

# A set of 150 pictures with morphologically complex English compound names: Norms for name agreement, familiarity, image agreement, and visual complexity

Niels Janssen · Petra E. Pajtas · Alfonso Caramazza

Published online: 18 March 2011  
© Psychonomic Society, Inc. 2011

**Abstract** We present a set of 150 pictures with morphologically complex English compound names. The pictures were collected from various sources and were standardized to appear as grayscale line drawings of a fixed size. All the compounds had two constituents and were primarily of the noun–noun type. Following previous studies, we collected name agreement (percentage and  $H$ ), familiarity, image agreement, and visual complexity norms, as well as frequency estimates for the whole compound word and its first and second constituents. These pictures and their corresponding norms (available from the Psychonomic Society's supplemental archive) are a valuable tool in the study of the morphological representation of complex words in language processing.

---

**Electronic supplementary material** The online version of this article (doi:10.3758/s13428-011-0065-0) contains supplementary material, which is available to authorized users.

---

N. Janssen  
University of La Laguna,  
Tenerife, Spain

P. E. Pajtas · A. Caramazza  
Harvard University,  
Cambridge, MA, USA

P. E. Pajtas · A. Caramazza  
Center for Mind/Brain Sciences, University of Trento,  
Trento, Italy

N. Janssen (✉)  
Grupo Neurociencia Cognitiva & Psicolingüística,  
Dpto. de Psicología Cognitiva, Social y Organizacional,  
Facultad de Psicología, Universidad de La Laguna,  
Campus de Guajara s/n - La Laguna,  
38205 Tenerife, España  
e-mail: njanssen@ull.es

**Keywords** Picture naming norms · Language · Compounds · Morphology

## Introduction

Much of the scientific progress in the field of cognitive psychology is due to the availability of standardized materials that allow for comparisons across studies and research groups. The set of standardized pictures collected by Snodgrass and Vanderwart (1980) has been particularly influential for researchers interested in the (neuro-) cognitive processes underlying word production (see, e.g., Goldrick, Folk, & Rapp, 2010; Hocking, McMahon, & Zubicaray, 2010; Strijkers, Costa, & Thierry, 2010). One shortcoming of these norms is that the pictures generally elicit monomorphemic names and are, therefore, unsuited for researchers interested in the question of how morphologically complex words are produced. To our knowledge, there are no standardized picture sets that elicit morphologically complex names. This situation clearly limits progress in the study of the role of morphology in language production, as evidenced by the relative paucity of studies on this topic (exceptions are Badecker, 2001; Bien, Levelt, & Baayen, 2005; Dohmes, Bölte, & Zwitserlood, 2004; Janssen, Bi, & Caramazza, 2008; Roelofs & Baayen, 2002).

In the present study, we sought to standardize and collect norms for a set of 150 pictures with morphologically complex names. Specifically, all pictures had English compound names (e.g., *windmill*). Each compound had two major constituents, and for each compound, the second constituent was a noun. While the majority of the 150 compounds were of the noun–noun type ( $n = 128$ ), there were also adjective–noun ( $n = 10$ ) and noun–verb ( $n = 12$ ) types. As in previous studies, for each picture, name agreement, familiarity, image agreement,

and visual complexity norms were collected (e.g., Alario & Ferrand, 1999; Cycowicz, Friedman, Rothstein, & Snodgrass, 1997; Dimitropoulou, Duñabeitia, Blitsas, & Carreiras, 2009; Sanfeliu & Fernández, 1996; Snodgrass & Vanderwart, 1980).

These norms have been shown to impact performance in a variety of tasks (see Alario et al., 2004, for an overview). *Name agreement*, which refers to the degree to which participants agree upon a name for a given picture, correlates negatively with picture-naming latencies (e.g., Lachman, Shaffer, & Hennrikus, 1974; Vitkovitch & Tyrell, 1995) and is unaffected by the frequency of the picture name (Lachman et al., 1974). *Familiarity*, which refers to the subjective familiarity with the concept that is depicted, has been shown to correlate negatively with lexical decision latencies (e.g., Gernsbacher 1984; Gordon, 1985). There is a discussion as to whether familiarity affects semantic or lexical processing (e.g., Balota, Pilotti, & Cortese, 2001). *Image agreement* refers to the degree to which participants judge their mental image of an object to be similar to an actually presented object. Previous studies have shown that this variable is negatively correlated with picture-naming latencies (Barry, Morisson, & Ellis, 1997). Finally, *visual complexity* refers to the complexity of the lining of an image and is thought to measure processes at early stages of picture processing. Previous research has either reported a negative correlation between visual complexity and picture identification (e.g., Ellis & Morisson, 1998) or has not found this variable to be influential (e.g., Snodgrass & Yuditsky, 1996).

The procedure of collecting the picture norms described below differed in an important way from the procedure used in previous studies (e.g., Alario & Ferrand, 1999; Snodgrass & Vanderwart, 1980). In previous studies, norms were typically collected in an untimed fashion; pictures were presented in a classroom setting, using a slide projector, to many participants simultaneously. Participants were then asked to write down their answers on a sheet of paper and were given ample time to prepare their responses (typically around 5 s). A general problem with this approach is that the setting in which the norms are collected differs from the setting in which the pictures and their norms are typically used (i.e., timed, computerized experiments). Given that there is ample evidence for the influence of situational context on various cognitive processes (e.g., Godden & Baddeley, 1975), we decided to elicit picture norms under timed circumstances that more accurately reflect a typical experimental setting. Specifically, participants were shown pictures on the computer screen and had to produce a response to the picture in less than 2 s. This timed procedure has been used to collect name agreement norms (e.g., Snodgrass & Yuditsky, 1996; Székely et al., 2003), but not for variables that consist of ratings such as

familiarity, image agreement, or visual complexity. We directly addressed the degree to which timed norms are better predictors of timed picture-naming latencies than are untimed norms by examining a subset of the pictures for which both timed and untimed norms were available.

## Method

*Participants* Ninety Harvard University students participated in the study. Thirty participants took part in the name agreement study, 29 took part in the familiarity study, and 31 took part in a joint image agreement and visual complexity study. All participants were native speakers of English. They received either \$10 per hour or course credit as compensation for their participation. Participants were all tested individually, not in a group setting.

*Materials* One hundred fifty pictures were selected from several sources (e.g., Google image search; ArtExplosion, 1998; Cycowicz et al., 1997). Selected images had the following properties: (1) All the images depicted objects (not actions); (2) all the images were simple line drawings (not actual photographs); and (3) in all the images, the object appeared by itself, without a background scene. In addition, object names had the following properties: (1) Object names were listed as compounds in the CELEX lexical database (Baayen, Piepenbrock, & van Rijn, 1993; 12 compounds were not listed; see Appendix 1); (2) they had a maximum of two constituents, where the second constituent was always a noun; and (3) all compounds were of the noun–noun ( $n = 128$ ), adjective–noun ( $n = 10$ ), or verb–noun ( $n = 12$ ) type. The objects were centered as 8-bit grayscale line drawings on a white background. The size of each image was  $260 \times 260$  pixels.

*Procedure* The three studies used a timed and computerized version of the procedure outlined by Snodgrass and Vanderwart (1980). Norms were collected for name agreement, familiarity, image agreement, and visual complexity. However, instead of asking participants to write down their answers in response to pictures presented with a slide projector (e.g., Alario & Ferrand, 1999; Snodgrass & Vanderwart, 1980), we presented the pictures on the computer screen using DMDX experiment software (Forster & Forster, 2003), and we collected the participants' keypresses or vocal responses (using a microphone).

To collect the name agreement norms, participants named the set of 150 pictures in a random order. Prior to the experiment, participants were told that they would see an object on the computer screen and that they should say aloud the first thing that provided an accurate description of

the object. They were instructed to do this as quickly as possible. When they did not recognize the object or when they could not recall the object's name, they were told not to respond. They were also told that after a while, the object would disappear, and the object's name would appear on the screen. On each trial, the participants saw a fixation cross (700 ms), a blank screen (200 ms), the picture (2,000 ms), and the name the experimenter had intended for the picture (1,000 ms), followed finally by a blank screen (2,000 ms). Naming the 150 pictures took approximately 20 min.

Familiarity, image agreement, and visual complexity norms were also collected using a computer. Participants in the familiarity task were told that they would see a picture presented on the computer screen and that they would have to rate “how usual or unusual the object is in your realm of experience.” Familiarity was defined as “the degree to which you come in contact with or think about the concept” (Snodgrass & Vanderwart, 1980). Participants were told to rate the concept itself, rather than the way it was drawn. The ratings used a 7-point scale, where 1 indicated a *very unfamiliar object* and 7 indicated a *very familiar object*. Participants were encouraged to use all seven ratings. Participants used the keyboard to press the number key that corresponded to their rating. On each trial, the picture remained on the screen for 2,000 ms, after which the next picture was presented.

Norms for image agreement and visual complexity were obtained from one group of participants. These two norms were collected in a blocked fashion, where participants first rated all the pictures on image agreement and then on visual complexity. In the image agreement block, participants were told that they would have to judge how closely a given picture resembled their mental image of the object. They were told that they would see the name of an object on the computer screen (3,000 ms) and that they had to form a mental image of the object. After 3,000 ms, a picture of the object followed, and they were required to rate the degree of agreement between their mental image and the picture, using a 7-point scale (where 1 indicated *low agreement between their image and the picture* and 7 indicated *high agreement*). In the subsequent visual complexity block, participants were told that they would see the pictures again and that, this time, they should rate the complexity of each picture, using a 7-point scale (where 1 = *very simple* and 7 = *very complex*). They were instructed to rate the complexity of the drawing (“the amount of detail or intricacy of lines in the picture,” per Snodgrass & Vanderwart 1980), rather than the complexity of the real-life object it represented. The trial structure in these two tasks was identical to the one used in the familiarity task.

In addition to the norms described above, lexical frequency estimates were collected for the names of the objects. For each object name, the surface and the first- and

second-constituent lemma frequencies were computed on the basis of the frequency estimates listed in the CELEX lexical database (Baayen et al., 1993). Lemma frequency corresponds to the frequency of a word as it appears in all its inflectional variants (e.g., the lemma frequency of *windmill* would be the frequency of the word *windmill* plus the frequency of *windmills*). For the 12 compounds in the set that were not listed in CELEX, we assumed that the frequency was zero. Since these frequency estimates are typically used in studies investigating the morphological representation of words, it will be informative to examine the relationship between these estimates and the picture's norms.

## Results and discussion

Picture names and norms are presented in Appendix 1 in alphabetic order. In addition, the pictures themselves are available as a compressed archive upon request from the first author or directly from the Psychonomic Society's supplemental archive. For each picture, the following information is presented: (1) an item number that is consistent across Appendices 1 and 2, (2) the most commonly used name, (3) the name as it is listed in CELEX, (4) the type of compound (e.g., noun–noun), (5) the two measures of name agreement (the statistic  $H$  and the percentage), (6) the means and standard deviations for the familiarity, image agreement, and visual complexity norms, (7) the surface and first- and second-constituent frequencies, and (8) the average picture-naming latency obtained from the name agreement study. Appendix 2 provides a list of the alternative names given to each picture. Failures in the naming task are listed as NR (*no response*).

Following Snodgrass and Vanderwart (1980), name agreement was expressed in terms of the proportion of participants who produced the most common name for the picture and in terms of the metric  $H$ .  $H$  represents a point-estimator for the distribution of the proportion of different responses given to a particular picture (i.e., its entropy; Shannon, 1948).  $H$  therefore provides a useful measure that captures the degree to which participants were consistent in producing a name for a specific picture.  $H$  can range from 0 to infinity, where values around 0 indicate *perfect name agreement* (all participants provided the same name) and larger values indicate *more variation* in the names given for a particular picture. It is important to note that decreasing values of  $H$  indicate an increase in name agreement. The following equation was used to compute  $H$ :

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

where  $k$  represents the number of different names given for a particular picture and  $p_i$  denotes the proportion of participants who produced a particular name. In line with previous studies (e.g., Snodgrass & Vanderwart, 1980), we eliminated *no* responses (NR) from the data set prior to the calculation of  $H$ , but not for the calculation of percentage of name agreement.

Table 1 lists the means and standard deviations, as well as Tukey's five-point summary (Tukey, 1977) for each of the following variables in our set: name agreement ( $H$  and percentage), familiarity, image agreement, and visual complexity. Also listed are the (log-transformed) surface frequency and first- and second-constituent frequency estimates from CELEX. Following Snodgrass and Vanderwart (1980), we use  $H$  as the index of name agreement. Figure 1 represents the distribution of these variables, using histograms and density functions.

The measured name agreement has a low mean (0.95), and its distribution is skewed leftward, indicating that there are many pictures in the set with high name agreement (Fig. 1a, b). The bimodal distribution of the surface frequency variable (Fig. 1f) reflects the fact that in the CELEX database, frequency estimates for many compounds in our set are zero or close to zero. Since compounds are generally long words, it is expected that, on average, their frequencies are low; this pattern is expected on the basis of Zipf's law, which states that the frequency of occurrence of a word is inversely proportional to the length of the word (Zipf, 1932). However, it should be noted that not all compounds in our set have zero or close-to-zero frequency; the histogram in Fig. 1f shows that there is a reasonable amount of spread in surface frequency. In addition, significant surface frequency effects on picture-naming latencies have been found with pictures chosen from this set (Janssen et al., 2008).

As was previously stated, our procedure for collecting picture norms differed from the procedure used in previous studies: we collected norms under timed conditions, whereas in previous studies, participants' written and vocal responses to a picture were collected without time constraints (Alario & Ferrand, 1999; Sanfiliu & Fernández, 1996; Snodgrass & Vanderwart, 1980). Following the argument in the introduction, one might expect the norms collected under timed conditions to be better predictors of timed picture-naming latencies than are norms collected under untimed conditions. Untimed norms were available for a subset of 28 pictures from the original Snodgrass and Vanderwart study. In order to assess the degree to which timed norms are better predictors of timed naming latencies, three different analyses were performed on the timed and untimed norms available for the 28 pictures.

First, Pearson correlations were computed between the timed and untimed norms to verify that both norming procedures captured similar underlying constructs. Correlations between timed and untimed norms were high (see Table 2), suggesting that our norming procedure captures similar underlying constructs as the untimed procedure. Second, linear models that contained only a timed or a corresponding untimed norm were fitted to the naming latencies from the name agreement experiment, using a standard item-based regression analysis (i.e., ordinary least squares). Except for visual complexity, both timed and untimed norms were significant predictors of naming latency (see Table 3). Importantly, however, the timed predictors were more accurate, because they accounted for a larger amount of variance (i.e., a larger adjusted  $R^2$ ). Finally, item-based regression analyses examined whether linear models that contained a predictor corresponding to a timed norm plus a corresponding

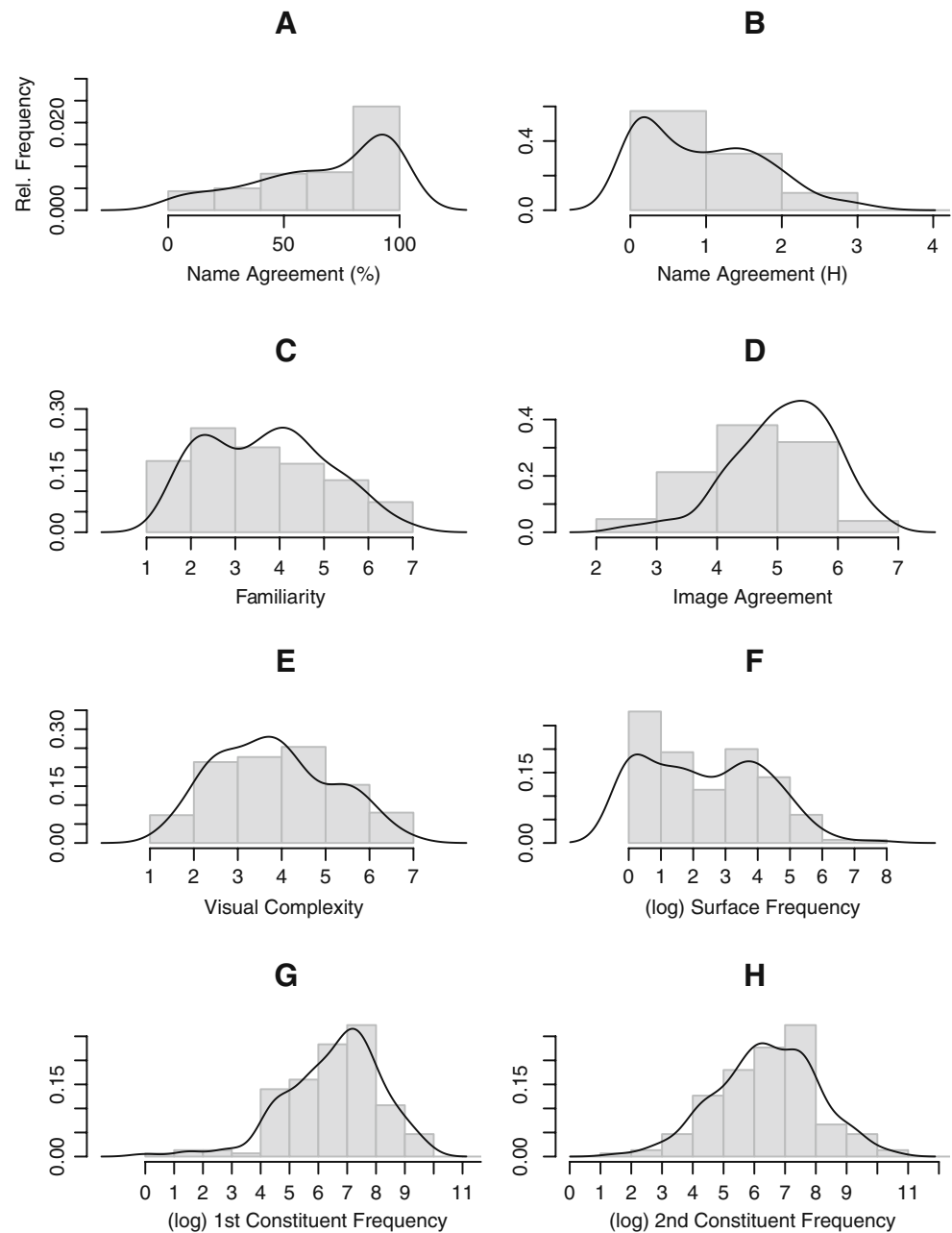
**Table 1** Summary statistics for all variables

Statistic	Name Agreement		Familiarity	Image Agreement	Visual Complexity	Surface Frequency*	1st Constituent Frequency*	2nd Constituent Frequency*
	$H$	%						
$M$	0.95	67.50	3.69	5.1	3.8	2	6.52	6.41
$SD$	0.80	29.14	1.35	0.83	1.31	1.7	1.66	1.61
Median	0.86	75.00	3.70	5.17	3.69	1.79	6.80	6.43
Min	0	0	1.32	2.39	1.19	0	0	1.61
Max	3.23	100.00	6.87	6.78	6.91	7.02	9.61	10.28
Q1	0.26	46.67	2.48	4.59	2.74	0	5.58	5.35
Q3	1.57	93.33	4.59	5.72	4.63	3.30	7.64	7.52
Skew	0.56	-0.70	0.23	-0.58	0.27	0.45	-0.80	-0.17

*Note.* Frequency taken from CELEX (Baayen, Piepenbrock, & van Rijn, 1993).  $M$ , mean;  $SD$ , standard deviation; Q1, 25th percentile; Q3, 75th percentile; Skew, skewness (Joanes & Gill, 1998)

\*Log transformed values

**Fig. 1** Histogram and density functions representing the distribution of the variables name agreement (%; panel A; *H*, panel B), familiarity (panel C), image agreement (panel D), visual complexity (panel E), log surface frequency (panel F), log first constituent frequency (panel G), and log second constituent frequency (panel H). Rel. Frequency. relative frequency of occurrence



**Table 2** Correlations for a subset of 28 pictures between timed norms collected here and untimed norms extracted from Snodgrass and Vanderwart (1980)

Norm	Correlation Between Timed and Untimed Norm
Name agreement (H)	.58*
Name agreement (%)	.67*
Familiarity	.87*
Image agreement	.64*
Visual complexity	.69*

\*Correlation coefficients significant at  $p < .01$

decorrelated untimed predictor were justified over models that contained only the predictor corresponding to the timed norm. Model comparisons using  $F$  tests (e.g., Baayen, 2008) revealed no differences between these two models for each norm, suggesting that the presence of the decorrelated untimed predictor was unjustified in the model (all  $F$ s  $< 1$ ). Overall, these analyses show that, for the subset of pictures used here, the timed norms are more accurate predictors of naming latency than are the untimed norms. This makes it recommendable that future studies rely on a timed procedure for collecting picture norms.

Table 4 lists the intercorrelations of the norms collected for the 150 pictures in the present study. In addition, the

**Table 3** Overview of the  $t$ ,  $p$ , and adjusted  $R^2$  statistics obtained after fitting the name agreement ( $H$  and percentage), familiarity (FAM), image agreement (IA), and visual complexity (COMP) norms obtained using a timed procedure (present study) or using an untimed procedure (Snodgrass & Vanderwart, 1980) to the average picture-naming latencies from the name agreement study. Each variable was fitted in a separate model

	Timed			Untimed		
	$t(26)$	$p$	Adj. $R^2$	$t(26)$	$p$	Adj. $R^2$
$H$	6.26	< .001	.59	2.51	< .02	.16
%	-7.21	< .001	.65	-2.96	< .007	.22
FAM	-2.08	< .05	.11	-1.00	.24	0
IA	-3.79	< .001	.33	-2.59	< .02	.17
COMP	-0.10	.92	0	-0.14	.89	0

correlations of these norms with the frequency estimates that are typically used in language-processing studies are computed. For completeness sake, the intercorrelations of these variables were also computed. Significant correlations are marked with an asterisk. Overall, the intercorrelations found between the norms obtained in the present study are similar to those from previous studies (Alario & Ferrand, 1999; Sanfeliu & Fernández, 1996; Snodgrass & Vanderwart, 1980).

A strong negative correlation ( $-.88$ ) was expected between the variables  $H$  and percentage of name agreement (Table 4), since both variables measure a picture's name agreement. In addition, name agreement ( $H$ ) correlated somewhat negatively with familiarity ( $-.26$ ), indicating that pictures with a higher name agreement were also more familiar to our participants. There was also a negative

correlation between name agreement and image agreement ( $-.49$ ). This suggests that objects with a high name agreement were also judged to better match the mental images that participants had of these objects. In addition, there was a positive correlation between familiarity and image agreement ( $.29$ ), suggesting that with increasing familiarity, there was a better match between a participant's mental image and the actual image; there was also a correlation between familiarity and complexity ( $-.20$ ), indicating that pictures were judged to be more familiar when their visual complexity was lower. Finally, visual complexity ratings were correlated with the frequency of the second constituent ( $-.22$ ), suggesting a relationship between the complexity ratings and the frequency of the compound's second constituent.

## Conclusion

Our main motivation for the present study was to present a standardized set of pictures that elicit morphologically complex names. We collected name agreement, familiarity, image agreement, and visual complexity norms for 150 pictures with English compound names. It is our hope that the availability of these pictures and their corresponding norms will stimulate research into the role of morphology in language processing and that comparable norms will eventually become available in languages other than English.

**Acknowledgements** This research was sponsored by a Juan de la Cierva postdoctoral fellowship from the Spanish Government to N.J., and by Grant R01DC006842 from the National Institute on Deafness and Other Communication Disorders to A.C.

**Table 4** Correlations among the variables collected for the 150 pictures in the present study

Statistic	Name Agreement		Familiarity	Image Agreement	Visual Complexity	Surface Frequency*	1st Constituent Frequency*	2nd Constituent Frequency*
	$H$	%						
$H$	1							
%	$-.88^*$	1						
Familiarity	$-.26^*$	$.31^*$	1					
Im. agree.	$-.49^*$	$.52^*$	$.29^*$	1				
Complex.	.05	$-.02$	$-.20^*$	$-.09$	1			
Surf. frq.	$-.18$	.17	.16	0	$-.03$	1		
1st c. frq.	$-.01$	$-.03$	.12	$-.03$	$-.22^*$	.14	1	
2nd c. frq.	$-.12$	.17	.18	.13	.01	.13	$-.09$	1

Note. Im. Agree., image agreement; Complex, complexity; Surf. frq., surface frequency; 1st c. frq., 1st constituent frequency; 2nd c. frq., 2nd constituent frequency

\*Correlation coefficients significant at  $p < .01$

## Appendix 1

**Table 5** “Item” represents an item number that is consistent between Appendices 1 and 2; “Modal Name” refers to the most common name for the picture on the basis of the participants’ responses; “Celex Name” refers to the name of the picture as listed in the CELEX lexical database (Baayen, Piepenbrock, & van Rijn, 1993), and “na” when it was not listed; “Type” refers to the compound type as listed in

CELEX; *H* and % are two measures of name agreement; mean (*M*) and standard deviation (*SD*) are listed for the variables familiarity, image agreement, and visual complexity. “Surf. Frq.,” “1 Con. Frq.,” and “2 Con. Frq.” refer to the frequency estimates from CELEX for the surface and first- and second-constituent lemma frequencies

Item	Modal Name	Celex Name	Type	Name Agreement		Familiarity		Image Agreement		Visual Complexity		Surf. Frq.	1 Con. Frq.	2 Con. Frq.	Reaction Time
				<i>H</i>	%	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>				
1	airmattress	air mattress	NN	2.22	3.33	3.44	1.74	4.97	1.29	3.23	1.24	0.00	8.41	5.48	1,399
2	airplane	airplane	NN	0.05	96.67	5.34	1.54	5.96	1.02	4.35	1.54	4.30	8.41	7.04	886
3	alarmclock	alarm-clock	NN	0.60	86.67	5.58	1.58	4.95	1.71	4.55	1.49	0.69	5.96	6.56	1,293
4	ashtray	ashtray	NN	1.44	43.33	2.17	1.40	4.63	1.80	2.39	1.29	4.65	6.65	6.13	1,499
5	babycarriage	baby carriage	NN	2.06	43.33	2.74	1.43	4.39	2.22	4.18	1.59	0.00	8.44	5.64	1,218
6	backpack	na	NN	0.59	73.33	3.76	2.04	3.26	1.78	5.34	1.10	0.00	8.16	5.87	1,480
7	bagpipe	bagpipe	NN	0.26	80.00	1.85	1.21	3.89	1.74	5.28	1.45	1.10	7.27	6.33	1,319
8	barbedwire	barbed wire	AN	0.91	66.67	2.28	1.51	4.45	1.63	2.57	1.22	0.00	4.98	6.67	1,211
9	baseball	baseball	NN	0.05	96.67	4.18	1.73	6.55	0.71	3.25	1.44	4.71	7.27	7.60	871
10	basketball	basketball	NN	0	100.00	4.82	1.56	6.15	0.83	2.15	0.95	3.78	6.06	7.60	872
11	bath tub	bath tub	NN	0.21	96.67	5.31	1.87	4.94	1.49	2.67	0.96	3.47	6.73	5.12	1,004
12	beachball	beach ball	NN	0.46	90.00	3.33	1.34	6.07	1.04	2.09	1.20	0.00	7.28	7.60	988
13	beehive	beehive	NN	0.77	60.00	2.23	1.31	3.95	1.62	2.95	1.46	3.33	5.70	4.23	1,287
14	birdcage	bird-cage	NN	0.65	83.33	2.31	1.56	3.97	1.28	5.30	1.34	0.00	7.52	5.67	1,186
15	birdhouse	na	NN	0.26	93.33	2.33	1.27	4.91	1.12	1.64	0.98	0.00	7.52	9.29	1,111
16	blackberry	blackberry	AN	1.67	10.00	4.05	1.72	4.06	2.10	2.69	1.16	3.30	6.97	5.23	1,826
17	blackbird	blackbird	AN	2.14	16.67	3.58	2.04	5.41	1.38	5.74	1.54	3.33	6.97	7.52	1,348
18	blackboard	blackboard	AN	1.18	70.00	5.37	1.69	5.17	1.09	2.61	1.52	4.57	6.97	7.52	1,080
19	blacksmith	blacksmith	AN	2.30	36.67	1.68	1.00	4.71	1.75	6.81	0.46	3.43	6.97	3.93	1,852
20	bluejay	bluejay	AN	2.45	3.33	3.75	1.77	5.18	1.33	5.50	1.45	0.00	6.28	4.51	1,862
21	blueprint	blueprint	AN	1.38	30.00	2.88	1.90	4.25	1.71	6.15	1.38	3.99	6.28	6.18	1,653
22	bobsled	bobsled	NN	1.87	56.67	2.11	1.52	4.36	2.17	6.12	0.93	0.69	4.49	3.18	1,346
23	bookshelf	na	NN	1.16	56.67	6.05	1.21	4.85	1.58	3.07	1.56	0.00	8.96	6.21	1,129
24	bowtie	bow tie	NN	0.30	90.00	3.39	1.77	5.90	1.15	2.32	1.03	0.00	5.42	6.42	935
25	boxingglove	boxing-glove	NN	1.99	63.33	2.38	1.50	4.55	1.52	3.88	1.28	0.69	4.28	5.86	1,263
26	briefcase	briefcase	NN	0.58	80.00	4.18	1.24	4.46	1.79	3.96	1.03	4.98	4.20	9.09	1,262
27	bunkbed	bunk bed	NN	0.05	96.67	5.28	2.17	5.40	1.34	6.26	0.92	0.00	1.39	8.48	1,208
28	butterfly	butterfly	NN	0	100.00	3.64	1.68	4.98	1.59	1.59	0.78	4.49	6.20	6.46	833
29	chainsaw	chain saw	NN	1.18	66.67	1.89	1.09	5.60	1.41	4.04	1.23	0.00	6.77	3.30	1,191
30	cheerleader	cheerleader	VN	0	100.00	3.69	1.86	4.90	1.60	5.25	1.96	2.08	4.64	7.85	840
31	chessboard	chessboard	NN	1.28	43.33	3.69	1.70	5.15	1.66	2.09	1.11	2.40	5.58	7.52	1,283
32	christmastree	christmas-tree	NN	0	100.00	4.29	1.86	5.40	1.37	3.63	1.52	1.39	6.98	8.14	927
33	clothespin	clothespin	NN	1.30	66.67	2.90	1.22	5.37	1.92	4.16	1.50	0.00	7.71	5.70	1,523
34	corkscrew	corkscrew	NN	2.06	43.33	2.98	1.59	4.56	1.68	3.23	1.35	3.14	4.60	5.24	1,543
35	cowboy	cowboy	NN	0.26	93.33	2.11	1.35	5.32	1.49	6.07	1.22	4.44	6.58	8.74	1,319
36	creditcard	credit card	NN	1.35	70.00	5.70	1.35	5.80	1.40	4.64	1.93	0.00	6.63	7.13	1,276
37	crossbow	crossbow	NN	1.37	20	1.75	1.06	5.09	1.97	5.33	1.41	1.10	5.99	4.58	1,267
38	crowbar	crowbar	NN	1.67	43.33	1.91	0.91	5.56	1.63	2.57	1.82	2.48	4.53	7.41	1,403
39	cupboard	cupboard	NN	2.81	0	4.79	1.72	3.50	1.67	2.07	1.04	5.87	7.23	7.52	na

**Table 5** (continued)

Item	Modal Name	Celex Name	Type	Name Agreement		Familiarity		Image Agreement		Visual Complexity		Surf. Frq.	1 Con. Frq.	2 Con. Frq.	Reaction Time
				<i>H</i>	%	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>				
40	cupcake	cupcake	NN	0	100.00	4.41	1.66	4.77	1.37	2.17	0.93	0.00	7.23	6.42	894
41	dartboard	dartboard	NN	0.64	83.33	3.24	1.67	5.96	1.13	3.32	1.57	1.61	4.06	7.52	1,131
42	doghouse	doghouse	NN	0.26	93.33	2.38	1.45	5.73	1.75	3.52	1.11	0.00	7.63	9.29	1,211
43	doorknob	doorknob	NN	0.72	76.67	5.65	1.96	4.08	1.22	2.88	1.22	2.94	8.84	4.80	1,289
44	doughnut	doughnut	NN	0	100.00	4.59	1.58	5.79	1.07	3.11	0.83	3.04	5.22	6.02	922
45	dragonfly	dragonfly	NN	0.67	86.67	3.53	1.33	5.87	1.04	4.43	1.11	2.89	5.14	6.46	1,270
46	drumstick	drumstick	NN	1.65	53.33	4.39	1.80	3.72	2.36	2.39	0.98	1.39	5.65	6.55	1,478
47	dumbbell	dumbbell	AN	2.02	53.33	4.26	1.85	4.65	1.62	4.23	1.66	1.95	1.61	6.61	1,427
48	earmuffs	earmuff	NN	0.09	93.33	3.93	1.99	5.77	1.42	3.46	1.34	1.10	7.36	2.77	1,066
49	earring	earring	NN	0.55	83.33	4.40	2.55	4.18	2.06	3.03	1.42	2.83	7.36	6.78	1,353
50	eggplant	eggplant	NN	0.86	70.00	3.37	1.99	5.49	1.93	2.27	1.01	1.61	7.34	7.68	1,289
51	fingerprint	fingerprint	NN	0.77	83.33	3.51	1.82	6.40	1.02	5.39	1.98	2.56	7.70	6.18	1,087
52	firecracker	firecracker	NN	1.71	43.33	2.22	1.29	4.50	2.11	2.25	1.38	1.61	7.97	3.76	1,224
53	firehose	fire-hose	NN	1.05	3.33	2.72	1.40	4.40	1.69	2.64	1.17	0.00	7.97	4.29	1,412
54	fireplace	fireplace	NN	0.30	90.00	4.25	1.98	4.30	1.53	2.83	1.71	5.00	7.97	9.35	1,067
55	fishbone	fishbone	NN	2.02	36.67	2.70	1.63	4.99	1.77	3.18	1.10	1.61	7.98	7.13	1,328
56	fishinghook	na	NN	1.37	46.67	2.34	0.94	5.82	1.21	1.60	0.81	0.00	6.80	6.51	1,331
57	fishingrod	fishing-rod	VN	1.37	40.00	2.31	1.11	5.54	1.10	3.41	1.42	0.69	6.80	6.50	1,504
58	flyswatter	flyswatter	NN	0.85	80.00	2.57	1.48	5.60	1.40	2.65	1.28	0.69	6.46	1.61	1,426
59	football	football	NN	0	100.00	4.37	1.90	6.41	0.79	2.37	1.02	6.35	8.68	7.60	786
60	footprint	footprint	NN	0.51	86.67	4.04	1.93	5.50	1.54	1.77	1.01	2.40	8.68	6.18	916
61	fryingpan	frying-pan	NN	1.63	53.33	4.91	1.66	5.92	1.72	3.62	1.45	2.48	5.95	6.19	1,049
62	gasmask	gasmask	NN	0.91	80.00	1.52	0.83	4.70	1.97	3.78	1.28	1.79	7.23	5.87	1,232
63	gokart	go-kart	VN	1.84	43.33	1.79	0.85	4.20	2.19	6.91	0.30	2.08	6.08	5.25	1,711
64	greenhouse	greenhouse	NN	2.46	30.00	2.68	1.64	4.93	1.31	3.57	1.29	4.60	6.72	9.29	1,620
65	hairbrush	hairbrush	NN	1.40	63.33	5.09	1.58	4.59	1.68	4.09	1.42	2.20	8.18	5.69	1,050
66	handcuffs	handcuff	NN	0.09	93.33	2.39	1.64	6.36	0.88	2.83	1.22	3.56	9.47	2.64	966
67	handgrenade	hand-grenade	NN	0.88	20.00	1.84	1.32	5.20	2.09	3.67	1.13	0.69	9.47	4.99	1,257
68	handlebars	handlebar	NN	2.37	33.33	4.73	1.71	4.24	1.40	3.91	1.80	1.95	5.84	7.41	1,354
69	hanglider	hang-glider	VN	1.71	56.67	1.69	0.60	5.16	1.52	5.36	1.06	1.39	2.64	4.32	1,271
70	haystack	haystack	NN	1.53	60.00	1.76	0.86	4.07	1.88	4.15	1.78	2.89	5.59	5.40	1,292
71	headlight	headlight	NN	1.31	73.33	4.56	1.69	3.90	2.03	4.60	1.50	3.04	9.13	8.56	1,390
72	headphones	headphones	NN	0.40	90.00	6.05	1.24	4.89	1.35	4.84	1.33	3.14	9.13	7.02	1,227
73	highchair	high chair	AN	1.50	63.33	2.32	1.42	5.55	1.28	5.58	1.45	0.00	4.95	7.80	1,159
74	hotdog	hot dog	AN	0.05	96.67	5.02	1.53	5.70	1.05	3.50	1.28	0.00	7.86	7.63	824
75	hourglass	hourglass	NN	0.96	56.67	2.73	1.75	5.63	1.29	2.42	1.27	2.40	8.82	7.86	1,114
76	hovercraft	hovercraft	VN	1.48	23.33	1.71	1.23	3.19	1.94	6.24	0.85	2.08	5.37	5.78	2,171
77	icecream	ice-cream	NN	0.46	90.00	5.50	1.31	6.05	1.19	3.17	1.33	4.38	6.85	6.29	848
78	iceskate	ice-skate	NN	0.26	93.33	3.16	1.92	5.81	1.14	3.69	1.26	0.69	6.85	4.33	1,098
79	ironingboard	ironing-board	NN	0.05	96.67	3.78	1.84	6.03	1.03	2.64	1.26	1.61	4.23	7.52	1,177
80	jellyfish	jellyfish	NN	0.98	76.67	2.00	1.16	5.54	1.33	3.88	1.49	2.94	5.27	7.98	1,177
81	keyboard	keyboard	NN	0.05	96.67	6.86	0.44	5.67	1.90	3.96	1.69	3.87	7.34	7.52	963
82	keyhole	keyhole	NN	1.11	60.00	5.27	1.58	4.85	1.43	2.31	1.14	2.71	7.34	7.40	1,362
83	ladybug	ladybug	NN	0.21	96.67	3.61	1.43	4.80	1.49	2.47	0.95	0.00	7.61	4.48	1,093
84	lamppost	lamppost	NN	2.05	46.67	4.23	1.55	4.05	2.12	5.70	1.54	3.09	6.45	7.34	1,360
85	lifesaver	life-saver	NN	2.74	26.67	2.33	1.17	3.87	2.28	3.84	1.26	1.61	9.61	3.97	1,949

**Table 5** (continued)

Item	Modal Name	Celex Name	Type	Name Agreement		Familiarity		Image Agreement		Visual Complexity		Surf. Frq.	1 Con. Frq.	2 Con. Frq.	Reaction Time
				<i>H</i>	%	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>				
86	lifevest	na	NN	1.86	23.33	3.31	1.81	5.03	1.38	2.83	1.10	0.00	9.61	4.89	1,136
87	lightbulb	lightbulb	NN	0.21	96.67	6.24	1.10	6.75	0.45	3.96	1.49	0.00	8.56	5.34	843
88	lighthouse	lighthouse	NN	0.40	90.00	2.66	1.33	5.33	1.20	3.96	1.84	3.87	8.56	9.29	1,307
89	lipstick	lipstick	NN	0	100.00	3.58	2.36	6.16	0.75	4.33	1.38	4.81	7.25	6.55	982
90	magnifyingglass	magnifying glass	VN	0.46	90.00	2.73	0.99	6.24	0.88	4.14	1.51	0.00	4.85	7.86	979
91	mailbox	mailbox	NN	0.05	96.67	4.82	1.44	5.58	1.47	3.50	1.10	3.22	6.13	7.52	804
92	mapleleaf	maple-leaf	NN	1.35	66.67	4.46	2.01	5.58	1.41	1.66	1.15	0.00	4.19	7.28	1,170
93	matchbox	matchbox	NN	1.59	53.33	3.98	1.79	5.50	1.54	4.18	1.60	2.64	6.93	8.96	1,145
94	motorcycle	motorcycle	NN	0.05	96.67	3.70	1.56	5.88	1.13	5.81	1.65	5.41	5.55	6.33	1,001
95	mousetrap	mousetrap	NN	0.26	93.33	2.51	1.72	5.49	1.51	5.53	1.31	2.20	5.80	6.04	1,216
96	nailfile	nail-file	NN	1.72	40.00	4.15	2.04	4.64	1.85	3.59	1.44	0.69	6.10	6.53	1,654
97	necklace	necklace	NN	0.81	80.00	4.36	2.03	5.01	2.48	2.08	0.93	3.74	7.26	5.42	1,088
98	nervecell	nerve-cell	NN	1.77	6.67	3.14	1.40	5.11	1.63	2.83	1.35	0.00	5.79	7.10	1,251
99	newspaper	newspaper	NN	0	100.00	5.91	1.38	5.23	1.11	4.55	1.57	7.02	7.64	8.30	821
100	notebook	notebook	NN	0.67	86.67	6.18	1.45	5.06	1.64	3.57	1.24	4.93	7.64	8.96	1,097
101	notepad	na	NN	1.14	56.67	5.85	1.17	5.23	1.41	3.13	1.29	0.00	7.64	5.62	1,424
102	oillamp	na	NN	3.23	3.33	1.76	1.39	2.90	1.67	3.42	1.08	0.00	7.74	6.45	2,039
103	padlock	padlock	NN	0.69	16.67	4.96	1.50	4.13	1.14	3.17	1.18	3.22	5.62	5.63	1,447
104	paperclip	paper-clip	NN	0.34	86.67	5.38	1.56	6.78	1.08	2.13	1.24	0.69	8.30	4.19	957
105	peanut	peanut	NN	0	100.00	4.35	1.37	5.94	0.74	3.39	1.04	3.91	5.18	6.02	890
106	pineapple	pinneapple	NN	0.05	96.67	3.91	0.94	6.66	0.98	5.28	1.23	3.81	5.73	6.30	746
107	pitchfork	pitchfork	VN	0.72	66.67	2.13	1.71	4.49	1.52	2.21	1.26	0.69	5.89	5.59	1,149
108	pooltable	na	NN	1.41	73.33	4.33	1.87	4.45	1.67	3.59	1.31	0.00	6.60	8.34	1,203
109	powerstrip	na	NN	2.14	10.00	3.78	1.72	4.61	1.84	4.48	1.04	0.00	8.73	6.08	1,371
110	punchingbag	punching bag	VN	0.98	66.67	2.63	1.39	5.53	1.46	4.12	1.82	0.00	5.23	7.27	1,504
111	rainbow	rainbow	NN	0	100.00	3.21	1.66	5.17	1.64	3.79	0.66	4.62	7.16	4.58	983
112	raindrop	raindrop	NN	2.83	33.33	4.71	1.97	5.33	1.98	1.19	0.93	2.08	7.16	6.38	1,219
113	razorblade	razor-bade	NN	1.25	10.00	2.21	1.18	3.19	2.21	2.27	1.48	2.48	5.06	5.98	1,487
114	reindeer	reindeer	NN	1.72	16.67	2.12	1.69	4.72	1.18	4.73	1.42	1.10	4.53	5.35	1,601
115	rockingchair	rocking-chair	VN	0	100.00	3.91	1.84	6.06	1.51	5.20	1.58	1.79	5.53	7.80	951
116	rollercoaster	roller coaster	NN	0.09	93.33	3.90	1.35	4.47	1.62	5.63	1.08	0.00	4.54	3.04	1,231
117	rollerskate	roller-skate	NN	1.62	60.00	1.85	1.04	2.65	1.73	4.60	1.47	0.69	4.54	4.33	1,273
118	sailboat	sailboat	VN	0.26	93.33	3.16	1.79	5.13	1.07	4.82	1.42	1.10	4.56	7.22	987
119	seagull	seagull	NN	1.63	53.33	3.56	1.70	4.90	1.68	5.54	1.12	2.94	8.04	4.42	1,530
120	seahorse	seahorse	NN	0.09	93.33	1.81	1.66	5.97	1.16	5.21	1.11	0.00	8.04	7.77	1,032
121	seatbelt	seat-belt	NN	0.09	93.33	5.55	1.60	5.10	1.41	3.53	1.26	1.79	7.57	6.18	1,124
122	sewingmachine	sewing-machine	NN	0.09	93.33	2.68	1.43	5.40	1.15	4.57	1.51	0.69	4.30	7.70	1,079
123	slotmachine	slot-machine	NN	1.85	46.67	2.66	2.01	4.97	1.29	4.13	1.68	0.69	4.63	7.70	1,523
124	snowflake	snowflake	NN	0.26	93.33	4.67	1.26	5.48	1.41	3.98	1.29	1.79	7.01	4.83	857
125	snowman	snowman	NN	0.05	96.67	3.78	1.79	6.40	0.84	3.41	1.16	2.08	7.01	10.28	815
126	spaceship	spaceship	NN	1.81	30.00	1.32	0.81	2.39	1.80	5.73	1.49	3.47	7.79	7.17	1,416
127	spinningwheel	spinning-wheel	VN	1.92	26.67	1.62	0.77	4.29	2.23	4.72	1.12	1.79	6.13	6.68	1,504
128	stoplight	stop light	NN	1.11	70.00	5.86	1.66	6.14	1.01	4.53	1.51	0.00	6.87	8.56	1,358
129	strawberry	strawberry	NN	0.05	96.67	5.08	1.53	5.73	1.14	3.75	1.62	3.93	6.09	5.23	845
130	suitcase	suitcase	NN	0.97	60.00	4.54	1.37	4.79	1.78	3.08	1.01	5.40	6.84	9.09	1,142

**Table 5** (continued)

Item	Modal Name	Celex Name	Type	Name Agreement		Familiarity		Image Agreement		Visual Complexity		Surf. Frq.	1 Con. Frq.	2 Con. Frq.	Reaction Time
				<i>H</i>	%	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>				
131	sunflower	sunflower	NN	0.94	80.00	4.21	1.49	6.04	0.87	5.03	1.53	3.04	7.91	7.42	890
132	sunglasses	sunglasses	NN	0.26	93.33	5.25	1.94	5.35	1.24	4.54	1.07	4.01	7.91	6.35	856
133	swimmingpool	swimming-pool	NN	1.42	26.67	3.49	1.72	3.95	1.85	5.40	1.56	2.56	4.69	6.60	1,100
134	tapemeasure	tape-measure	NN	1.39	53.33	3.15	1.32	5.36	1.14	4.03	1.03	1.10	6.41	7.18	1,244
135	teabag	teabag	NN	0.51	86.67	4.44	1.81	5.40	1.27	1.54	0.64	1.10	7.40	7.27	1,345
136	teapot	teapot	NN	1.18	70.00	4.03	1.65	5.49	1.82	2.74	1.31	3.99	7.40	6.47	1,126
137	thumbtack	thumbtack	NN	1.57	53.33	4.03	1.74	4.95	1.73	1.58	0.82	0.00	6.17	3.91	1,166
138	toiletpaper	toilet-paper	NN	0.26	93.33	6.49	1.00	5.84	1.64	2.41	1.19	1.10	6.23	8.30	893
139	toothbrush	toothbrush	NN	0	100.00	6.87	0.41	6.30	0.87	3.70	1.46	3.40	7.36	5.69	863
140	toothpaste	toothpaste	NN	0.63	90.00	6.07	1.20	4.90	1.14	2.33	1.28	3.53	7.36	4.53	1,170
141	totempole	totem-pole	NN	0.18	86.67	1.65	0.68	5.97	1.22	6.43	0.82	0.69	3.09	5.93	1,144
142	trashcan	na	NN	0.97	80.00	5.52	1.23	5.91	1.24	3.95	1.27	0.69	4.20	5.12	886
143	vacuumcleaner	vacuum cleaner	NN	1.36	50.00	4.99	1.51	5.72	1.33	5.97	0.99	0.00	5.58	5.31	911
144	vendingmachine	vending machine	VN	0.30	90.00	5.42	1.22	5.86	1.31	6.16	1.50	0.00	2.89	7.70	1,146
145	videotape	na	NN	2.95	6.67	4.44	1.51	5.22	1.53	2.61	1.16	2.08	4.17	4.32	1,271
146	walkman	na	NN	2.13	40.00	4.44	1.60	4.61	1.71	5.73	1.25	0.00	6.87	10.28	1,749
147	watermelon	watermelon	NN	0.30	90.00	4.23	1.39	4.20	1.41	2.87	1.20	1.79	9.02	4.13	1,047
148	wheelbarrow	wheelbarrow	NN	0.05	96.67	2.48	1.24	5.39	1.56	2.78	1.27	2.83	6.68	4.19	1,097
149	wheelchair	wheelchair	NN	0.09	93.33	2.48	1.44	4.98	1.30	3.88	1.48	3.78	6.68	7.80	969
150	windmill	windmill	NN	0	100.00	1.94	1.49	5.51	1.60	5.82	1.17	4.77	7.67	5.61	1,038

**Appendix 2**

**Table 6** “Item” is an item number that is consistent between Appendix 1 and 2. “Modal Name” is the participants’ most common name for a picture; “NR” refers to the number of *no responses* to a particular picture; and “Nondominant Names” lists the various alternative names given to a picture (with their frequency between parentheses).

Item	Modal Name	NR	Nondominant Names
1	airmattress	17	airconditioner (1), airvent (1), blow up mattress (1), bread (1), inflatable (1), ironingboard (1), mattress (2), plate (1), radiator (1), sleeping (1), wash (1)
2	airplane	1	
3	alarmclock	1	clock (2), stopwatch (1)
4	ashtray	11	block (1), cupholder (2), cupholder (1), paper (1), platform (1)
5	babycarriage	1	babystroller (4), baby stroller (3), carriage (5), stroller (4)
6	backpack	6	suitcase (2)
7	bagpipe	6	
8	barbedwire	8	knot (1), stitches (1)
9	baseball	1	

**Table 6** (continued)

Item	Modal Name	NR	Nondominant Names
11	bathtub	0	tub (1)
12	beachball	1	ball (1), volleyball (1)
13	beehive	10	hivest (1), honeyhive (1)
14	birdcage	0	cage (5)
15	birdhouse	1	birdfeeder (1)
16	blackberry	0	berry (1), grapes (1), handgun (1), nut (1), pinecone (1), pine cone (1), raspberry (21)
17	blackbird	1	bird (11), cardinal (1), crow (9), raven (1), scarecrow (1), sparrow (1)
18	blackboard	0	chalkboard (7), map (1), screen (1)
19	blacksmith	6	anvil (3), carpenter (2), guy hammers (1), hammer (2), hammer and anvil (1), iron and hammer (1), iron worker (1), metalsmith (2)
20	bluejay	2	bird (8), bluebird (6), canary (1), cardinal (7), robin (3), sparrow (1), woodpecker (1)

**Table 6** (continued)

Item	Modal Name	NR	Nondominant Names
21	blueprint	5	floorplan (13), map (3)
22	bobsled	3	ice luge (3), skiluge (1), sled (2), sledder (1), sledding (1), snowboard (1), tobagon (1)
23	bookshelf	1	bookcase (11), shelves (1)
24	bowtie	2	bow (1)
25	boxingglove	0	boxingmit (3), boxing mit (2), fightingmit (1), glove (1), mit (1), mitten (1), ovenmit (1), punching glove (1)
26	briefcase	4	carryingcase (1), suitcase (1)
27	bunkbed	1	
29	chainsaw	2	handsaw (1), powersaw (1), saw (6)
31	chessboard	0	checkboard (2), checkerboard (13)
33	clothespin	4	clotheshanger (1), hairpin (1), paper (1), paperclip (2), pin (1)
34	corkscrew	6	bottleopener (1), bottle opener (2), corkopener (2), drill (1), screw (1), screwdriver (2), wineopener (2)
35	cowboy	1	lasso (1)
36	creditcard	1	bow (1), ID (3), ID card (3), radio (1)
37	crossbow	5	arrow (2), bow (1), bow and arrow (16)
38	crowbar	9	cane (3), lockpick (1), rope (1), snake (1), walking cane (1), wire (1)
39	cupboard	4	armoir (2), briefcase (1), bureau (3), cabinet (2), chest (2), closet (3), drawers (1), dresser (4), dresserdrawers (1), wardrobe (7)
41	dartboard	2	bullseye (1), target (2)
42	doghouse	1	birdhouse (1)
43	doorknob	2	doorhandle (5)
45	dragonfly	1	earthfly (1), firefly (1), mosquito (1)
46	drumstick	2	chickenleg (8), chicken leg (1), leg (1), thigh (1), turkeyleg (1)
47	dumbbell	2	barbell (4), blot (1), free weight (1), hand weight (1), weight (3), weightlift (1), weights (1)
48	earmuffs	2	
49	earring	3	braces (1), earhook (1)
50	eggplant	5	pear (1), plum (3)
51	fingerprint	0	thumbprint (4), thumb print (1)
52	firecracker	3	candle (1), dynamite (10), firework (1), fireworks (1), match (1)
53	firehose	2	gardenhose (2), hose (23), waterhose (1), wateringhose (1)
54	fireplace	2	fire (1)
55	fishbone	1	dogfish (1), fish (8), fish skeleton (5), skeleton (4)
56	fishinghook	3	fishhook (2), hook (11)
57	fishingrod	2	fishinghook (1), fishingline (1), fishingpole (14)
58	flyswatter	2	fly (1), mosquito (1), net (2)
60	footprint	1	foot (3)

**Table 6** (continued)

Item	Modal Name	NR	Nondominant Names
61	fryingpan	3	pan (7), pot (1), saucepan (1), sauce pan (1), skillet (1)
62	gasmask	2	airmask (1), facemask (1), mask (1), oxygenmask (1)
63	gokart	7	bumpercar (3), car (1), paddleboat (1), racecar (3), race car (1), racingcar (1)
64	greenhouse	1	frame (2), frame of a house (1), framing (1), house (11), plainwood (1), rain (1), shed (1), structure (1), unfinished house (1)
65	hairbrush	1	brush (6), comb (2), haircomb (2)
66	handcuffs	2	
67	handgrenade	5	grenade (19)
68	handlebars	2	bicycle (10), bicycle handle (1), bicycle (1), bikebrakes (1), bike handle (1), bikehandles (1), bike handles (1), handles (1), hand thing (1)
69	hangglider	5	delta (1), glider (1), kite (1), parachute (1), paraglider (1), paragliding (1), parasail (2)
70	haystack	4	baybail (1), berries (1), hay (2), hut (3), nest (1)
71	headlight	2	bumper (1), carlight (1), fender (1), front headlight (1), headlamp (1), rearviewmirror (1)
72	headphones	1	earphones (2)
73	highchair	3	babychair (3), babyseat (2), babystool (1), chair (1), highseat (1)
74	hotdog	1	
75	hourglass	10	time (1), timecapsule (1), timeglass (1)
76	hovercraft	16	bumpercar (3), bumpercars (1), dunebuggy (1), hoverboat (1), racecardriver (1)
77	icecream	1	icecream cone (1), rollerskate (1)
78	iceskate	1	skate (1)
79	ironingboard	1	
80	jellyfish	2	octopus (2), squid (2), stingray (1)
81	keyboard	1	
82	keyhole	3	lock (8), plug (1)
83	ladybug	0	bug (1)
84	lamppost	1	lamp (2), lightpole (2), lightpost (1), streetlamp (6), streetlight (4)
85	lifesaver	6	buoy (1), innertube (1), life (3), lifepreserver (1), life preserver (3), liferaft (2), lifering (1), life ring (1), life thing (1), preserver (1), rope (1)
86	lifevest	2	jacket (1), lifejacket (8), life preserver (1), vest (11)
87	lightbulb	0	light (1)
88	lighthouse	1	lighttower (2)
90	magnifyingglass	1	microscope (1), spyglass (1)
91	mailbox	1	
92	mapleleaf	0	canada (3), canadianleaf (1), leaf (6)

**Table 6** (continued)

Item	Modal Name	NR	Nondominant Names
93	matchbox	1	matchbook (2), matches (9), mtachbookbox (1), table (1)
94	motorcycle	1	
95	mousetrap	1	mousecatcher (1)
96	nailfile	3	butter knife (1), file (3), knife (10), penknife (1)
97	necklace	1	pearl necklace (4), pearls (1)
98	nervecell	11	axon (1), bloodvessel (1), cell (1), nerve (1), neuron (11), spider web (1), synapse (1)
100	notebook	1	addressbook (1), book (1), journal (1)
101	notepad	4	notebook (8), spiral notebook (1)
102	oillamp	4	bottle (1), genie (1), genie bottle (1), genielamp (4), genie lamp (1), kettle (1), lamp (4), lantern (1), magiclamp (1), magic lamp (3), teakettle (2), tea kettle (1), teapot (4)
103	padlock	1	lock (24)
104	paperclip	3	pin (1)
106	pineapple	1	
107	pitchfork	8	fork (1), forklift (1)
108	pooltable	1	billiards (1), billiards (2), billiardtable (1), billiard table (1), pingpong (1), pool (1)
109	powerstrip	12	cupholder (1), electrical socket (1), electric socket (1), outlet (6), remote (1), socket (1), surgeprotector (2), surge protector (2)
110	punchingbag	6	boxing (1), table (2), weightbag (1)
112	raindrop	0	drop (2), droplet (3), drop of water (1), teardrop (6), tear drop (2), treadrop (1), waterdrop (3), waterdroplet (1), water droplet (1)
113	razorblade	21	cutter (1), doorhinge (1), lamp (1), razor (2), vice (1)
114	reindeer	2	buck (1), deer (6), elk (1), moose (15)
116	rollercoaster	2	
117	rollerskate	2	bike (1), rollerblade (2), skate (5), skateboard (1), tricycle (1)
118	sailboat	1	sailship (1)
119	seagull	3	bird (7), dove (1), pelican (1), pigeon (1), sparrow (1)
120	seahorse	2	
121	seatbelt	2	
122	sewingmachine	2	
123	slotmachine	7	gas (1), gas machine (1), gaspump (2), gas pump (2), gas station (1), sink (1), vendingmachine (1)
124	snowflake	1	spiderweb (1)
125	snowman	1	
126	spaceship	9	alien (1), lunar module (1), marsian (1), robot (3), UFO (6)
127	spinningwheel	12	loom (1), pool (1), sewingmachine (3), sowingwheel (1), spindle (2),

**Table 6** (continued)

Item	Modal Name	NR	Nondominant Names
			spinningmachine (1), wheel (1)
128	strawberry	1	
129	suitcase	0	briefcase (12)
130	sunflower	1	daisy (2), dandelion (1), flower (2)
131	sunglasses	1	aviators (1)
132	swimmingpool	3	lake (2), patio (1), pool (16)
133	tapemeasure	1	measuringtape (9), measuring tape (4)
134	teabag	2	pricetag (1), tag (1)
135	teapot	0	teacup (1), teakettle (7), tea kettle (1)
136	thumbtack	2	pin (3), pushpin (2), tack (7)
137	toiletpaper	1	toilet paper roll (1)
139	toothpaste	0	ointment (1), paste (1), tooth (1)
140	totempole	4	
141	stoplight	0	stoplight (21), streetlight (2)
142	trashcan	0	garbagebin (1), garbage can (4), trashbin (1)
143	vacuumcleaner	2	vaccum (3), vacuum (10)
144	vendingmachine	2	snackmachine (1)
145	videotape	0	cassette (2), cassette tape (2), CD tape (1), tape (4), taperecorder (1), VHS (1), vhcassette (1), video (1), videocassette (5)
146	walkman	7	cassetteplayer (2), cassette player (2), headphones (2), radio (1), stereo (1), tapeplayer (1), video (1), videotape (1)
147	watermelon	2	cantelope (1)
148	wheelbarrow	1	
149	wheelchair	2	

## References

- Alario, F.-X., & Ferrand, L. (1999). A set of 400 pictures standardized for French: Norms for name agreement, image agreement, familiarity, visual complexity, image variability, and age of acquisition. *Behavior Research Methods, Instruments, & Computers*, *31*, 531–552.
- Alario, F.-X., Ferrand, L., Laganaro, M., New, B., Frauenfelder, U. H., & Segui, J. (2004). Predictors of picture naming speed. *Behavior Research Methods, Instruments, & Computers*, *36*, 140–155.
- ArtExplosion, (1998). NOVA Development [CD-ROM].
- Baayen, R. H. (2008). *Analyzing linguistic data. A practical introduction to statistics using R*. Cambridge: Cambridge University Press.
- Baayen, R. H., Piepenbrock, R., & van Rijn, A. (1993). *The CELEX lexical database [CD-ROM]*. Philadelphia: University of Pennsylvania, Linguistic Data Consortium.
- Badecker, W. (2001). Lexical composition and the production of compounds: Evidence from neologistic errors in naming. *Language and Cognitive Processes*, *16*, 337–366.
- Balota, D. A., Piloti, M., & Cortese, M. J. (2001). Subjective frequency estimates for 2,938 monosyllabic words. *Memory & Cognition*, *29*, 639–647.
- Barry, C., Morisson, C. M., & Ellis, A. W. (1997). Naming the Snodgrass and Vanderwart pictures: Effects of age of acquisition, frequency, and name agreement. *Quarterly Journal of Experimental Psychology*, *50A*, 560–585.

- Bien, H., Levelt, W. J. M., & Baayen, H. (2005). Frequency effects in compound production. *Proceedings of the National Academy of Sciences*, *102*, 17876–17881.
- Cycowicz, Y. M., Friedman, D., Rothstein, M., & Snodgrass, J. G. (1997). Picture naming by young children: Norms for name agreement, familiarity and visual complexity. *Journal of Experimental Child Psychology*, *65*, 171–237.
- Dimitropoulou, M., Duñabeitia, J. A., Blitsas, P., & Carreiras, M. (2009). A standardized set of 260 pictures for modern Greek: Norms for name agreement, age of acquisition, and visual complexity. *Behavior Research Methods*, *41*, 584–589.
- Dohmes, P., Bölte, J., & Zwitserlood, P. (2004). The impact of semantic transparency of morphologically complex words on picture naming. *Brain and Language*, *90*, 203–212.
- Ellis, A. W., & Morrison, C. M. (1998). Real age-of-acquisition effects in lexical retrieval. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *24*, 515–523.
- Forster, K. I., & Forster, J. C. (2003). DMDX: A Windows display program with millisecond accuracy. *Behavior Research Methods, Instruments, & Computers*, *35*, 116–124.
- Gernsbacher, M. A. (1984). Resolving 20 years of inconsistent interactions between lexical familiarity and orthography, concreteness, and polysemy. *Journal of Experimental Psychology: General*, *113*, 256–281.
- Godden, D. R., & Baddeley, A. D. (1975). Context-dependent memory in two natural environments: On land and underwater. *British Journal of Psychology*, *66*, 325–332.
- Goldrick, M., Folk, J., & Rapp, B. (2010). Mrs. Malaprop's neighborhood: Using word errors to reveal neighborhood structure. *Journal of Memory and Language*, *62*, 113–134.
- Gordon, B. (1985). Subjective frequency and the lexical decision latency function: Implications for mechanisms of lexical access. *Journal of Memory and Language*, *24*, 631–645.
- Hocking, J., McMahon, K., & de Zubicaray, G. (2010). Semantic interference in object naming: An fMRI study of the postcue naming paradigm. *NeuroImage*, *50*, 796–801.
- Janssen, N., Bi, Y., & Caramazza, A. (2008). A tale of two frequencies: Determining the speed of lexical access for Mandarin Chinese and English compounds. *Language and Cognitive Processes*, *23*, 1191–1223.
- Joanes, D. N., & Gill, C. A. (1998). Comparing measures of sample skewness and kurtosis. *The Statistician*, *47*, 183–189.
- Lachman, R., Shaffer, J. P., & Hennrikus, D. (1974). Language and cognition: Effects of stimulus codability, name-word frequency, and age of acquisition on lexical reaction time. *Journal of Verbal Learning & Verbal Behavior*, *13*, 613–625.
- Roelofs, A., & Baayen, H. (2002). Morphology by itself in planning the production of spoken words. *Psychonomic Bulletin & Review*, *9*, 132–138.
- Sanfeliu, M. C., & Fernández, A. (1996). A set of 254 Snodgrass–Vanderwart pictures standardized for Spanish: Norms for name agreement, image agreement, familiarity, and visual complexity. *Behavior Research Methods, Instruments, & Computers*, *28*, 537–555.
- Shannon, C. E. (1948). A mathematical theory of communication. *Bell System Technical Journal*, *27*, 379–423.
- Snodgrass, J. G., & Vanderwart, M. (1980). A standardized set of 260 pictures: Norms for name agreement, image agreement, familiarity, and visual complexity. *Journal of Experimental Psychology: Human Learning and Memory*, *6*, 174–215.
- Snodgrass, J. G., & Yuditsky, T. (1996). Naming times for the Snodgrass and Vanderwart pictures. *Behavior Research Methods, Instruments, & Computers*, *28*, 516–536.
- Strijkers, K., Costa, A., & Thierry, G. (2010). Tracking lexical access in speech production: Electrophysiological correlates of word frequency and cognate effects. *Cerebral Cortex*, *20*, 912–928.
- Székely, A., D'amico, S., Devescovi, A., Federmeier, K., Herron, D., Iyer, G., et al. (2003). Timed picture naming: Extended norms and validation against previous studies. *Behavior Research Methods, Instruments, & Computers*, *35*, 621–633.
- Tukey, J. W. (1977). *Exploratory data analysis*. Reading, MA: Addison-Wesley.
- Vitkovitch, M., & Tyrell, L. (1995). Sources of disagreement in object naming. *Quarterly Journal of Experimental Psychology*, *48A*, 822–848.
- Zipf, G. K. (1932). *Selected studies of the principle of relative frequency in language*. Cambridge, MA: Harvard University Press.