English translation
								-	-
1.	Auto	Car	0	0	0	0	0	-	-
2.	Baby	Baby	0	0	0	0	0	-	-
3.	Bakker	Baker	0	0	0	0	0	-	-
4.	Balkon	Balcony	2	0	0	0	0	-	-
5.	Ballet	Ballet	0	0	0	0	0	-	-
6.	Ballon	Balloon	0	0	0	0	0	-	-
7.	Balpen	Ball-pen	0	0	0	0	0	-	-
8.	Beitel	Chisel	0	0	0	0	0	-	-
9.	Beker	Cup	0	0	0	0	0	Trofee (1)	Trophy
10.	Bijbel	Bible	0	0	0	0	0	-	-
11.	Bloem	Flower	1	1	0	0	0	distel (2)	thistle
12.	Boeddhist	Buddhist	0	0	1	0	0	monnik (4)	monk
13.	Boerin	Farmer's wife	0	0	0	0	0	-	-
14.	Bonsai	Bonsai	0	1	0	0	0	-	-
15.	Cactus	Cactus	0	0	0	0	0	-	-
16.	Dollar	Dollar	0	0	0	0	0	-	-
17.	Duikbril	Diving-glasses	6	0	0	1	0	-	-
18.	Fakkel	Torch	0	0	0	0	1	-	-
19.	Fondue	Fondue	0	0	0	0	0	-	-
20.	Foto	Picture	0	0	0	0	0	-	-
21.	Gieter	Watering-can	0	0	0	0	0	-	-
22.	Halter	Bar-bell	0	0	0	0	0	-	-
23.	Handdoek	Towel	0	0	0	0	0	-	-
24.	Judo	Judo	0	0	0	0	0	-	-

25.	Kikker	Frog	0	0	0	0	0	-	-
26.	Kiwi	Kiwi	0	0	0	0	0	-	-
27.	Koffer	Handbag	0	0	0	0	0	-	-
28.	Koffiepot	Coffee-can	0	0	0	0	0	Koffie (111)	Coffee
29.	Kompas	Compass	0	0	0	0	0	-	-
30.	Krokus	Crocus	0	0	0	0	0	-	-
31.	Kuiken	Chick	0	1	1	1	0	-	-
32.	Ladder	Ladder	0	0	0	0	0	-	-
33.	Lama	Lama	0	0	1	0	0	-	-
34.	Melkboer	Milkman	0	0	0	0	0	-	-
35.	Moslim	Muslim	0	0	1	0	0	-	-
36.	Mossel	Mussel	1	1	0	0	0	-	-
37.	Oorbel	Earring	2	0	0	0	0	-	-
38.	Paleis	Palace	0	0	0	0	1	Moskee (4)	Mosque
39.	Parfum	Perfume	2	0	1	0	0	-	-
40.	Passer	Compasses	0	0	0	0	0	-	-
41.	Perzik	Peach	0	0	0	0	0	-	-
42.	Rugzak	Rucksack	0	0	0	0	0	-	-
43.	Snavel	Beak	0	0	0	0	0	-	-
44.	Tandarts	Dentist	0	0	0	0	0	-	-
45.	Tijger	Tiger	0	0	0	0	0	-	-
46.	Toilet	Toilet	0	0	0	0	0	-	-
47.	Trein	Train	0	0	0	0	0	Perron (19)	Platform
48.	Trommel	Drum	0	0	1	0	6	Tamtam (1)	Tamtam
49.	Tutter	Dummy	0	0	0	0	0	-	-
50.	Varken	Pig	0	0	0	0	0	-	-
51.	Vinger	Finger	0	0	1	0	0	-	-
52.	Visser	Angler	0	0	0	0	0	-	-
53.	Vogel	Bird	0	0	0	0	0	Zwaluw (5)	Swallow
54.	Walvis	Wale	0	0	0	0	0	-	-
55.	Wortel	Carrot	0	0	0	0	0	-	-
56.	Zakmes	Pocket-knife	0	0	0	0	0	-	-
57.	Zetel	Seat	0	0	0	0	0	Sofa (9)	Sofa