

French categorization norms for 70 semantic categories and comparison with Van Overschelde et al.'s (2004) English norms

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The present methodological note provides categorization norms for 70 semantic categories collected from 200 participants. The categories were mainly derived from a French translation of the Van Overschelde, Rawson, and Dunlosky (2004) inductor terms including a large set of semantic categories. Our study also extends recent French norms (Léger, Boumlak, & Tijus, 2008; Marchal & Nicolas, 2003) and tests their stability. These 70 categories constitute the widest French categorization norms to date and will be of use to studies in the fields of both linguistics and psycholinguistics. A cross-linguistic comparison, with both quantitative and qualitative results, is also performed, which should prove useful for bilingual and/or cross-linguistic studies. The norms collected for all 70 categories are available for download as supplemental materials from <http://brm.psychonomic-journals.org/content/supplemental>.

Categorization is the cognitive process without which the world would appear chaotic. From birth, humans store a phenomenal amount of knowledge derived from their interactions with objects and surrounding circumstances. Daily, they manipulate objects, see other people using these objects, and store them in memory. These internal representations are brought together under the term of *semantic knowledge*. As outlined by Cree and McRae (2003), the memory network involved in the retrieval, processing, and, possibly, the output of this semantic knowledge is called *semantic memory*. Continuously growing from early childhood, this network is fully efficient when adult and remains quite efficient in normal aging (Luo & Craik, 2008). Obviously, an exhaustive description of the content of this memory is utopian. Nevertheless, it is possible to examine its structure and mechanisms via behavioral studies (Bueno & Frenck-Mestre, 2008; McRae & Boisvert, 1998; Neely, 1991; Quinn & Kinoshita, 2008), neuroimaging studies (Dehaene et al., 1998), or computerized simulations involving a cross-section of these representations in memory (Masson, 1995; Plaut, 1995; Plaut & Booth, 2000). Generally, the building of the experimental material of these studies depends on carefully checked norms of association, categorization, or semantic features (see, e.g., for these three types of norms, Ferrand & Alario, 1998; Van Overschelde, Rawson, & Dunlosky, 2004; McRae, Cree, Seidenberg, & McNorgan, 2005, respectively). The majority of studies on semantic memory have been performed in English and certainly depend on norms produced in this language.

The present article provides French categorization norms for 70 semantic categories in adults in the aim of

extending the currently available norms to the French language. We have adopted the methodology of Van Overschelde et al.'s (2004) English norms and will present comparisons between the two studies in order to investigate their cross-linguistic generalization and to be of use for future cross-linguistic research.

The first categorization norms were in English (Battig & Montague, 1969; Cohen, Bousfield, & Whitmarsh, 1957) and, as reported by Van Overschelde et al. (2004), were used in more than 1,600 published articles in approximately 220 different periodicals. Recently, Van Overschelde et al. updated and increased Battig and Montague's norms by testing 70 semantic categories from over 700 North American participants (see Table 1 for number of participants and categories for English norms). Given the speed of language change, categorization norms (and to a lesser extent, associative norms) rapidly become obsolete, necessitating relatively frequent updating.

To collect their normative data, Van Overschelde et al. (2004) asked participants from three different universities to perform a production task for 70 semantic categories. Among these categories, 56 were derived from Battig and Montague (1969), and 14 were added on the basis of three different criteria (general, ad hoc, and domain-relevant categories). Categories were displayed one by one, and the participants had 30 sec to typewrite a maximum number of exemplars per category. The entire experiment was computerized and allowed quantitative and qualitative measures.

Norms can reflect the use of the language for a given, relatively short period and can be considered to be a socio-cultural "snapshot." Thus, Van Overschelde et al. (2004)

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Table 1
Number of Categories and Participants Tested in a Set of
English and French Semantic Categorization Norms

Reference	Number of Categories	Maximum Number of Participants per Category
English Norms		
Cohen, Bousfield, & Whitmarsh (1957)	43	400
Battig & Montague (1969)	56	442
Van Overschelde, Rawson, & Dunlosky (2004)	70	710
French Norms		
Charles & Tardieu (1977)*	28	n.a.
Denis (1978)*	16	60
Tourrette (1979)*	30	114
Cordier (1980)	5	280
Dubois (1983)	22	75
Marchal & Nicolas (2003)	38	85 ^a
Léger, Boumlak, & Tijus (2008)	21	100
The present study	70	200

*Unpublished norms. ^aTwo distinct groups of 85 young and 85 elderly French speakers.

computed a measure of a generational stability on Battig and Montague's (1969) data through Pearson product-moment correlations. Fifty-four of the 56 categories showed a good generational stability. As was reported by Van Overschelde et al., elements that constitute good category exemplars can change depending on societal evolution. For instance, the authors report the exemplars of diseases that either declined (tuberculosis) or appeared (AIDS) during the 35-year-old period between their study and that of Battig and Montague. As such, changes mainly concern categories dealing with "trends" (e.g., A TYPE OF DANCE OF A FEMALE FIRST NAME), whereas categories such as A COLOR or A PART OF THE HUMAN BODY show a strong stability.

The question of possible differences within the same cultural group has been dealt with in various American norms. Norms are frequently collected, within the same time frame, from different geographical locations (Maryland and Illinois for Battig & Montague, 1969; Colorado, Maryland, and North Carolina for Van Overschelde et al., 2004) and include a relatively high number of participants (however, never surpassing 200 per location). Van Overschelde et al. computed Pearson product-moment correlations and showed a high degree of geographical stability within the United States, as did Battig and Montague with their own data. Such results from single regions make it possible for us to consider that collecting data can be extended to the entire country.

In comparison with English categorization norms, published French norms for a large set of categories are markedly rarer. Until recently (Léger, Boumlak, & Tijus, 2008; Marchal & Nicolas, 2003), only norms dealing with a small set of categories (Cordier, 1980; Dubois, 1983), publications of limited circulation, and/or unpublished works were the reference for French semantic categorization norms (Charles & Tardieu, 1977; Denis, 1978; Tourrette, 1979). Table 1 sums up the number of categories and participants tested in several of these semantic categorization norms.

In general, to overcome the lack of norms in French, researchers make ad hoc pretests on a small number of participants (generally, fewer than 40), with no aim of publishing their normative data.

Marchal and Nicolas (2003) collected data on 38 semantic categories from 85 young and 85 elderly adults. The participants' task was to write the first four exemplars that came to mind with no time constraint. In Léger et al.'s (2008) study, three groups of 100 young adults participated, each of which was involved in collecting data for 7 semantic categories, so that a total of 21 categories was processed. Their task was to write the maximum number of exemplars per category, with no time constraint. Whereas Marchal and Nicolas gave no criterion concerning the distinction of the different categories, Léger et al. arranged their 21 categories into 3 superordinate categories: natural objects ($N = 9$), artifactual objects ($N = 9$), and human activities ($N = 3$). These two French studies shared 13 categories.

The aim of the present study was to obtain categorization norms for a set of 70 semantic categories, collected in 200 young French adults. In comparison with recently published French norms (Léger et al., 2008; Marchal & Nicolas, 2003), the present study substantially increases the number and the diversity of categories and constitutes the widest base of French categorization norms to date. Such diversity was certainly lacking for studies that needed to deal with different approaches to the study of semantic memory structure. Our study provides 55 and 56 categories in addition to those in Marchal and Nicolas's and Léger et al.'s studies, respectively, while sharing 15 and 14, respectively, with those studies (see Tables 4 and 5). A measure of stability will be given for these common categories in the Results section.

Given the rise in the number of cross-linguistic and/or bilingual paradigms, the necessity of adopting a common methodology goes without question. We adopted that in Van Overschelde et al.'s (2004) study, which thus enabled

the comparison of French and English semantic memory processes. Moreover, collection of the data in that study and in the present one was obtained in a relatively short time period, which certainly permits good generational stability. To fill the void in French norms with respect to number of categories, we translated 59 of the inductor terms in Van Overschelde et al. Eleven categories were discarded due to a high American specificity (example: A STATE). We replaced them by 11 new categories (see the Materials section for a description and Table 3).

Ordering each semantic category in *superordinate* categories, such as living, nonliving, natural, artifacts, broad, or narrow, appears quite difficult. The overlap between categories' dimensions makes a general classification difficult (e.g., *UN OISEAU*/A BIRD is both a living and a natural thing, whereas *UN PHÉNOMÈNE MÉTÉOROLOGIQUE*/A WEATHER PHENOMENON is both a nonliving and a natural thing). Whereas the dichotomy between a finite and a nonfinite category is manifest (e.g., A MONTH VS. A GIRL'S FIRST NAME), the dichotomy between large and narrow categories is again difficult to draw. In this connection, Quinn and Kinoshita (2008) noted that "what has been called a large category in one study may be referred to as a small/narrow category in another" (p. 288). Such distinctions are therefore relative ones (e.g., *UNE COULEUR*/A COLOR can be classified as a natural thing regarding the green color of the chlorophyll making up a plant but can be classified as an artifact if it refers, for instance, to a chemical ink). Given the complexity involved in classifying semantic categories, it was not relevant to provide a classification in the present study.

To sum up, our study provides a large view of the categorization process, since it deals with a large diversity of semantic categories and provides materials for different approaches in the study of semantic memory structure.

METHOD

Participants

Two hundred eighteen students participated in the collection of the norms, which lasted roughly 45 min. The participants were recruited from two universities (Paris 13–Villetaneuse and Paris 8–Saint-Denis). To broaden our sample, participants were recruited from three different majors (psychology, linguistics, and economics; $N = 100, 50, \text{ and } 50$, respectively). Eighteen participants were ruled out because they either were not native French speakers or surpassed the age limit determined for the group. The results were computed on a maximum of 200 students per category ($M = 196, SD = 10.93$, range = 147–200). The group consisted of 162 women and 38 men (mean age = 22.3 years, $SD = 5.88$).

Materials

The materials consisted of the 70 semantics categories (see Table 3). Fifty-nine of them were taken from Van Overschelde et al. (2004). Actually, 11 categories were discarded from the latter since they were too culturally marked and/or elicited proper nouns as answers (e.g., A FOOTBALL TEAM NAME, A COLLEGE OR UNIVERSITY, A STATE) and were replaced by 11 new categories; 4 categories were selected to take into account "contemporary" matters (e.g., *UN PÉRIPHÉRIQUE INFORMATIQUE*/A PERIPHERAL DEVICE), 4 permitted further comparisons between children and adults (e.g.,

UN TYPE D'HABITATION ANIMALE/A TYPE OF ANIMAL DWELLING), and 3 referred to never studied categories of objects (e.g., *UN OBJET DE DÉCORATION*/AN INTERIOR DECORATION). To our knowledge, none have been tested in previous norms (in either English or French), which thereby increases the diversity of available categories. Consequently, the overlap of the present and previous norms allows for cross-linguistic comparisons for 59 semantic categories. Although language-specific comparisons were not our priority, we will report herein comparisons with the French norms collected by Marchal and Nicolas (2003) and by Léger et al. (2008) for 15 and 14 common categories.

Procedure

The present study was not computerized, contrary to Van Overschelde et al.'s (2004) study.¹ This constitutes the main difference in procedure with the present study. Group sessions were held between March and May 2008. The participants were given a 70-page, A5-format booklet including the name of a semantic category on each odd page. The instructions were presented on the booklet cover (and were adapted for the noncomputerized situation; see the Appendix); they specified that the task was to handwrite the maximum number of exemplars for each semantic category in a 30-sec time window. A category instance was given (*UN MATÉRIEL DE BUREAU*/A STATIONERY), as were possible responses to this category (e.g., *trombone/paper clip, stylo/pen, agrafeuse/stapler*). The experimenter produced a "beep" every 30 sec, indicating that the participants had to move to the next category. A 2-sec latency period was taken into account for the participants to turn the page. In addition, if the participants did not understand the name of the category, it was specified to quietly wait until the end of the 30-sec time window and to resume when the following category began. Two breaks were proposed: one at the first third of the booklet, the other at the second third. Ten different randomization orders were created to avoid list effects as well as communication among participants during the data collection. Care was taken to avoid the proximity of certain categories, mainly to prevent priming effects (e.g., *UN TYPE DE DANSE*/A TYPE OF DANCE was never adjacent to *UN STYLE DE MUSIQUE*/A STYLE OF MUSIC, or *UN MEUBLE*/AN ARTICLE OF FURNITURE was never adjacent to *UNE CHOSE FAITE DE BOIS*/A THING MADE OF WOOD). Three dependent variables concerning produced exemplars were collected inside each category: *name* of exemplars (both in French and English), *total*, and *first occurrence* (see Table 2 for the example of *UNE PIERRE PRÉCIEUSE*/A PRECIOUS STONE). The data for the whole category set are available for *total of different entries* per category, *potency*, and *rank*. These six variables will be described in the Results section below.

Posttest. Following collection of the category exemplars, a posttest was performed to make sure that the name we gave to each category (or its translation) was fully understandable. In this perspective, 66 new participants were asked to determine the name of the category from the provided exemplars. Each participant received a 70-page, A5-format booklet. All the exemplars of a specific semantic category found in our main study were written on each page of this booklet. The participants had to write down the name of the semantic category that could include all the exemplars given. The participants were given the exemplars in alphabetic order. Responses such as *UNE DANSE, UN TYPE DE DANSE, or UNE SORTE DE DANSE* (A DANCE, A TYPE OF DANCE, or A KIND OF DANCE) were considered as a unique correct response. The results of this "opposite exercise" indicated that the correct name of the semantic category derived from exemplars was easily recovered by the participants. The results of this posttest could be seen as a sort of reliability estimate. However, the participants had difficulties with three specific semantic categories (*UN MANDAT POLITIQUE*/AN ELECTIVE OFFICE, *UN CONDIMENT*/A SUBSTANCE FOR FLAVORING FOOD, and *UN OBJET CÉLESTE*/A CELESTIAL OBJECT). Nearly 25% of the participants did not give a response to these categories. These difficulties must then be taken into account when these categories are used in semantic tasks.

Table 2
Entire Set of Responses for the Category *UNE PIERRE PRÉCIEUSE/A PRECIOUS STONE*

The Present Study			Van Overschelde, Rawson, and Dunlosky (2004) Study		
French Name	Total (199)	First Occurrence	English Name	Total (647)	First Occurrence
diamant	.89	.36	diamond	.92	.50
rubis	.75	.32	ruby	.78	.15
émeraude	.62	.06	emerald	.51	.06
saphir	.53	.09	sapphire	.49	.02
améthyste	.15	.03	amethyst	.18	.02
or	.15	.05	gold	.14	.02
topaze	.14	.02	topaz	.12	.01
jade	.08	.02	jade	.06	
aigue marine	.06	.01	aquamarine	.04	.00
argent	.05		silver	.08	
cristal	.05	.01	crystal	.04	.00
ambre	.04		amber	.02	.00
lapis-lazulis	.04		lapis	.00	
opale	.04	.01	opal	.18	.01
agate/agathe	.03	.02	agate	.00	.00
perle	.03		pearl	.22	.01
quartz	.03		quartz	.06	
bijou	.02	.01	jewel	.03	.00
onyx	.02		onyx	.04	.00
zirconium	.02		zirconium	.01	
carat	.02		carat	.00	
aventurine	.01		aventurine	–	–
bague	.01	.01	rings	.00	
grenat	.01		garnet	.11	.01
jaspe	.01		jasper	.00	
joyau	.01		jewelry	.00	
nacre	.01		mother-of-pearl	.00	
opaline	.01		opaline	–	–
pierre	.01		stone	–	–
pierre de lune	.01	.01	moonstone	.00	
turquoise	.01		turquoise	.05	.01
citrine	.01		citrine	.00	
collier	.01		necklace	–	–
corail	.01		coral	.00	.00
diadème	.01		tiara/diadem	–	–
gemme	.01	.01	gem(stone)	.19	.11
granite	.01		granite	.01	.00
ivoire	.01		ivory	.00	
météore	.01		meteor	–	–
musée	.01		museum	–	–
œil de tigre	.01		tiger's eye	.01	
olivine	.01		olivine	–	–
pierre noire	.01		black chalk	–	–
tanzanite	.01		tanzanite	.02	

RESULTS

Data for the 70 categories from the 200 booklets were manually entered into an Excel spreadsheet. Fewer than 1% of the responses were excluded because of illegible handwriting. We corrected spelling mistakes when they were not ambiguous (e.g., *papyrus* instead of *papyrus*). The proportions for the whole category set were calculated and are available for consultation/downloading as supplemental materials from <http://brm.psychonomic-journals.org/content/supplemental>. Usually, responses below the threshold of 5% are considered as marginal and do not appear in tables. However, for a larger view of the categorization process, responses below this threshold are also shown. Each semantic category is displayed in a

separate sheet on the electronic archive. The construction of each table is provided via the example of the category *UNE PIERRE PRÉCIEUSE/A PRECIOUS STONE*. Table 2 provides the results for *names*, *totals*, and *first occurrences* for this category.

Names (French/English). This column lists all the exemplars given in response to the category in question. The singular form presentation was adopted in order to maintain consistency. However, a few items remained in the plural form, since their use was only plural (e.g., *fondations/foundation*). When a French response had two or more translation equivalents, we numbered these responses and gave the different translations (e.g., *Boisson 1* and *Boisson 2* for *beverage* and *drink*, respectively). When a word had various correct spellings, all spellings

Table 3
Participant Counts, Total of Different Entries, Potency, Rank, Academic Stability, and Cross-Linguistic Stability
According to the Present French Norms and Van Overschelde, Rawson, and Dumlosky's (2004) English Norms

Category	The Present Study										Cross-Linguistic Stability
	Participant Counts	Total of Different Entries	Academic Stability			Van Overschelde et al.'s Study			Rank		
			PSY/LIN	PSY/ECO	LIN/ECO	Potency	Rank				
1. Une pierre précieuse/a precious stone	199 (1)	44	.99*	.99*	.98*	63	3.9	.98*	4.6	61	.96*
2. Une unité de temps/a unit of time	200 (0)	38	.98*	.99*	.96*	12	6.5	.96*	7.8	7	.82*
3. Un membre de la famille/a relative	200 (0)	55	.99*	.99*	.99*	1	9.6	.99*	9.2	5	.79*
4. Une unité de distance/a unit of distance	198 (2)	33	.98*	.99*	.99*	31	4.9	.98*	6.4	22	.25
5. Ce qui peut voler/a thing that flies	198 (2)	102	.98*	.98*	.97*	42	4.6	.98*	5.3	44	.89*
6. Un support écrit/a type of reading material	196 (4)	109	.95*	.96*	.93*	53	4.2	.95*	5.3	42	.16
7. Un grade militaire/a military title	198 (2)	51	.97*	.98*	.96*	44	4.5	.97*	4.6	61	.80*
8. Un animal à 4 pattes/a four-footed animal	200 (0)	100	.97*	.97*	.96*	7	7.5	.96*	7.7	10	.95*
9. Une matière textile/a type of fabric	194 (6)	54	.96*	.96*	.97*	38	4.7	.96*	5.3	44	.85*
10. Une couleur/a color	200 (0)	45	.99*	.98*	.98*	2	9.5	.99*	10.0	3	.97*
11. Un ustensile de cuisine/a kitchen utensil	200 (0)	82	.98*	.96*	.96*	17	5.7	.98*	6.2	25	.80*
12. Un bâtiment religieux/a building for religious service	200 (0)	33	.99*	.99*	.98*	60	4.0	.99*	3.7	69	.90*
13. Ce qui fait du bruit/a thing that makes noise	200 (0)	177	.91*	.91*	.89*	41	4.6	.91*	6.2	25	.37***
14. Un meuble/an article of furniture	200 (0)	59	.98*	.98*	.97*	20	5.6	.98*	6.5	20	.38
15. Une partie du corps humain/a part of the human body	200 (0)	87	.97*	.95*	.92*	3	8.9	.97*	11.2	1	.85*
16. Un fruit/a fruit	199 (1)	47	.95*	.96*	.92*	4	8.1	.95*	7.5	13	.85*
17. Une arme/a weapon	199 (1)	108	.97*	.98*	.96*	34	4.9	.97*	5.6	35	.53***
18. Un mandat politique/an elective office	147 (53)	38	.94*	.97*	.94*	70	3.1	.94*	4.9	56	.71***
19. Un type d'habitation humaine/a type of human dwelling	200 (0)	68	.97*	.97*	.96*	24	5.3	.97*	5.5	38	.86*
20. Une boisson alcoolisée/an alcoholic beverage	199 (1)	79	.96*	.97*	.92*	15	5.8	.96*	5.6	35	.86*
21. Ce qui est vert/a thing that is green	200 (0)	141	.91*	.88*	.82*	52	4.3	.91*	5.0	53	.91*
22. Un acte puni par la loi/a crime	200 (0)	116	.97*	.97*	.94*	43	4.6	.97*	4.9	56	.61*
23. Un outil de bricolage/a carpenter's tool	200 (0)	84	.98*	.97*	.98*	30	4.9	.98*	5.2	50	.88*
24. Un membre du clergé/a member of the clergy	191 (9)	38	.96*	.98*	.94*	56	4.1	.96*	4.1	67	.70*
25. Un condiment/a substance for flavoring food	147 (53)	85	.89*	.89*	.81*	57	4.1	.89*	5.7	33	.84*
26. Un type de carburant/a type of fuel	200 (0)	49	.98*	.97*	.95*	62	3.9	.98*	4.1	67	.58**
27. Une profession/an occupation or profession	200 (0)	223	.91*	.81*	.79*	13	6.4	.91*	6.3	24	.11
28. Un paysage géographique naturel/a natural earth formation	196 (4)	95	.95*	.95*	.90*	39	4.6	.95*	5.6	35	.57*
29. Un sport/a sport	200 (0)	85	.95*	.93*	.94*	11	6.8	.95*	7.8	7	.41
30. Un phénomène météorologique/a weather phenomenon	200 (0)	71	.97*	.97*	.94*	22	5.5	.97*	5.8	29	.51**
31. Un vêtement/an article of clothing	200 (0)	90	.93*	.95*	.91*	6	7.7	.93*	8.4	6	.55**
32. Une partie d'un bâtiment/a part of a building	198 (2)	104	.95*	.93*	.90*	26	5.1	.95*	6.5	20	.73*
33. Un élément chimique/a chemical element	189 (11)	97	.66*	.68*	.78*	54	4.2	.66*	5.3	44	.43***
34. Un instrument de musique/a musical instrument	200 (0)	63	.97*	.98*	.97*	9	6.9	.97*	7.6	11	.60*
35. Un objet que l'on perd facilement/an object that can be lost†	198 (2)	98	.95*	.95*	.93*	55	4.2	.95*	—	—	—

Table 3 (Continued)

Category	The Present Study										Van Overschelde et al.'s Study		Cross-Linguistic Stability
	Participant Counts	Total of Different Entries	Academic Stability			Potency			Rank	Potency	Rank	Stability	
			PSY/LIN	PSY/ECO	LIN/ECO	PSY/LIN	PSY/ECO	LIN/ECO					
36. Un style de musique/a type of music	198 (2)	79	6.9	10	.96*	.96*	.91*	7.6	11	.77*			
37. Un oiseau/a bird	199 (1)	76	5.6	19	.86*	.96*	.83*	6.1	27	.44***			
38. Une boisson non alcoolisée/a nonalcoholic beverage	198 (2)	68	5.6	21	.98*	.94*	.93*	6.4	22	.62**			
39. Un moyen de transport/a type of vehicle	199 (1)	69	8.0	5	.97*	.98*	.97*	6.8	16	.69*			
40. Une science/a science	197 (3)	112	4.1	58	.91*	.95*	.88*	5.0	53	.70**			
41. Un jouet/a toy	200 (0)	112	4.8	36	.94*	.94*	.91*	5.2	50	.74*			
42. Un type de danse/a type of dance	200 (0)	76	5.1	25	.92*	.97*	.94*	5.5	38	.61**			
43. Un légume/a vegetable	200 (0)	61	5.8	14	.92*	.91*	.92*	5.8	29	.40***			
44. Un type de chaussure/a type of footwear	200 (0)	75	4.9	29	.97*	.96*	.92*	5.8	29	.25			
45. Un insecte/an insect	200 (0)	52	5.4	23	.97*	.97*	.94*	5.4	41	.91*			
46. Un loisir/a leisure activity†	198 (2)	135	5.7	16	.94*	.93*	.95*	—	—	—			
47. Un objet que l'on collectionne/a collection object†	199 (1)	145	4.4	47	.93*	.91*	.89*	—	—	—			
48. Une fleur/a flower	200 (0)	64	5.1	27	.97*	.95*	.95*	5.0	53	.87*			
49. Une maladie/a disease	200 (0)	116	4.8	35	.95*	.95*	.93*	4.4	66	.69*			
50. Un arbre/a tree	199 (1)	70	4.9	28	.89*	.93*	.91*	5.7	33	.32			
51. Un type de bateau/a type of ship/boat	200 (0)	72	3.9	65	.97*	.94*	.91*	4.5	63	.42***			
52. Un poisson/a fish	199 (1)	84	4.9	32	.90*	.87*	.86*	5.5	38	.66*			
53. Un serpent/a snake	189 (11)	38	3.5	69	.97*	.98*	.98*	5.4	41	.04			
54. Un appareil électroménager/a household appliance†	198 (2)	62	4.8	37	.94*	.96*	.92*	—	—	—			
55. Une matière enseignée à l'école/an academic discipline†	200 (0)	53	7.0	8	.99*	.98*	.98*	—	—	—			
56. Un périphérique informatique/a peripheral device†	186 (14)	68	3.9	64	.96*	.91*	.89*	—	—	—			
57. Une drogue/a drug	199 (1)	62	4.4	45	.94*	.97*	.93*	5.2	50	.52***			
58. Une source d'énergie/a source of energy†	197 (3)	77	3.8	67	.95*	.92*	.94*	—	—	—			
59. Un liquide/a liquid	200 (0)	88	4.3	49	.95*	.97*	.96*	5.3	44	.79*			
60. Une chose portée par les femmes/a thing women wear	200 (0)	108	5.6	18	.91*	.92*	.91*	6.8	16	.62*			
61. Un métal/a metal	198 (2)	37	4.4	46	.98*	.98*	.97*	4.8	59	.84*			
62. Une catégorie grammaticale/a part of speech	171 (29)	67	4.3	48	.84*	.92*	.80*	4.8	59	.68**			
63. Un média/a media†	197 (3)	61	4.0	61	.99*	.98*	.98*	—	—	—			
64. Une chose faite de bois/a thing made of wood	199 (1)	133	4.9	33	.93*	.96*	.93*	5.8	29	.74*			
65. Ce que l'on sauve lors d'un incendie/a thing taken from a burning home	198 (2)	90	4.1	59	.88*	.83*	.79*	5.4	41	.17			
66. Un type d'habitation animale/a type of animal dwelling†	199 (1)	90	4.3	51	.94*	.95*	.95*	—	—	—			
67. Un objet de décoration/an interior decoration†	199 (1)	110	4.6	40	.94*	.94*	.88*	—	—	—			
68. Un objet céleste/a celestial object†	152 (48)	56	3.8	66	.98*	.98*	.92*	—	—	—			
69. Un outil de jardinage/a gardener's tool	198 (2)	61	4.3	50	.98*	.98*	.96*	4.5	63	.70**			
70. Une plante aromatique/an herb	192 (8)	77	3.8	68	.94*	.90*	.85*	4.9	56	.46***			

Note—PSY, psychology; LIN, linguistics; ECO, economics. †Substituted categories compared with Van Overschelde et al. (2004). * $p < .001$. ** $p < .01$. *** $p < .05$.

were indicated as a single entry (e.g., *hachisch*, *haschich*, *hachich*). The same procedure was applied when two entries referred to the same meaning (e.g., *titane* and *titanium*).²

Total. The heading of this column first indicates (in parentheses) the number of participants who gave at least one response for the category in question. Then the column details the proportion for each French exemplar, with the English equivalent when available. The proportion was calculated for each response by dividing the number of participants who gave the considered exemplar by the total number of participants who gave at least one exemplar for the category considered. For instance, in French, for the category *UNE PIERRE PRÉCIEUSE/A PRECIOUS STONE*, *diamant/diamond* had a proportion of .89 (178 participants out of a total of 199 gave this response).

First occurrence. Herein, we provide the proportion of participants who gave the response as a first choice. It was calculated by dividing the number of participants who gave the response as a first choice by the total number of participants who gave at least one response in the category. For example, *diamant/diamond* was given as a first choice with a proportion of .36 (72 participants out of a total of 199 gave this response as a first choice). An empty cell on the *First Occurrence* column indicates that the exemplar was never given as a first choice. A “–” sign indicates that the exemplar was not present in Van Overschelde et al.’s (2004) study.

In the following, we will present a measure of academic stability, a cross-linguistic comparison, and a language-specific comparison. Table 3 presents a measure of academic stability according to the three university majors of the participants in our study. It also shows a direct comparison between our French data and Van Overschelde et al.’s (2004) English data. Lastly, Tables 4 and 5 display comparisons between the present study and Marchal and Nicolas’s (2003) and Léger et al.’s (2008) studies, respectively. As such, three dependent variables concerning the data set of the whole category were analyzed and are detailed through the headings below (*potency*, *rank*, and *academic stability*; see Table 3).

Participant counts. This column indicates the total number of participants who gave at least one response in the category. The total number of participants who gave no response is provided in parentheses.

Total of different entries. The total number of different entries per category is given (e.g., 44 different entries were given for the *UNE PIERRE PRÉCIEUSE/A PRECIOUS STONE* category).

Potency. A measure of category potency was calculated by dividing the total number of responses in the category by the total number of participants who gave at least one response. The average number of responses per category is thus known. For instance, the category *UNE PIERRE PRÉCIEUSE/A PRECIOUS STONE* had a potency of 3.9—that is, 3.9 words were given on average by participants.

Rank of the category. Herein, we indicate the rank obtained by each category as a function of the formerly calculated potency strength. For instance, the category *UN MEMBRE DE LA FAMILLE/A RELATIVE* has the largest potency

strength (this category generated an average of 9.6 words per participant) and, therefore, has a rank of 1, whereas *UN MANDAT POLITIQUE/AN ELECTIVE OFFICE* has the smallest strength and therefore a rank of 70 (on average, 3.1 words per participant).

Academic stability. We computed three Pearson product–moment correlation coefficients, one for each pair of majors (psychology, linguistics, and economics), for frequencies with which each response was generated. As was expected, strong positive correlation coefficients were observed, suggesting the generalization of the norms across university majors ($p < .001$ for the whole r ; see Table 3). This generalization cannot really be compared with the Van Overschelde et al. (2004) and Battig and Montague (1969) generalization, which concerned a geographic stability—that is, students from different regions of the United States. Whereas Balota, Ferraro, and Connor (1991) reported an influence of demographic variability in the collection of imageability norms, our results show an academic stability in categorization norms.

Cross-Linguistic Comparisons (see Table 3)

Considering potency, the averages for the 59 common categories were 5.29 ($SD = 1.45$) and 5.91 ($SD = 1.42$) for the present study and for Van Overschelde et al.’s (2004) study, respectively. The difference was significant [$t(116) = 2.34, p < .05$]. Slightly more exemplars were given per category in Van Overschelde et al.’s study. We also performed a Pearson product–moment correlation test on this potency strength between our French and Van Overschelde et al.’s English norms, for available categories. The results showed a strong positive correlation ($r = .90, p < .001$).

Considering rank, another correlation test was performed on the differences of ranks (Spearman rho) for available categories and again showed a high degree of correlation ($r = .76, p < .001$). Both of these strong positive correlations indicate that French and English participants have a close quantitative behavior when categorizing.

In order to have a statistical measure of the qualitative similarity of the French and American categorization process, we performed Pearson product–moment correlations between the two sets of frequencies. Since responses below a threshold of 5% are usually considered as marginal measures, we performed this correlation test only when this threshold was surpassed in one or both languages for each exemplar (see the “Cross-Linguistic Stability” subheading, Table 3). We report, for each of the 59 common categories, the Pearson product–moment correlation coefficient. The observed correlation coefficients ranged from +.04 to +.97. Although 50 categories showed high correlation coefficients, 9 categories did not reach significance: A UNIT OF DISTANCE, A TYPE OF READING MATERIAL, AN ARTICLE OF FURNITURE, AN OCCUPATION OR PROFESSION, A SPORT, A TYPE OF FOOTWEAR, A TYPE OF SHIP/BOAT, A SNAKE, and A THING TAKEN FROM A BURNING HOME.

Comparison With Other French Norms

In order to have a measure of the stability between our norms and other recent French norms, we also calculated

Table 4
Potency and Language-Specific Stability for the Fifteen Shared Categories Between
the Present French Norms and Marchal and Nicolas's (2003) French Norms

Category	Potency		Language-Specific Stability
	The Present Study	Marchal and Nicolas's Study	
Un ustensile de cuisine/a kitchen utensil	5.7	4	.91
Un meuble/an article of furniture	5.6	4	.91
Une partie du corps humain/a part of the human body	8.9	4	.94
Un fruit/a fruit	8.1	4	.95
Une arme/a weapon	4.9	4	.93
Un outil de bricolage/a carpenter's tool	4.9	4	.87
Un vêtement/an article of clothing	7.7	4	.86
Un instrument de musique/a musical instrument	6.9	4	.94
Un oiseau/a bird	5.6	4	.92
Un légume/a vegetable	5.8	4	.71
Un insecte/an insect	5.4	4	.92
Une fleur/a flower	5.1	4	.92
Un arbre/a tree	4.9	4	.92
Un type de bateau/a type of ship/boat	3.9	4	.92
Un poisson/a fish	4.9	4	.61

and compared (when possible) potencies and ranks between our data and those common to Marchal and Nicolas's (2003) and Léger et al.'s (2008) studies. The results are presented in Tables 4 and 5.

Marchal and Nicolas (2003) versus the present study (see Table 4). Marchal and Nicolas's methodology led to an unchanging potency of 4. The averages for potency between this study and ours for the 15 shared categories were 4 and 5.89, respectively ($SD = 1.39$). On average, the participants naturally gave 1.89 additional words per category with the 30-sec time window methodology used in the present study, as compared with Marchal and Nicolas's methodology, where participants had to give only the first four exemplars that came to mind. Because of the unchanging potency in Marchal and Nicolas's study, neither correlation nor rank computation could be performed.

Léger et al. (2008) versus the present study (see Table 5). The averages for potency between Léger et al.'s study and ours for the 14 common categories were 13.76 ($SD = 5.06$) and 5.92 ($SD = 1.09$), respectively. With a

no-time-constraint methodology, participants gave, on average, 7.84 additional words, as compared with our 30-sec time window methodology. We also performed a Pearson product-moment correlation test on the potency strength between this study and ours. The result shows a positive correlation ($r = .77, p < .01$). Lastly, a correlation test was performed on the differences of ranks (Spearman rho). The ranks from our study were (re)calculated taking into account the number of common categories. This correlation test showed a high degree of correlation ($r = .85, p < .001$).

The potency differences arise mainly from three different methods in data collection. As a reminder, in the present study, the participants had to give a maximum number of exemplars in a 30-sec time window; in Marchal and Nicolas's (2003) study, participants had to give only four exemplars; and in Léger et al.'s (2008) study, participants had no time constraints and were encouraged to write a maximum number of exemplars.

As for cross-linguistic comparisons, we computed Pearson product-moment correlation coefficients with the two

Table 5
Potency, Rank, and Language-Specific Stability for the Fourteen Shared Categories Between
the Present French Norms and Léger, Boumlak, and Tijus's (2008) French Norms

Category	The Present Study		Léger et al.'s Study		Language-Specific Stability
	Potency	Rank	Potency	Rank	
Un meuble/an article of furniture	5.6	8	10.4	10	.96
Un fruit/a fruit	8.1	1	18.3	4	.93
Une arme/a weapon	4.9	11	8.9	14	.92
Une profession/an occupation or profession	6.4	5	25.4	1	.83
Un sport/a sport	6.8	4	20.2	2	.91
Un vêtement/an article of clothing	7.7	2	19.3	3	.91
Un instrument de musique/a musical instrument	6.9	3	14.7	5	.91
Un oiseau/a bird	5.6	7	11.9	7	.93
Un jouet/a toy	4.8	14	9.5	13	.90
Un légume/a vegetable	5.8	6	12.8	6	.90
Un insecte/an insect	5.4	9	10.4	11	.94
Une fleur/a flower	5.1	10	10.5	8	.93
Un arbre/a tree	4.9	13	9.5	12	.92
Un poisson/a fish	4.9	12	10.5	9	.92

other French norms on the set of exemplars for each category (see Tables 4 and 5, "Language-Specific Stability," and the supplemental materials). Although the methodology used to collect data was different for the three studies, the results showed a large stability in the exemplars produced by our participants and those in the two other recently published French norm studies (all r s, ranging from .61 to .96, were significant at a $p < .001$ threshold).

DISCUSSION

To sum up, the norms presented herein, dealing with a large set of categories, provide contemporary information about the dominant exemplars given to a broad range of French categories. Considering the large number of participants coming from different majors and the large set of categories tested, these norms provide a strong test of this process in French and could be useful in building experimental materials that necessitate control of semantic aspects. The strong academic stability across our three majors suggests generalization across university majors.

For the purpose of providing a French–English comparison in a common time period, we adopted Van Overschelde et al.'s (2004) methodology. A cross-linguistic comparison with both quantitative and qualitative analyses is available. First, a quantitative test showed a significant difference between the French categorization in the present study and the English categorization in Van Overschelde et al.'s study for the measure of the potency average (a slightly greater number of exemplars—on average, 0.6 word—was given in Van Overschelde et al.'s [2004] study). On the other hand, a strong stability was attested to by correlations of both potency and rank. Second, the qualitative test performed on each category between the two studies mainly showed stability (50 out of 59 shared categories had a significant correlation coefficient), indicating a large *semantic knowledge* overlap in French and English.

Surprisingly, some quite usual categories seem to be language specific (*UNE PROFESSION/AN OCCUPATION* and *UN SERPENT/A SNAKE*, for instance; see the complete list of language-specific categories in the Results section), whereas, as could be expected, other categories showed a large overlap in the exemplars given and their respective frequencies (e.g., *UN ANIMAL À QUATRE PATTES/A FOUR-FOOTED ANIMAL* and *UNE COULEUR/A COLOR*). Nevertheless, a strong correlation between the responses in the two languages for a category should be considered with caution, especially when the frequency of the most typical exemplars differs. For instance, although the correlation for the global category *UN LÉGUME/A VEGETABLE* was significant, the French exemplar *courgette* was almost 10 times more frequent than its American English translation *zucchini*. Thus, the building of semantic experimental materials must be based on word-by-word checking and not on the basis of the category as a whole.

In the past, the relative lack of non-English categorization norms has led researchers focused on memory structure to derive their material from English norms without taking account of linguistic/cultural biases. The necessity of using language-specific categorization norms to control for so-

ciocultural influences has also been underlined by Cordier (2002), Malt, Sloman, and Gennari (2003), and Yoon et al. (2004) in an intercultural and interage comparison for the latter. Moreover, the translation of an item should not be considered as a perfect equivalent between two languages. All these considerations must be taken into account when experiments dealing with semantic aspects are run.

The necessity of using well-built and language-appropriated categorization norms can also be justified by a recent challenge in traditional behavioral tasks. For decades, a massive recourse to the lexical decision task (mostly based on associative norms) prevailed over other behavioral tasks, although the lexical decision task may not be best suited when early processes of semantic memory are studied. Semantic recovery can be facilitated in categorization tasks, as compared with lexical decision tasks, as has been shown by McRae and Boisvert (1998) with a 250-msec SOA and by Grainger and Frenck-Mestre (1998) and Bueno and Frenck-Mestre (2002, 2008) with short SOAs (43 and 57 msec). As such, it may be preferable for online categorization tasks to be based on semantic categorization norms rather than associative ones.

Given the interest of the cross-linguistic approach in distinguishing what is relevant to universal processes from what is language specific, and given the burst of studies aimed at comparing monolinguals with bilinguals, the present norms should be useful for future research. Indeed, for further studies whose focus is on cross-linguistic differences and on bilingual semantic structure, the present comparison is a precious tool for controlling linguistic materials. However, it is limited to studies conducted in the French and English languages. Further studies are necessary to broaden these comparisons to other languages (e.g., Spanish, Portuguese, and Chinese).

Stability across the present norms and other recently published French norms (Léger et al., 2008; Marchal & Nicolas, 2003) is attested to by several comparisons presented herein. First, a quantitative stability is shown through the Spearman rho test between the ranks of the shared categories (test available only for the comparison with Léger et al., 2008). Despite methodological differences across studies, a strong qualitative stability is also reported. Correlation coefficients (computed on the 15 and 14 shared categories) between data from the present study and those from the two other French norms are both high and reliable. As such, the present study cannot be considered to be a global update of these recent published norms but, rather, as a test of their stability and, above all, as a complement (55 and 56 additional categories, respectively).

Although existing in English, norms for a large set of categories have been lacking in French. The present study fills in this gap and provides the largest French categorization norms to date.

AUTHOR NOTE

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NOTES

1. Although Van Overschelde et al. (2004) recorded time responses, this measure did not appear relevant to us, for two reasons. First, in their study, the delay was recorded from the onset of the category name to the moment the participant pressed the "Enter" key (when done typing the word). A large variance in typing ability was undoubtedly present. Second, word length was confounded with time necessary for typing (short words are undoubtedly quicker to type than long words).

2. The electronic version of the *Trésor de la langue française* (Imbs, Martin, & Centre de Recherche pour un Trésor de la Langue Française, 1971) was used to check spelling and definition of words (URL: <http://atilf.atilf.fr/tlf.htm>).

SUPPLEMENTAL MATERIALS

The French category norms discussed in this article may be downloaded from <http://brm.psychonomic-journals.org/content/supplemental>.

APPENDIX**INSTRUCTIONS**

AGE:
GENDER:
MAJOR:
L1 (MOTHER TONGUE):

You will find the name of a category on each odd page of this booklet

For example: "A STATIONERY"

Your task will be to give **a maximum of exemplars** belonging to this category.

For instance, for the category "A STATIONERY," you could give as answers:

- Paperclip
- Pen
- Stapler
- Ruler
- Binder
- Paper
- Glue
- ...

The experimenter will give you the start signal.

Every 30 seconds, the experimenter will inform you, with a "beep," to turn the page and change the category you are working on. You only have **30 seconds per category** to perform the task (i.e., give a maximum of exemplars within this time window). You can neither continue working on a category once a new beep is given nor go back to complete a previous category. Two breaks will be proposed during the session of data collecting. Please use a legible handwriting as much as you can (thereafter, your answers will be manually entered in an electronic spreadsheet by experimenters).

Do you have any questions?

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