ORIGINAL ARTICLE

A comparative study of norms for a 400 picture set between Brazilian and American children

Um estudo comparativo das normas de um conjunto de 400 figuras entre crianças brasileiras e americanas

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Original version accepted in English

Abstract
Objective: This study compared Brazilian and North American children regarding naming, familiarity and visual complexity of a set of 400 pictures.
Method: Thirty-six Brazilian children (18 boys) aged 5 to 7 were evaluated. Their characteristics and the study procedure and measures were the same as those employed for the North American population enabling direct comparison of data from the two samples through Spearman rho correlations and Student t tests.
Results: Positive significant correlations between overall results of Brazilian and North American children were observed for all measures. Qualitative analysis showed that both groups gave modal names that differed from the intended names for the same 59 pictures. The Brazilian children named 72 pictures differently from the intended names that were correctly named by the North American children, who named 26 pictures differently from the intended names that were correctly named by the Brazilians.
Conclusion: The 400 picture set was shown to be an adequate tool for use in different cultures. However, it is advisable to avoid pictures that produced naming inconsistencies by the Brazilian and North American children in studies in other cultures with the same age group until specific norms are made available.

Keywords: Child development; Memory; Cultural factors; Visual perception; Comparative study.

Resumo
Objetivo: Este estudo comparou os resultados entre crianças brasileiras e americanas quanto à nomeação, familiaridade com o conceito representado e complexidade visual de um conjunto de 400 figuras.
Método: Foram avaliadas 36 crianças brasileiras (18 meninos) de 5 a 7 anos de idade com características semelhantes às crianças americanas. Os procedimentos e medidas empregados no estudo brasileiro foram os mesmos usados para a população americana permitindo comparação direta dos dados das duas amostras através de correlações rho de Spearman e testes t de Student.
Resultados: Foram observadas correlações positivas significativas para todas as medidas entre as amostras brasileira e americana. A análise qualitativa demonstrou que ambos os grupos deram nomes modais que diferem do proposto para 59 figuras. As crianças brasileiras utilizaram nomes que diferem do proposto para 72 figuras nomeadas corretamente pelas americanas. As americanas nomearam diferentemente do nome modal 26 figuras nomeadas corretamente pelas brasileiras.
Conclusão: O conjunto de 400 figuras mostrou-se um instrumento adequado para uso em diferentes culturas. Contudo, é aconselhável evitar o uso de figuras que produziram inconsistência de nomeação nas populações brasileira e norte-americana em estudos em outras culturas com o mesmo grupo etário até que normas específicas estejam disponíveis.

Descritores: Desenvolvimento infantil; Memória; Fatores culturais; Percepção visual; Estudo comparativo.

Introduction

In cognitive and developmental neuropsychology pictures have frequently been used as part of research into children's ability to process information.[1] However, little work on standardization of appropriate pictorial stimuli has been performed for young individuals although as early as 1980 the pioneering work by Snodgrass and Vanderwart,[2] who standardized parameters for 260 pictures of common objects for American college students, illustrates the importance of this type of control over material to be used in this field.

Since the publication of Snodgrass and Vanderwart's[2] norms, a consistent body of research has determined that the factors that seem to determine picture naming by adults are the different names given to the pictures (naming consistency), in addition to familiarity with the concepts represented and the degree of visual complexity of the drawings. These factors are therefore considered important in the selection of appropriate stimuli for the construction of cognitive tests.[3] Few studies, however, have determined their importance in investigations of developmental psychology except the data collected for American 8-10 year-olds[4] and 5-7 year-olds.[3]

The task of naming a picture, independently of age of subjects, involves at least three basic stages: a) identification of the object represented, which activates visual storage or its structural representation, during which only the physical characteristics are recovered; b) access to its semantic representation, which then allows the object to be recognized; c) lexicalization, or activation of the phonological representation, through which the name of the picture is recovered and pronounced.[5-8] In addition, naming of pictures by children seems to be affected by the same variables that influence naming in adults, although younger children are less efficient in this task, attributing more alternative names than adults or older children.[3] With maturation, children respond more accurately although it is unclear if the three basic

stages of naming are affected in similar ways or whether specific stages are affected differently.[9]

Familiarity with concepts depicted and visual complexity of drawings are factors that also affect the processing of pictures by adults: familiarity is an important predictor of naming latency, since more familiar pictures are more rapidly named, and visual complexity affects variables such as recognition and naming latency.[10] Judging the familiarity and visual complexity of a stimulus also shows age-related differences, although classification ability reflects information processing and does not appear to undergo major alterations after the age of 7.[11,4]

Cultural context is another important factor to be considered in the selection of pictures to be used in cognitive tests, since the objects that are familiar in one culture may be unusual in others.[12] For the pictures proposed by Snodgrass and Vanderwart,[2] norms were established for adults in Spain,[12] Japan,[13] Iceland,[14] Britain[15] and Wales,[5] and for a larger set composed of 400 pictures in the U.S.,[3] France[10] and Brazil.[16] Normative data from these studies show that despite pictures are judged as having similar familiarity and visual complexity, name agreement is specific to the particular language investigated.[12]

The study carried out by Cycowicz et al[3] on the 400 picture-set was recently replicated in Brazil, providing normative data for children whose first language is Portuguese.[16] Important differences between the Brazilian and American children were observed, reflecting variations related to child development and cultural influences in picture identification and naming. The aim of the present paper was to compare the data obtained for naming, familiarity and visual complexity from Brazilian and American children aged 5 to 7 in order to determine possible cultural factors that may influence naming and so help determine pictures that may not be appropriate for this age group due to developmental characteristics of picture processing.

Methods
1. Participants
Thirty-six Brazilian children (18 boys) whose first language was Portuguese, aged 5 to 7 (mean ± SD=6.56 ± 0.50 years), selected from schools in the city of São Paulo, and who belonged to middle-class families (socioeconomic status was determined using the scale created by ABIPEME: Brazilian Association of Market Research Institutes). All children presented normal behavior as evaluated by their teachers on the CATRS-10 scale[17] (scores=3.2 ± 3.3) and were in age-appropriate divisions. All children were given a book in return for their participation. Their data were compared to those reported by Cycowicz et al[3] who studied 30 American children (16 boys) of the same age range (mean ± SD=6.07 ± 0.73) and socioeconomic status as the Brazilian volunteers.

2. Procedures
Selection of subjects, their characteristics and the study procedure and measures were the same as those employed by Cycowicz et al,[3] thus allowing for direct comparison between our data and those for the American population. The protocol was approved by the Research Ethics Committee of the institution to which the researchers belonged ('Federal University of São Paulo') and the children's parents signed informed consent forms agreeing with their children's participation. The children were evaluated individually in their own schools and in appropriate rooms from the point of view of noise and lighting. The pictures were drawn in black over a white background on 16 x 11cm cards. Presentation was in random order and pictures were subdivided into 5 sets of 80 stimuli each, totaling 5 sessions for each child. For name agreement, children were asked "What is this picture?" To obtain scores for familiarity the question was

"How often do you think about this thing? A lot (scored 5), sometimes (scored 3), or very little (scored 1)?". Complexity scores were obtained by asking participants "How difficult is it to draw this picture? Is it hard (scored 5), medium (scored 3) or easy (scored 1)?" When the child did not recognize an object depicted he/she was asked, "What can you do with it?" or "Where do you find it?" in order to determine whether he/she knew the concept and was only failing to come up with a name for it. If the child answered either of these questions his/her naming was considered "does not know name" (DKN) and familiarity and complexity ratings were obtained. If the child failed to answer the questions concerning the nature of the object, naming was scored as "does not know object" (DKO) and the next picture was presented. Practice pictures were shown at the beginning of each session. To illustrate the familiarity ratings, pictures of an ice cream (very familiar) and a light-house (not at all familiar) were employed. For the scores on complexity, a triangle (not complex) and a computer (complex) were used as examples. In order to reduce response bias, the participants were encouraged not to rate all pictures using the same points in the familiarity and complexity scale, but to use the whole range of responses possible. The children gave their responses verbally and the experimenter entered the information into response sheets.

3. Measures
The following measures were obtained for each picture:

1) Modal name: the name given by the majority of participants.

2) Name agreement: refers to the degree to which participants agreed on the name of the picture. Two measures were used: the percentage of participants who used the modal name and the H index, which takes into account the number of participants who gave each one of the different names used for the same picture.[2-3] The H index was computed for each picture by the formula:

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

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. DKN and DKO do not enter into the computation of this index. The greater the agreement in naming between participants, the closer H is to zero, while higher percentage of name agreement reflects more similarity in naming.

3) Familiarity: refers to the familiarity of the concept depicted. Scores ranged from 1 to 5 (1=unfamiliar, 3=medium, 5=familiar).

4) Visual complexity: refers to the amount of lines and details in the drawing. Scores ranged were 1= simple, 2=medium, 5=complex.

5) Length of modal name: number of letters in the modal name. In some cases, more than one modal name was available, so the mean length was calculated.

4. Statistical analysis
Involved mean scores per picture. Pictures were used as units of measurement. The hypotheses of normality and equality of variance of scores on the 7 measures investigated (percentage of participants who used the modal name, the H statistics, familiarity, visual complexity, word length, DKN and DKO) for the whole 400 picture set were tested using Kolmogorov-Smirnov and Levene tests, respectively. Most measures did not show normal distribution or homocedasticity and non-parametric tests were thus employed. The Spearman's rho correlation and the Student's t test were used for unequal measurements in the comparison of data from Brazilian and American children. Age was also compared through Student t tests, and proportion of boys and girls in each sample was compared using X8[2]. The significance level adopted was 0.01 due to the large number of comparisons.

Results

Indices for naming (*H* and percentage), familiarity, visual complexity and word length of the 400 pictures for the Brazilian children may be found in the study by Pompéia et al.[16] We shall only report here the comparison between results of the Brazilian children and the data provided by Cycowicz et al[3] for the American population.

There was no difference between the proportion of boys and girls in both samples. It was not possible to perform a direct statistical comparison between schooling years and socio-economic status of children because both these measures vary in Brazil and the USA. However, Brazilian children were slightly older than American ones (p<0.01).

Table 1 shows the comparison between both groups' means for the 400-picture set. Student's *t* tests showed that there was no significant difference for the values of *H* and percentage of naming agreement between the Brazilian and American children (p_s>0.27); however, indices for familiarity, visual complexity, word length and use of "does not know object" (DKO) and "does not know name" (DKN) responses showed significant differences (p_s<0.001): American children rated the pictures as less familiar and more complex than Brazilian children (p_s<0.001), while the percentages of DKO and DKN responses were higher for the Brazilian children (p_s<0.0001). In relation to word length, the American children

used shorter names than the Brazilians (p=0.003).

Table 1 also shows correlation between the two groups for all variables. Positive significant correlations were found for all measures, with higher correlations (r>0.60) for measurements of naming (*H* and percentage agreement), complexity, and DKN and DKO responses, but modest correlations for familiarity and word length (r<0.4).

In order to refine the analysis of cultural factors that may influence the responses from the Brazilian and American children, responses rated as differing from the intended names for the 400 pictures in the normative data proposed by Cycowicz et al[3] were analyzed qualitatively (Tables 2, 3 and 4), and showed that:

1) Of the 400 pictures, the same 59 were named differently from the intended name by both the Brazilian and the American children (Table 2). Both groups simplified the names of the same 7 pictures, i.e., when the intended name consisted of a compound noun, the children used only one of the nouns to name it: pictures 19 (baseball bat)="bat"; 96 (football helmet)="helmet"; 193 (sail boat)="boat"; 194 (salt shaker)="salt"; 214 (spool of thread)="thread"; 265 (bird nest)="nest"; 329 (bird cage)="cage"*. Both groups failed to recognize 24 of the 59 pictures and, interestingly, attributed exactly the same modal name different from the intended name to these pictures. For example,

Table 1 - Comparison of overall responses from Brazilian and American children for the 400 pictures

	Group	Mean	SD	t test	Correlation
H	brasilian	1.13	0.79	- 0.25	0.611*
	american	1.14	0.89		
Percentage (%)	brasilian	60.4	0.30	- 1.10	0.728*
	american	62.7	0.28		
Familiaridade (escore)	brasilian	3.53	0.68	22.21**	0.313*
	american	2.62	0.46		
Complexidade (escore)	brasilian	2.39	0.50	- 15.21**	0.719*
	american	3.11	0.80		
NSN (%)	brasilian	7.62	0.11	10.54**	0.600*
	american	1.43	0.03		
NSO (%)	brasilian	9.58	0.14	8.22**	0.727*
	american	3.30	0.05		
Extensão	brasilian	6.30	2.56	2.72**	0.395*
	american	5.90	2.41		

*NOTE: H: information statistics; Percentage (%): percentage of name agreement; DKN: doesn't know name; DKO: does not know object; Length: number of letters in modal name; SD: standard deviation; Correlation: Spearman rho correlation between measures of both samples. *p<0.01; **p<0.001.*

pictures 324 (arch), named as "tunnel" and picture 355 (hyena), considered a "wolf"; the remaining 29 pictures showed different naming errors but were mostly of the coordinate type (concepts given names that belong to the same semantic category[2]).

2) Twenty-six pictures (Table 3) were named differently to the intended name by the American children but correctly by the Brazilian children (i.e., correctly meaning the same as the intended name). Note that 8 of these pictures seemed to be more familiar to the Brazilian than to the American children, who used the following modal names: picture 10 (ashtray)="hole"; 61 (clothespin)="clip"; 238 (top)="driedle"; 325 (armadillo)="rat"; 326 (avocado)="egg"; 337 (cockroach)="bug"; 380 (scorpion)="lobster"; 392 (toucan)="bird". The remaining 18 pictures

were more ambiguous for the American group than for the Brazilians, except for the picture 228 (television), which the American children named with the synonym "TV". In descriptive terms, the other 17 pictures showed greater variability (H=1.60) and less naming consistency (42%) than the overall average (H=1.14; %=63) in the American group, unlike the observations of the Brazilian population for the same pictures (H=1.04; %=69) (see Table 1).

3) There were 72 pictures that the Brazilian children named differently from the intended name but that were correctly named by the American children (Table 4). Fifteen of these pictures are uncommon and were little known by the young Brazilian population: picture 9 (artichoke)=no modal name produced; 11

Table 2 - Naming data of the 59 pictures that were named differently from the intended name by both Brazilian and American children

Pict. Nº	Intended name in English	Modal Names American children	Modal Names Brazilian children	Pict. Nº	Intended name in English	Modal Names American children	Modal Names Brazilian children
19	baseball bat	*bat*	*taco§*	291	hoe	*rake*	*pá*
24	beetle	bug	barata	292	lantern	lamp	lâmpada
29	blouse	shirt	blusa§§	294	logs	wood	madeiras§§
54	cherry	apple	maçã§§	295	maracas	rattles	chocalho
56	chisel	screw driver	chave de fenda	298	paddle	mirror	raquete
79	dresser	drawer	gaveta§§	302	pinball machine	bed	cama§§
96	football helmet	helmet	capacete §	303	platypus	duck	pato§§
99	French horn	trumpet	corneta	312	syringe	shot	infecção
101	frying pan	pan	panela§§	318	tram car	cable car	
127	kettle	teapot	bule§§	319	weather vane	arrow	galo de antena
136	leopard	tiger	onça	324	arch	tunnel	túnel§§
137	lettuce	cabbage		329	bird cage	cage	gaiola§
152	nail file	knife	faca§§	330	blowfish	fish	peixe§§
156	nut	screw	parafuso§§	332	buffalo	bull	touro§§
163	peach	orange		334	calipers	belt	
193	sailboat	boat	barco§	338	compass	clock	relógio§§
194	salt shaker	salt	sal§	340	cymbals	wheel	roda§§
214	spool of thread	thread	linha§	341	dart	needle	flecha
224	sweater	shirt	blusa	344	dragonfly	butterfly	borboleta§§
230	thimble	cup	lixo	346	eel	fish	peixe§§
248	violin	guitar	violão§§	355	hyena	wolf	lobo§§
258	wine glass	cup	copo	360	ladle	spoon	colher§§
262	basin	box	banheira	371	peas	pea pod	
265	bird nest	nest	ninho§	372	pelican	bird	
272	colander	bowl	panela	377	ray	bat	morcego§§
279	fern	plant	planta§§	378	rosebud	flower	flor§§
282	fishhook	hook	gancho§§	383	skull	skeleton	caveira
283	fishing reel		rolo de linha	384	spatula	pan	pá
286	goggles	binocular	óculos	394	vulture	bird	
288	groceries	bag	sacola				

NOTE: Pict. nº: the same picture number used by Cycoiwicz et al (1997); Intended name: the original name proposed by Cycowicz et al. (1997); Modal name: name given by the majority of subjects in each sample. – When more than one modal name was elicited in responses from the Brazilian children, we did not determine a modal name (blank spaces in table); § short version of the intended name; §§ exactly the same modal name that differed from the intendend name given by both samples.

(asparagus)="stick"; 17 (barn)="house'; 50 (caterpillar)=no modal name produced; 51 (celery)=no modal name produced; 207 (sled)="ski"; 256 (windmill)="fan"; 261 (acorn)="cap'; 281 (fire hydrant)="post"; 307 (saddle)=no modal name produced; 333 (cactus)=no modal name produced; 367 (moose)="bull"; 373 (pretzel)="rope"; 386 (squash)="fish". The pictures 373 (pretzel) and 386 (squash) were named differently to the intended name by the adult Brazilians as well.[16] There were a further 8 pictures that received as modal names more common words in Portuguese, such as pictures 141 (lips)="mouth"; 144 (mitten)="glove"; 149 (mouse)="rat"; 239 (traffic light)="light"; 243 (trumpet)="cornet"; 271 (closet)="cupboard"; 297 (net)="net" (although there is a specific but unusual name for this object in Portuguese=*puçá*); 299 (parachute)="balloon"; 364 (lizard)="gecko" (common animal in Brazil). Three pictures with compound names were also simplified only by the Brazilian population: picture 95 (football)="ball"; 190 (rolling

Table 3 - Naming data of the 26 pictures that were named differently from the intended name by the American children only

Pict. Nº.	Intended name in English	Modal name
7	arm	hand
10	ashtray	hole
13	baby carriage	carriage
46	cap	hat
57	church	house
61	clothespin	clip
82	eagle	bird
104	glass	cup
176	pliers	tool
179	pot	pan
198	screw	nail
228	television	TV
238	top	driedle
269	chest	box
277	faucet	sink
287	grill	barbecue
296	microscope	telescope
305	rocket	rocket ship
316	tire	wheel
325	armadillo	rat
326	avocado	egg
337	cockroach	bug
347	fishbowl	fish tank
348	fishtail	fin
380	scorpion	lobster
392	toucan	bird

NOTE: see note of table 2.

pin)="rolling"; 327 (baseball glove)="glove". The remaining modal names were mostly of the coordinate type.

Descriptively, these 72 pictures showed greater variability (mean $H=1.47$) and less percentage (mean 34%) of naming consistency for the Brazilian children compared to the overall mean for all 400 pictures ($H=1.13$; %=60; see[16]). Similar effects were observed for the American children in relation to the same pictures ($H=1.56$; %=47) when compared to the overall average for the 400 pictures in Cycowicz et al[3] paper ($H=1.14$, %=63).

Discussion

The data obtained in the present study show the importance of cultural and developmental characteristics in naming, familiarity and visual complexity for the set of 400 pictures proposed by Cycowicz et al.[3]

Overall there was no significant difference between samples in naming. This is a surprising result that contrasts with the comparison between children and adults of the same culture (Americans[3] and Brazilians[16]) and between adults of different cultures,[10] which show differences in naming. This suggests that the 400 picture set can be useful not only to extract stimuli for cognitive testing of children in different countries, but also to compose instruments for the study of child development independently of language and possibly culture as long as care is taken to avoid certain "problem" pictures as discussed below. There are also other considerations in selecting stimuli for this age group because although there were no differences in naming indexes, there was more variability in naming by Brazilian children. This will be discussed bellow.

The Brazilian children classified the pictures as more familiar and less complex than the American children, and showed a greater number of DKO and DKN responses. Differences in numbers of DKO responses, which were higher for the Brazilian than the American children, however, may explain the differences in familiarity and complexity scores between groups, since when participants did not recognize an object presented, the indices for these measurements were not collected, following the procedure of Cycowicz et al.[3] Accordingly, the higher score for familiarity and lower score for complexity by the Brazilian in comparison with the American children in fact corresponds to an average that may be distorted, since it was obtained on the basis of the smaller number of pictures of known objects, which tend to be considered more familiar and less complex than pictures representing unknown concepts.[3]

The large number of DKO responses may also explain the low correlation for familiarity between the populations of children studied. The correlations between evaluations of complexity, however, were less affected by the knowledge of the objects represented. This reflects the findings of similar scores for complexity between adults and children obtained by Cycowicz et al,[3] although the DKO responses were also higher for the American children. Therefore, it would be important for further research to attribute scores of lowest familiarity also for pictures of unknown objects, so as to avoid the possible bias caused by this scoring scheme.

The correlation for the measurement of word length was also low, which seems to be a cultural phenomenon related to structural differences between English and Portuguese languages (English words tend to be shorter). In any case, it was observed that both Brazilian and American children prefer shorter names for familiar objects (e.g. ball for football).[4]

The qualitative analysis of the modal names that differed from the intended names by both groups produced more indications of cultural and developmental factors present in this set of pictures. In both groups, 24 pictures were given the same modal names that differed from the intended names, which suggest developmental characteristics independent of native language: a) the pictures may be ambiguous for both groups, since the visual details are not too clear, inducing incorrect recognition[3] (e.g. pinball machine for bed); b) the pictures represent concepts not yet acquired by this age-group, so children attribute names using known objects that are visually similar to the target (e.g. clock for compass); c) the pictures represent objects as yet lacking lexical representation for the children, so they may know the object but not yet have the right word to designate it, leading

Table 4 - Naming data of the 72 pictures named differently from the intended name by the Brazilian children only

Pict. Nº	Intended name in English	Modal name	Translation	Pict. Nº	Intended name in English	Modal name	Translation
9	artichoke			268	câmera		
11	asparagus	pau	wood	271	closet	guarda-roupa	wardrobe
17	barn	casa	house	275	dust pan	Pá	shovel
50	caterpillar			281	fire hydrant	Poste	lamp post
51	celery			285	globe	mundo	world
58	cigar	cigarro	cigarette	289	headphones		
64	coat	blusa	blouse	297	net	rede	pop. for "net"
72	desk			299	parachute	balão	balloon
74	doll	menina	girl	304	rake	vassoura	broom
77	doorknob			307	saddle		
85	envelope	carta	letter	315	thermos	copo	glass
93	fly	mosquito	mosquito	317	tractor	carro	car
95	football	bola	ball	321	zipper	cabeça de Mickey	Mickey's head
98	fox	lobo	wolf	327	baseball glove	luva	glove
117	harp	piano	piano	333	cactus		
123	iron	ferro	"short for iron"	345	easel		
124	ironing board	mesa de passar	"ironing table"	349	flamingo	pato	duck
125	jacket	blusa	blouse	350	funnel		
139	light switch	luz	light	352	hammock	barco	boat
141	lips	boca	mouth	353	harmônica		
142	lobster	caranguejo	crab	354	horseshoe	imã	magnet
144	mitten	luva	glove	356	igloo	casa de gelo	ice house
149	mouse	rato	rat	357	jar	pote	pot
184	record player			358	jellyfish	planta	plant
190	rolling pin	rolo	roll	359	koala	urso	bear
203	shirt	blusa	blouse	364	lizard	lagartixa	gecko
207	sled	esqui	ski	367	moose	touro	bull
213	spinning wheel	máquina	machine	373	pretzel	corda	rope
223	swan	pato	duck	374	propeller	ventilador	fan
231	thumb	dedo	finger	379	saxophone	corneta	cornet
235	toe	pé	foot	386	squash	peixe	fish
239	traffic light	farol	light	388	stethoscope	escutar o coração	"listener of heart"
243	trumpet	corneta	cornet	391	totem pole	estátua	statue
250	watch	relógio	clock	393	turkey	pavão	peacock
256	windmill	ventilador	fan				
259	wrench	chave de fenda	screw driver				
261	acorn	touca	"type of hat/hood"				
267	blimp	foguete	rocket				

NOTE: see note of table 2.

them to search for names that are near it in their semantic repertoire (e.g. dresser for drawer). However, lexical representation also seemed to be influenced by culture: several pictures were given names of objects visually similar to the concepts represented but more commonly experienced in their daily life, such as picture 136 (leopard) which was named "onça" (wild feline found in South America) by the Brazilian children and "tiger" by the American ones (perhaps because of cartoons or of logotypes such as of brands of cornflakes).

Results also suggest that the common naming misconception observed among the Brazilian and American children may be related to the stages of naming referred to in the introduction: they may be errors of identification (first stage), semantic errors in recognition (second stage), or reflect confusion in locating a name (third stage).[3,9] In any case, it is difficult to separate lack of knowledge of the object from difficulty in naming as such, since

stages of naming are so closely related to both maturation and experience in the child.[5]

The Brazilian children also produced modal names that differed from the intended names not observed in the American children. Descriptively, these 72 pictures showed greater variability and less percentage of naming consistency for the Brazilian children compared to the overall mean for all 400 pictures. Similar effects were observed for the American children in relation to the same pictures when compared to the overall average for the 400 pictures in Cycowicz et al[3] paper. This suggests that these pictures represent concepts that are not fully acquired by the age group under study, especially since most of the errors committed by the Brazilian children were of the coordinate type (concepts given names that belong to the same semantic category[2]). In any case, we observed a strong cultural factor affecting the naming of these pictures to the extent that some were also incorrectly named by

Brazilian adults, such as 373 (pretzel), which is not well-known in Brazil, and pictures such as 141 (lips) and 149 (mouse), which were given names more widely used in Portuguese.[16]

On the other hand, we found that the American children gave modal names that differed from the intended names to 26 pictures that were correctly named by the Brazilian children. In descriptive terms, these pictures showed greater variability and less naming consistency for the Americans in terms of percentage than the overall average, unlike the observations for the Brazilian population for the same pictures. This shows that these pictures are less known by the American children and do not seem to relate to cognitive development. Cycowicz et al[3] attributes the failure of the American children to recognize the picture of an ashtray, for example, to the fact that US laws now ban smoking in public places, so children are not exposed to this concept, fact that explains the apparent absence of semantic knowledge of this picture. Lack of experience with concepts may also be affecting other pictures such as 325 (armadillo) a common animal in Brazil, named as "rat" by American children, and 326 (avocado), a common fruit in Brazil, named as "egg", and picture 10 (ashtray), which was correctly named by the Brazilian children (smoking is nor yet banned in this country).

Concepts belonging to a given semantic category also showed developmental and cultural influences. Some concepts belonging to the clothing category were named differently by the Brazilian children: pictures 64 (coat), 29 (blouse), 125 (jacket), 203 (shirt), and 224 (sweater) were all generically named "blouse", while the American children named pictures 29 (blouse) and 224 (sweater) as "shirt". The American children made more naming mistakes for items in the categories tools and musical instruments[3]. In the group of Brazilian children, modal names that differed from the intended names in the musical instruments category were also common: pictures 99 (French horn), 243 (trumpet) and 379 (saxophone), all generically given the modal name "cornet", and pictures 117 (harp) and 248 (violin) were named "piano" and "guitar", respectively. Therefore, the clothing and musical instrument categories showed more errors for the Brazilian children, while the American children made more errors in tools and musical instruments.[3] The results for the clothing category contradict findings reported by Nelson[18] who rated this category as well defined by 5-8 year-old American children. However, it should be borne in mind that this study was carried out some 26 years before the present study and naming of objects in certain categories may shift through generations. Also, Nelson's[18] sample included 8 year-olds who may have increased correct responses in this category. In addition, a developmental feature is present in the errors committed by both groups, since they were mainly errors of the coordinate or synonym type. These data indicate that categories including items outside of daily experience of young children are named as semantically related objects that are part of their experience, indicating that the child is aware of the category that the object belongs to.[18,3]

It is unlikely that the discrepancies between samples can be explained in terms of the slight age difference between Brazilian and American children, mainly because responses were in ge-neral very similar. Unfortunately, Cycowicz et al. did not inform the number of subjects of each age, hampering us to select subjects with exactly the same ages. In addition, the differences between samples can not be attributed to gender, nor to the social class and schooling, which were equivalent in both cases (all children were from middle-class families and in age-appropriate forms) although it was impossible to compare data between populations directly in this respect due to cultural differences in determining these factors.

Limitations and clinical implications

This study's proposal was to follow Cycowicz et al's[3] procedure as to be able to compare Brazilian and American children regarding naming, familiarity and visual complexity of a set of 400 pictures. Although many interesting results were obtained regarding similarities and differences between samples - findings that may aid other researchers in selecting appropriate stimuli for cognitive tests in the age group used here - further studies are needed with larger samples and children of more age groups, as to a better understanding of developmental and cultural issues related to picture identification be achieved. We also showed that certain aspects of the procedure developed by Cycowicz et al[2] should be reassessed, namely DKO measures, since when participants are unable to recognize an object, familiarity and visual complexity indices are not collected, a fact that may distort findings.

Conclusion

The set of 400 pictures, although adequate to be used in different countries, was shown to be affected by cultural and developmental factors. We suggest that pictures that display large variability in responses by both the Brazilian and American children should be avoided in studies in other cultures with the same age groups until local norms are made available.

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