Picture naming in 3- to 8-year-old French children: Methodological considerations for name agreement

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Picture naming has become an important experimental paradigm in cognitive psychology. Young children are more variable than adults in their naming responses and less likely to know the object or its name. A consequence is that the interpretation of the two classical measures used by Snodgrass and Vanderwart (1980) for scoring name agreement in adults (the percentage of agreement, based on modal name, and the *H* statistic, based on alternative names) will differ because of the high rate of "don't know object" responses, common in young children, relative to the low rate of "don't know object" responses more characteristic of adults. The present study focused on this methodological issue in young French children (3–8 years old), using a set of 145 Snodgrass–Vanderwart pictures. Our results indicate that the percentage of agreement based on the expected name is a better measure of picture-naming performance than are the commonly used measures. The norms may be downloaded from www.psychonomic.org/archive.

Studying the development of cognitive functions—specifically, in younger children who cannot read verbal material—often makes the use of pictures necessary. One of the tasks in which this kind of stimulus is used is the picture-naming task. During a picture-naming task, participants are asked to give a name to a picture as quickly as possible (Snodgrass & Vanderwart, 1980). Retrieving the name of a picture involves multiple stages. According to most models of the naming process, participants must initiate visual recognition processes and then must activate semantic information, prior to lexical selection and phonological encoding (Humphreys, Riddoch, & Quinlan,

1988; Johnson, Paivio, & Clark, 1996; Levelt, 1989). Hence, there are several sources of naming ambiguity for pictures. These sources, according to Snodgrass and Vanderwart, can be the concept itself, the picture itself, the possible name or names a picture can have, and the participants' knowledge of concepts and their names (Glaser, 1992; Vitkovitch, Humphrey, & Lloyd Jones, 1993; Vitkovitch & Tyrrell, 1995).

This shows that it is necessary to determine a picture's most common name and the degree of name agreement between participants (Cycowicz, Friedman, Rothstein, & Snodgrass, 1997; Dell'Acqua, Lotto, & Job, 2000; Vitkovitch & Tyrrell, 1995). This is the goal of normative studies that provide standardized pictorial material on name agreement.

Name agreement is generally assessed with two different measures: the *percentage of agreement*, which is based on the percentage of participants producing the modal name, and the *H statistic* (Snodgrass & Vanderwart, 1980). The modal name is defined as the name given by the majority of participants. The *H* statistic is computed for each picture with the formula

$$H = \sum_{i=1}^{k} P_i \log_2 \left(1 / P_i \right),$$

where *k* refers to the number of different names given to each picture and P_i is the proportion of participants who gave each name. According to the authors,

a picture that elicited the same name from all the participants able to name it has an *H* value of .0 and indicates perfect name agreement. Increasing *H* values indicate decreasing name agreement and, generally, decreasing percentages of participants who all gave the same name. The *H* value captures more information about the distribution of names across participants than the percentage agreement measure does. For example, if two concepts both are given their dominant name by 60% of the participants, but one is given a single other name and the second is given four other names, both concepts will have equal percentage agreement scores, but the first will have a lower *H* value.

(Snodgrass & Vanderwart, 1980, p. 184)

Therefore, the *H* statistic reflects the variability of responses in a group of participants well: It is calculated from all the alternative answers (different from the expected name). However, it does not take into account the lack of response: Adults were instructed to write "don't know object" (DKO) if the picture was unknown to them, "don't know name" (DKN) when the name was unknown, and "tip of the tongue" (TOT) when the name was momentarily irretrievable.

In order to adapt the material to different nationalities, normative data for pictures have been collected for adults in the Netherlands (Van Schjagen, Tamsa, Bruggemann, Jackson, & Michon, 1983), Belgium (Martein, 1995), Spain (Cuetos, Ellis, & Alvarez, 1999; Sanfeliu & Fernandez, 1996), England (Barry, Morrison, & Ellis, 1997; Vitkovitch & Tyrrell, 1995), France (Alario & Ferrand, 1999), Italy (Bates, Burani, D'Amico, & Barca, 2001; Bates et al., 2003; Dell' Acqua et al., 2000), and Iceland (Pind, Jónsdóttir, Gossurardóttir, & Jónsson, 2000). Cultural differences emerged from comparisons between countries. For example, a comparison between Italian and both American English and Spanish name agreement values reflects cultural differences (Dell' Acqua et al., 2000). Recently, two large-scale cross-linguistic studies were conducted to investigate universal and language-specific contributions to naming behavior across 7 languages (Bates et al., 2003; Székely et al., 2003) and 10 languages (Kremin et al., 2003). The researchers wanted to investigate universal and language-specific contributions to naming behavior, knowing that languages vary qualitatively in the presence/absence of specific features that are relevant for lexical access (e.g., Chinese has lexical tone, Hungarian has nominal case markers, and English has neither). These languages also vary in the availability of alternative names for the same concept. The authors found variation in *nameability* within each language, suggesting that name agreement was also "lexically" related to the specific language under study. Naming performance was higher for English speakers (as should be expected, since these pictures were designed for use in American or British studies) and lower for Chinese and Bulgarian speakers (lower name agreement, more alternative names, and longer reaction times). As was expected, the authors found substantial cross-language differences in name agreement values, due to word structure: length, frequency, syllable type, and complexity. For example, naming behavior was influenced by length and/or word complexity in Italian and Spanish languages, but not in German.

As for the dominant names elicited by each picture, these authors examined a number of dimensions that were believed to affect accuracy and/or latency in studies of lexical access. Among them, object familiarity, word frequency, visual complexity (Alario & Ferrand, 1999; Barry et al., 1997; Bates et al., 2003; Berman, Friedman, Hamberger, & Snodgrass, 1989; Cuetos et al., 1999; Cycowicz et al., 1997; Martein, 1995; Pind et al., 2000; Sanfeliu & Fernandez, 1996; Székely et al., 2003; Vitkovitch & Tyrrell, 1995), age of acquisition (AoA; Barry et al., 1997; Bonin, Chalard, Méot, & Fayol, 2001, 2002; Bonin, Fayol, & Chalard, 2001; Brysbaert, Van Wijnendaele, & De Deyne, 2000; Caroll & White, 1973; Cycowicz et al., 1997; Ellis & Morrison, 1998; Gerhand & Barry, 1999; Gilhooly & Gilhooly, 1980; Gilhooly & Hay, 1977; Iyers, Saccuman, Bates, & Wulfeck, 2001; Kremin, Hamerel, Dordain, De Wilde, & Perrier, 2000; Morrison, Chappell, & Ellis, 1997; Morrison, Ellis, & Quinlan, 1992; Pind et al., 2000), or the dimensions of objects (Walker, Barrow, & Rastatter, 2002; Walker & Rastatter, 2003) were frequently reported to affect the speed and the accuracy of picture naming.

Studies have specifically pointed out that AoA (i.e., the age at which a word was acquired) is an essential determinant of naming latency and name agreement. Name agreement is higher for concepts acquired at an earlier age. Most studies relied on adult estimates of AoA (*rated AoA*). As was claimed by Morrison and Ellis (1995), it must be ensured that this estimation truly reflects the age at which words are learned, and not a combination of variables with which AoA is correlated, such as word frequency, concreteness, or familiarity. Therefore, some studies have collected objective AoA scores from children (Chalard, Bonin, Méot, Boyer, & Fayol, 2003; Ellis & Morrison, 1998; Gilhooly & Gilhooly, 1980; Gilhooly & Hay, 1977; Morrison et al., 1997; Morrison & Ellis, 2000; Morrison, Hirsh, Chappell, & Ellis, 2002; Pind et al., 2000; Pind & Tryggvadóttir, 2002). Although rated AoA correlates with objective AoA measures, the latter are a stronger predictor of word-processing speed than are the first. However, determining objective AoA depends on how name agreement is measured. Generally, Morrison et al.'s (1997) procedures have been used to assign objective AoA scores to the items. In the first procedure, a curve-fitting function was computed for each item across all the children's data, using logistic regression analyses; in the second procedure, the AoA of a word was defined as the age at which 75% of the children in a given age group could name the picture correctly. The question was, what does *correctly* mean? To answer this question, it is necessary to collect normative data related to picture naming from children. Yet this type of research is rare. To our knowledge, only one normative study has been conducted with younger children (Cycowicz et al., 1997), but some

other developmental studies have compared children's and adults' performances (Berman et al., 1989; Chalard et al., 2003; D'Amico, Devescovi, & Bates, 2001; Martein, 1995; Morrison et al., 1997; Pind et al., 2000; Wiegel-Crump & Dennis, 1986). Cycowicz et al. revealed that 6-year-old English children provided modal names that differed from adults' modal names for 13.5% of the pictures. Moreover, children gave DKN and DKO responses for 9.8% of the pictures (vs. 1.7% for adults; Snodgrass & Vanderwart, 1980), and produced a larger number of alternative names than did adults. Wiegel-Crump and Dennis (1986) studied 6- to 14-year-old children, and the results indicated that naming improved with age. Omissions decreased in favor of correct answers, and wrong answers were more and more semantically, rather than visually, related to the image. With development, children respond more quickly and reach adult levels of accuracy. Berman et al. (1989) found that there was substantial agreement on the modal name (245 pictures out of 259) between children 8 to 10 years of age and adults. According to D'Amico et al. (2001), Italian children (between 5 and 6 years of age) were much slower and less consistent than adults in producing the target name.

It is difficult to compare these results, because the method for eliciting object names differs in these studies. In D'Amico et al.'s (2001) study, children were not assisted in naming the pictures, which disappeared at the end of the 5,000-msec window if there was no response. In other studies, children were asked to clarify whether they did or did not know the concept when they could not name the picture (Berman et al., 1989; Cycowicz et al., 1997), or they were presented several stimuli from the same semantic category (Wiegel-Crump & Dennis, 1986). Therefore, it is difficult to know whether discrepant results in picture naming reflect true differences or stem from methodological variations.

Overall, these results seem to indicate that children younger than 8 years old are less efficient in picture naming than are older children and adults. Several reasons could be given for this result. (1) Very young children produce more alternative answers, and many of them can be considered as failures. For example, in Cycowicz et al.'s (1997) study, the 6-year-old children's responses for a picture of *artichoke* (Item 9) included "balloon, bananas, cabbages, fruit, lettuce, palm tree, parachute, tree and vegetable." (2) They also provide more DKO and DKN answers. (3) The percentage of name agreement is always based on modal names, and the modal names are more often different from the adults' modal names. For instance, the majority of the children called a *screw* (Item 198) "nail" or a *peach* (Item 163) "orange" (Cycowicz et al., 1997).

In summary, the *H* statistic is a good indicator of picture-naming variability. However, (1) the DKO and the DKN responses are usually eliminated when *H* values are computed (Snodgrass & Vanderwart, 1980), and (2) the computed *H* value relies on the modal name, and the modal names produced by young children do not necessarily correspond to adults' modal names.

The percentage of agreement is not a good indication of correct picture naming in this population either because, although it corresponds to the percentage of participants naming the picture, it also is based on the modal names.

For these reasons, we claim that these classical measures used to assess name agreement (the percentage of agreement based on modal names and the *H* statistic) do not seem to be the most appropriate for young children.

Aim of the Study

The present study, which was carried out by monitoring the naming performance of young French children, focused on the method used to obtain name agreement scores. The aim was to compare several parameters (expected name, modal name, DKO responses, DKN responses, and nondominant names) used to assess picture naming. This should allow us to determine which measure is the most appropriate when normative data on picture naming are collected with young children.

METHOD

Participants

Nine hundred sixty French children (50% boys, 50% girls) from schools in and around the cities of Grenoble and Aix-en-Provence participated: 80 each at 3, 4, 5, 6, 7, and 8 years of age at pre- and elementary school level for each picture. The preschool children's mean age was 4.4 years (range, 2.9–5.10 years; $SD = 0.9$). The elementary children's mean age was 7.5 years (range, 5.10–9.9 years; $SD = 0.91$). They were from middle and upper middle class families. All the children were native French speakers. Informed consent was obtained from schools and parents before carrying out the study.

Materials

A selection was made from the 260 Snodgrass and Vanderwart (1980) pictures. Some of the original pictures were not used, for various reasons: Some of them referred to the American cultural environment (e.g., *football helmet*, *baseball bat*, or *pretzel*); others were old-fashioned representations of objects (e.g., *doorknob*, *kettle*, *record player*, or *wagon*); and some pictures were not appropriate for young children (e.g., *cigar*, *cigarette*, or *gun*).

Finally, a set of 145 pictures was selected (pictures are available at http://www.upmf-grenoble.fr/lpnc/Personnel/Christine_Cannard/pictures.pdf.

To allow easy reference with previous articles, entries are listed according to the identifying numbers originally assigned to each drawing by Snodgrass and Vanderwart (1980). The pictures were black outline drawings on a white background. Each picture occupied a square of 6×6 cm on an A4-format paper. The selected pictures were divided into two lists, one with 72 items (nine sets of 8 pictures) and another one with 73 items (eight sets of 8 pictures and one set of 9 pictures). The nine sets were presented randomly to each participant from either List 1 or List 2. So, two groups of 80 children at each age were tested, resulting in a total of $2*80*6 = 960$ children.

Procedure

Each child was tested individually in a quiet room, during a 15- to 20-min session, by using a single list of pictures. Instructions were identical to those published by Cycowicz et al. (1997). The child was instructed to look carefully at the black-and-white line-drawn object and to answer the question "What is this picture?" When the child did not recognize the object depicted or did not say anything,

the next picture was presented. When the child could not name the picture, questions were asked to clarify whether he/she did or did not know the concept—that is, "What can you do with it?" or "Where have you seen it?" No feedback was provided, and incorrect answers were left uncorrected. Encouragement was offered periodically throughout testing. At regular intervals (10 min) during the experiment, younger children were asked whether they were tired.

ANALYSES AND RESULTS

The results for each age group are presented online as Appendix A (a PDF-formatted version is available at http://www.upmf-grenoble.fr/lpnc/Personnel/Christine_Cannard/AppendixA.pdf; see also the Archived Materials section, below). The item numbers correspond exactly to those in Snodgrass and Vanderwart's (1980) publication. Appendix A reports the expected name and the alternative answers, including the DKO response and all responses other than the expected name. Each alternative name is associated with the number of participants (in parentheses) who produced the response.

The Expected Name

The expected name corresponds to the most frequent name given in a language, in this case French, for a pictured object. We referred to Alario and Ferrand (1999), who worked recently with French adults. Two judges examined children's answers independently. Decisions were made regarding some ambiguous responses. More specifically, the following cases were considered correct: (1) the use of specific responses instead of generic ones (e.g., when a child said "white bear" or "polar bear" instead of *bear*), (2) abbreviations corresponding to everyday language in oral conversations (e.g., "télé" instead of *télévision* or "frigo" instead of *réfrigérateur*), or (3) mispronunciations of correct names.

Despite the use of less stringent accuracy criteria than those used by Snodgrass and Vanderwart (1980), our find-ings show that only four pictures (3%) elicited the expected name with 100% of the 3-year-old children and 70 pictures (48%) with 100% of the 6- to 8-year-old children.

"Don't Know Object" Responses

When the child said: "I don't recognize the object at all," his/her response was scored as a DKO response. However, when a child did not recognize the object and gave a wrong answer, such as "to hang clothes on" to describe the *swing* (Item 225) or "to shave" to describe the *nail* (Item 151), his/her response was not scored as DKO. As in Cycowicz et al.'s (1997) study, this kind of response was included in the *nondominant names* category.

Although the stimuli were selected specifically for French children (see the Materials section), some pictures were not recognized. Sometimes, the DKO answers were predominant, especially in the younger age groups (see Table 1). It was the case for 17% of the pictures in the 3- to 5-year-old children but concerned only 0.2% in the 6- to 8-year-olds.

"Don't Know Name" Responses

With adults, DKN answers have been reported by the participants themselves (Snodgrass & Vanderwart, 1980). In our study, since additional questions were asked when the children either said that they did not recognize the object or said nothing, a response was always obtained. In actual fact, when a child says "to play music" or "musical instrument" for an *accordion*, this answer can be viewed as a DKN response, because it might indicate that he/she recognizes the object but cannot name it. Since it is impossible to know whether the child meant an *accordion,* a *piano*, or any other musical instrument, we classified this kind of response as a nondominant name. Therefore, the DKN category was not used in our experiment. In Cycowicz et al.'s study (1997), it is difficult to understand which answers were scored as DKN responses.
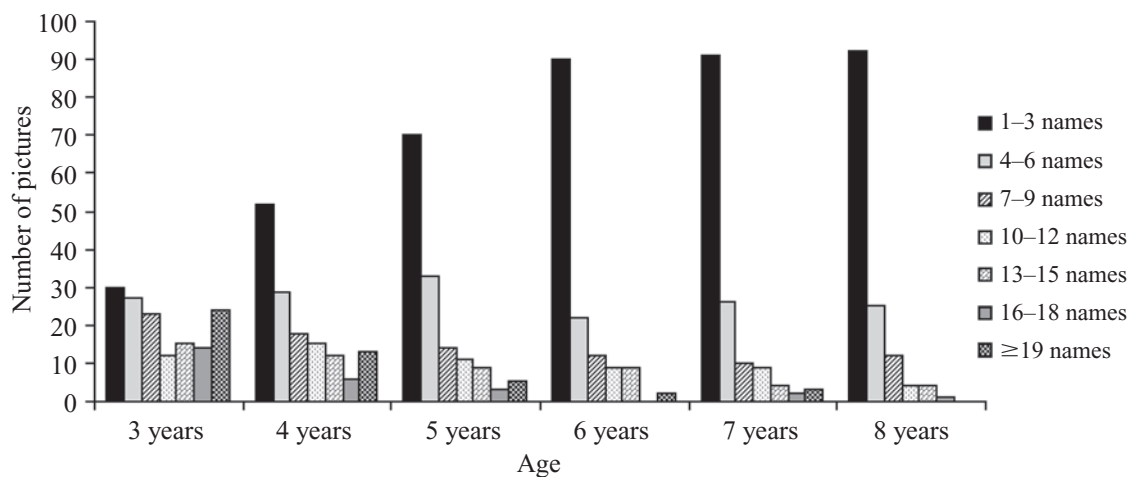

Figure 1. Number of alternative answers elicited by the Snodgrass and Vanderwart (1980) pictures, as a function of age.

Table 1
Naming Failure: Percentage of Items for Which the Most Common Response Was "Don't Know Object"

Age (Years)	Items	Frequency (%)
3	accordion, axe, cloud, ear, hair, iron, ironing board, light switch, nail, nose, peach, pineapple, pliers, plug, ring, roller skate, sandwich, screw, skirt, stove, swing, tie, toaster, wrench	16.6
4	accordion, drum, hair, hanger, iron, ironing board, light switch, nail, nose, peach, pitcher, plug, roller skate, screw, skirt, tie, toaster, wrench	12.4
5	toaster, peach	1.4
6	toaster	0.7
7	—	0
8	—	0

Alternative Answers

The number of alternative names for each picture was derived by simply counting the number of different names provided, including the target name.

The 3- and 4-year-old children produced many more alternative answers than did the 6- to 8-year-olds, resulting in a lower name agreement, expressed by a higher mean H value: 1.5 and 1.1, respectively, for the 3- and 4-year-olds, as compared with 0.6, 0.5, and 0.4 for the 6-, 7-, and 8-year-olds (Table 2).

The results show (Figure 1) that out of 145 selected pictures, for the 3-year-old children, 8 yielded a single name and 39 yielded 2–5 names. Ten to 19 names were given to 43 pictures and 20 or more names to 21 pictures, whereas among the 8-year-old children, a single name was provided for 76 pictures and 10 or more names for 9 pictures only (no picture elicited 20 or more names). The highest number of different names (34 in all) was elicited by Picture 234 (*toaster*) with the 3-year-old children and by Picture 163 (*peach*) with the 6- to 8-year-olds (25 different names for the 6-year-olds and 16 for the 8-year-olds).

Modal Name

First, as was predicted, especially with the younger children, some objects received a modal name that differed from the expected name (Table 3). The youngest children provided more different modal names (for 19.3% of the pictures) than the older groups did (3.4% in the 8-year-old children). From the age of 5 onward, the percentage of different first names decreased.

Second, for some pictures, the percentage of DKO responses was higher than that for the modal names (Table 3). Overall, about 17% of the pictures elicited more DKO responses than modal names in the 3-year-old children versus 0% for the older groups. For instance, 48.7% of the 3-year-old children gave a DKO response, and 11% gave the modal name "shell" for *hair* (Item 113).

Finally, in some cases, the modal name was not a noun but a periphrasis—specifically, in the very young children (Table 3). Sometimes, the percentage of children giving a periphrasis was higher than the percentage of participants giving the modal name. For instance, the *pitcher* (Item 175)

was correctly named by 8% of the 3-year-old children and was defined as "to give water to drink" by 18%.

DISCUSSION

A summary of the data obtained from our sample of French-speaking children is presented online as Appendix B (a PDF-formatted version of the normative data is available on our Web site at http://www.upmf-grenoble.fr/lpnc/Personnel/Christine_Cannard/AppendixB.pdf; see also the Archived Materials section, below).

For each picture, the following information is presented: (1) the expected name in French; (2) its English translation; (3) the modal name; and (4) the three measures of name agreement: the H statistic, the percentage of agreement based on the modal name as it is classically calculated, and the percentage of agreement based on the expected name. In the following part of this article, we will discuss why this last measure provides additional information necessary to understand the development of picture-naming abilities.

Comparison Between the Name Agreement Results Expressed by the H Values and by the Percentage of Agreement Based on the Expected Name

As can be seen in Appendices A and B, an identical H value at two different ages might conceal different levels of picture-naming performance. For instance, the concept *leg* (Item 134) has the same H value of 1 for the 3- and 6-year-old children, although the modal name was correct only for the older group. The younger children called it "foot." The percentage of agreement based on expected name reveals these differences. The expected name *leg* was given by 33% of the 3-year-old children but by 70% of the 6-year-olds. Analogously, Item 177 (*plug*) and Item 179 (*pan*) obtained a similar H value (1.78 and 1.82, respectively). However, *plug* was not recognized by 67.5% of the participants (DKO responses) and was named only by 8.7% of them, whereas *pan* was not recognized by 5% of the children and was named by 72.5% of them. The H values are identical, because the same number of alternative names was produced by the same number of partici-

Table 2
Summary Statistics for H Statistic as a Function of Age, for a Set of 145 Selected Snodgrass and Vanderwart (1980) Pictures

	3 Years	4 Years	5 Years	6 Years	7 Years	8 Years
Mean	1.5	1.1	0.9	0.6	0.5	0.4
SD	1.0	1.0	0.9	0.8	0.8	0.7
Median	1.4	1.0	0.6	0.2	0.0	0.0
Minimum	0.0	0.0	0.0	0.0	0.0	0.0
Maximum	3.5	3.5	3.4	3.5	3.0	3.0
Range	3.5	3.5	3.4	3.5	3.0	3.0
Q1	0.6	0.2	0.1	0.0	0.0	0.0
Q3	2.4	1.8	1.5	1.1	0.9	0.7
IQR	1.8	1.6	1.4	1.1	0.9	0.7

Note—Q1, 25th percentile; Q3, 75th percentile; IQR, interquartile range.

Table 3
Analysis of the Modal Name as a Function of Age

	3 Years	4 Years	5 Years	6 Years	7 Years	8 Years
Percentage of pictures where modal name differs from expected name	19.3	9.6	5.5	4.8	3.4	3.4
Percentage of pictures where DKO responses outnumber modal names	16.6	12.4	1.4	0.7	0	0
Percentage of pictures where periphrases outnumber modal names	2.7	0.7	0.7	0	0.7	0

pants and DKO responses were eliminated when H values were computed (Snodgrass & Vanderwart, 1980). On the contrary, when the name agreement is expressed by the percentage of the expected name answers, scores are 8.8% for *plug* versus 69.4% for *pan*. This discrepancy demonstrates that the H statistic (which is a good indicator of picture-naming variability) cannot be applied in a developmental context for scoring picture-naming accuracy.

Moreover, the 25th percentile of the H statistic (Table 4) is very close to 0 even for the youngest age groups (recall that a 0 value indicates perfect name agreement). This results from the fact that the young children produced many DKO answers that did not enter into the computation of the H statistic. This finding is in line with Cycowitz et al.'s study (1997).

Comparison of the Name Agreement Results Expressed by the Percentage of Agreement Based on the Modal Names and by the Percentage of Agreement Based on the Expected Names

Modal names differed between age groups. For example, the *light switch* picture (Item 139) elicited different modal names at each age: The modal name given by the 3-year-old children was "door" (13.8%), whereas "for the light" was given by the 4- and 5-year-old children (13.8% and 23.9%, respectively) and "a light" by the 6-year-olds (28.7%). Only 16% of the 7-year-old children produced "light switch" (with 11 alternative names). It was not until 8 years of age that a notable proportion of children (41%) provided the expected name (but nevertheless, with 13 alternative names). Thus, modal names cannot be compared between age groups. Although the percentage of name agreement based on modal names takes into account DKO and DKN responses, unlike the H statistic, it is nevertheless not adequately suited for giving a developmental indication about

the recognition of a picture by the children, since modal names can often be different from expected names.

Table 4 presents the summary statistics for name agreement based on modal names and expected names, obtained for young French children. Two-tailed t tests between these two measures (i.e., percentages of expected names vs. percentages of modal names) revealed significant differences in 3-year-old ($p < .001$), 4-year-old ($p < .02$), 5-year-old ($p < .02$), 6-year-old ($p < .05$), 7-year-old ($p < .10$), and 8-year-old ($p < .05$) children. These results indicate that the measure of name agreement expressed by the percentage of participants naming the picture with its modal name is always higher than the measure of name agreement expressed by the percentage of participants naming the picture with its expected name, especially with very young children.

CONCLUSION

Norms were gathered for French children for the Snodgrass and Vanderwart (1980) pictures. Attention was focused on a comparison of three measures of name agreement, in order to determine the most appropriate measure for scoring picture naming in young children. The basic name agreement measures (the percentage of agreement, which is the percentage of participants giving the most common name for each picture, and the H statistic, which takes into consideration the proportion of participants producing each alternative name) were compared with a new measure of name agreement based on the proportion of participants producing the expected name.

First, the measure of name agreement expressed by the H statistic value was higher for the youngest groups, demonstrating that the 3- and 4-year old participants produced more alternative names than did the older ones. There-

Table 4
Summary Statistics for Name Agreement in French Children for a Set of 145 Selected Snodgrass and Vanderwart (1980) Pictures

	3 Years			4 Years			5 Years			6 Years			7 Years			8 Years		
	H	MN%	EN%	H	MN%	EN%	H	MN%	EN%	H	MN%	EN%	H	MN%	EN%	H	MN%	EN%
Mean	1.1	61.2	57.9	1.1	69.6	67.4	0.9	79.6	77.7	0.6	85.0	83.6	0.5	87.4	86.3	0.4	90.5	89.6
SD	1.0	29.8	32.9	1.0	28.2	30.9	0.9	23.5	26.5	0.8	21.1	23.8	0.8	19.3	21.7	0.7	16.1	18.6
Median	1.0	66.7	62.5	1.0	76.3	75.3	0.6	90.4	90.2	0.2	97.5	97.5	0.0	98.8	98.8	0.0	100.0	100.0
Minimum	0.0	4.6	0.0	0.0	6.3	1.2	0.0	16.4	7.3	0.0	17.3	4.9	0.0	15.7	8.8	0.0	22.4	18.4
Maximum	3.5	100.0	100.0	3.5	100.0	100.0	3.4	100.0	100.0	3.5	100.0	100.0	3.0	100.0	100.0	3.0	100.0	100.0
Range	3.5	95.5	100.0	3.5	93.8	98.8	3.4	83.6	92.7	3.5	82.7	95.1	3.0	84.3	91.3	3.0	77.6	81.6
Q1	0.2	34.7	29.2	0.2	50.6	47.5	0.1	68.7	64.6	0.0	74.1	74.1	0.0	81.3	81.3	0.0	85.5	85.5
Q3	1.8	90.2	90.2	1.8	96.3	95.2	1.5	98.8	98.8	1.1	100.0	100.0	0.9	100.0	100.0	0.7	100.0	100.0
IQR	1.6	55.5	61.1	1.6	45.7	47.7	1.4	30.1	34.1	1.1	25.9	25.9	0.9	18.8	18.8	0.7	14.5	14.5

Note—H, name agreement based on H statistic; MN, name agreement based on modal name; EN, name agreement based on expected name; Q1, 25th percentile; Q3, 75th percentile; IQR, interquartile range.

fore, the *H* value clearly reflects the variability of the responses, but not the numerous mistakes that children can make. In actual fact, pictures with low *H* values should have a correct name agreement, but that is not always the case, because the *H* value is based on modal names that often differ from expected names.

Second, the percentage of agreement based on modal names, in contrast to the *H* value, takes into account DKO responses but, like the *H* value, gives information only about the percentage of participants producing the most common name. For adults, many of the concepts showed perfect name agreement; that is, the name given by the majority of participants is identical to the expected name. This is not the case for young children. For example, the 3-year-olds in our study elicited the same dominant responses as the adults in Snodgrass and Vanderwart's (1980) study only for 97 of the 145 items (66%). This shows that modal names are not always the same as expected names with children. In the present study, the percentage of agreement based on modal names was always higher than when based on expected names, especially for very young children. Therefore, this type of percentage of agreement, like the *H* value, is not precise enough to highlight children's naming mistakes, because it also is based on the modal name.

Thus, these two classical measures are dependent on the modal name, which is empirically determined, and are not the most appropriate when the participants are young children whose responses are likely to be highly variable and who are also much more likely than adults to omit a large number of responses.

When pictorial stimuli are used in studies on cognitive processes in children, attention must be paid to the way in which name agreement is computed. Numerous articles have been published analyzing the properties of objects and their names that influence picture naming. The norms for name agreement will be useful, for example, for determining the impact of name agreement on naming speed and accuracy. Effects of name agreement were reported in a number of previous studies with adults (Alario et al., 2004; Bates et al., 2003; Bonin et al., 2002; Bonin, Peereman, Malardier, Méot, & Chalard, 2003; Cuetos et al., 1999; Dell'Acqua et al., 2000; Kremin et al., 2003; Kremin et al., 2000; Pind & Tryggvadóttir, 2002; Sanfeliu & Fernandez, 1996; Snodgrass & Vanderwart, 1980; Snodgrass & Yuditsky, 1996; Vitkovitch & Tyrrell, 1995) or with children (Berman et al., 1989; Cycowicz et al., 1997; Johnson, 1995); for example, pictures with a single dominant response were named more quickly and accurately than those with multiple responses. This is not always the case with young children. Item 106, for example (*glove*), was incorrectly named by the majority of the 3-year-olds in our study. In this case, the *H* statistic is essential for knowing the number of alternative names, but to determine the impact of name agreement on naming accuracy, it would be better to take into consideration the expected name, and not the modal name.

It is also expected that the norms for name agreement will be useful for choosing appropriate pictures for a given population. To select suitable pictorial stimuli for studies with children, it is important to choose pictures that are correctly identified by children. Although Snodgrass and Vanderwart's (1980) pictures were drawn to elicit correct basic-level naming (e.g., *dog* rather than *poodle*), young children still often use incorrect basic-level names, even if they are nearly always from the same semantic category (e.g., *spider* for *ant*; Cycowicz et al., 1997; Vitkovitch et al., 1993; Vitkovitch & Tyrrell, 1995). It is, then, critical that computed measures of name agreement do not conceal these errors. Recall that percentage of agreement based on modal names may completely ignore children's errors if they are common to a majority of the participants. Our data call into question the conclusions from previous normative studies with young children—for example, D'Amico et al.'s (2001) considerations on how semantic categories differentially influence children's and adults' naming. Using a measure of percentage of agreement based on modal name, they revealed that adults were especially fast in naming pictures depicting parts of the body but were relatively slow to name pictures of people and animals, whereas children gave their best performance in naming animals, followed by parts of the body and vehicles. We had an item belonging to the category of parts of the body in our sample—namely, Item 134, depicting a *leg*. We found a high level of name agreement in the 3-year-old group when this measure was based on modal name (66.7%), but this modal name did *not* correspond to the expected name. The children said "foot" instead of "leg," and only 27.8% said the expected name. Although this specific result might not directly contradict D'Amico et al.'s data based on older children, it suggests the need to be wary when using norms on picture naming in developmental studies. Yet most normative studies have underestimated the important qualitative differences in the distribution of naming responses across age groups. We have underlined some of them in this study: proportion of DKO responses and possible high level of agreement on a name different from the expected name. Our study aims at offering researchers working with young French children a database that specifically takes into account these specificities.

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ARCHIVED MATERIALS

The following materials and links may be accessed through the Psychonomic Society's Norms, Stimuli, and Data archive, http://www.psychonomic.org/archive/.

To access these files, search the archive for this article using the journal (*Behavior Research Methods*), the first author's name (Cannard), and the publication year (2005).

FILE: Cannard-BRM-Norms-2005.zip.

DESCRIPTION: The compressed archive file contains two files providing French normative data for 145 Snodgrass and Vanderwart's (1980) pictures, developed by Cannard et al. (2004):

cannard2004appendixA.pdf, containing the alternative responses given for each picture by 3- to 8-year-old children. For each picture, the following information is presented: (1) the item numbers, which correspond exactly to those in Snodgrass and Vanderwart's (1980) publication, (2) the expected name given in French, (3) its English translation, (4) the percentage of "Don't Know Object" responses, and (5) the alternative answers, including all the responses other than the expected name. Each alternative name is associated with the number of participants (in parentheses) who produced the alternative response. The file contains six tables providing normative data for 3-, 4-, 5-, 6-, 7-, and 8-year-old children.

cannard2004appendixB.pdf, containing the norms for name agreement, as a document in .pdf format. For each picture, the following information is presented: (1) the item numbers, (2) the picture's author, (3) the expected name given in French, (4) its English translation, (5) the name agreement expressed by the percentage of participants naming the picture with its expected name (ENA), (6) the modal name (e.g., the name given by the majority of subjects), (7) the name agreement expressed by the percentage of participants naming the picture with its modal name (MNA), and (8) the name agreement expressed by the *H* statistic. The file contains six tables providing normative data for 3-, 4-, 5-, 6-, 7-, and 8-year-old children.

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