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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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 ρ 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 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 ρ 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. 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, 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 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. Few studies, however, have determined their importance in investigations of developmental psychology except the data collected for American 8-10 year-olds and 5-7 year-olds.

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. 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. 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 7.11,12

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 Britain15 and Wales;1 and for a larger set composed of 400 pictures in the U.S.,1 France15 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 particu-
lar language investigated.12

The study carried out by Cycowicz et al3 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 CATT-RS-10 scale17 (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 al3 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

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

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. 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 from 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 X². 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 al3 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>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<0.001): American children rated the pictures as less familiar and more complex than Brazilian children (p<0.001), while the percentages of DKO and DKN responses were higher for the Brazilian children (p<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 al3 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 (salt shaker)="salt"; 194 (salt shaker)="salt"; 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     |      |     |     |      |             |
| brasillian | 1.13 | 0.79 | 0.25 | 0.611* |
| american  | 1.14 | 0.89 |      |       |
| Percentage (%) |      |     |     |      |             |
| brasillian | 60.4 | 0.30 | 1.10 | 0.728* |
| american  | 62.7 | 0.28 |      |       |
| Familiaridade (escore) |      |     |     |      |             |
| brasillian | 3.53 | 0.68 | 22.21** | 0.313* |
| american  | 2.62 | 0.46 |      |       |
| Complexidade (escore) |      |     |     |      |             |
| brasillian | 2.39 | 0.50 | 15.21** | 0.719* |
| american  | 3.11 | 0.80 |      |       |
| NSN (%) |      |     |     |      |             |
| brasillian | 7.62 | 0.11 | 10.54** | 0.600* |
| american  | 1.43 | 0.03 |      |       |
| NSO (%) |      |     |     |      |             |
| brasillian | 9.58 | 0.14 | 8.22** | 0.727* |
| american  | 3.30 | 0.05 |      |       |
| Extensão |      |     |     |      |             |
| brasillian | 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) 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

| Pict. Nº | Intended name in English | Modal Names | Pict. Nº | Intended name in English | Modal Names |
|---------|--------------------------|-------------|---------|--------------------------|-------------|
| 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   | dress | drawer | gaveta§§ | 302 | pinball machine | duck | pato§§ |
| 96   | football | helmet | capacete § | 303 | platypus | | |
| 99   | French horn | trumpet | corneta | 312 | syringe | shot | infecção |
| 101   | frying pan | pan | panella§§ | 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 | 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   | spoon of thread | thread | linha§ | 341 | dart | needle | flecha |
| 224   | sweater &nbs

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 | Pict. Nº | Intended name in English | Modal Names |
|---------|--------------------------|-------------|---------|--------------------------|-------------|
| 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   | dress | drawer | gaveta§§ | 302 | pinball machine | duck | pato§§ |
| 96   | football | helmet | capacete § | 303 | platypus | | |
| 99   | French horn | trumpet | corneta | 312 | syringe | shot | infecção |
| 101   | frying pan | pan | panella§§ | 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 | 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   | spoon of thread | thread | linha§ | 341 | dart | needle | flecha |
| 224   | sweater | shirt | blusa | 344 | dragonfly | butterfly | borboreta§§ |
| 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 Cycoiwicz 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 (pretzel) and 386 (squash) were named differently to the intended name by the American children, respectively. There were 299 (parachute)=“balloon”; 364 (lizard)=“gecko” (common animal in Brazil). Three pictures 373 (pretzel) and 386 (squash) were named differently to the intended name by the American children.

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.

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 (Americans4 and Brazilians16) and between adults of different cultures,5 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 below.

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.5

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. 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 (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 |
|---------|--------------------------|------------|-------------|
| 9       | artichoke                | 268 câmera | guarda-roupa wardrobe |
| 11      | asparagus                | 271 closet | dust pan Pà shovel |
| 17      | barn                     | 275 fire hydrant Poste lamp post |
| 50      | caterpillar              | 281 globe mundo world |
| 51      | celery                   | 285 head phones |
| 58      | cigar                    | 289 headphones |
| 64      | coat                     | 297 net rede pop. for “net” |
| 72      | desk                     | 299 parachute balão balloon |
| 74      | doll                     | 304 rafe vassoura broom |
| 77      | doorknob                 | 307 saddle |
| 85      | envelope                 | 315 thermos copo glass |
| 93      | fly                      | 317 tractor carro car |
| 95      | football                 | 321 zipper cabeça de Mickey Mickey’s head |
| 98      | fox                      | 327 baseball glove luva glove |
| 117     | harp                     | 333 cactus |
| 123     | iron                     | 345 easel |
| 124     | ironing board            | 349 flamingo pato duck |
| 125     | jacket                   | 350 funnel |
| 139     | light switch             | 352 hammock barco boat |
| 141     | lips                     | 353 harmônica |
| 142     | lobster                  | 354 horseshoe imã magnet |
| 144     | mitten                   | 356 igloo casa de gelo ice house |
| 149     | mouse                    | 357 jar pote pot |
| 184     | record player            | 358 jellyfish planta plant |
| 190     | rolling pin              | 359 koala urso bear |
| 203     | shirt                    | 364 lizard lagartixa gecko |
| 207     | sled                     | 367 moose touro bull |
| 213     | spinning wheel           | 373 pretzel corda rope |
| 223     | swan                     | 374 propeller ventilador fan |
| 231     | thumb                    | 379 saxophone corneta cornet |
| 235     | toe                      | 386 squash peixe fish |
| 239     | traffic light            | 388 stethoscope escutar o coração “listener of heart” |
| 243     | trumpet                  | 391 totem pole estâlua statue |
| 250     | watch                    | 393 turkey pavão peacock |
| 256     | windmill                 | 394 | |
| 259     | wrench                   | 396 | |
| 261     | acorn                    | 397 | |
| 267     | blimp                    | 398 | |

**NOTE:** see note of table 2.
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. 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 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. 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. The results for the clothing category contradict findings reported by Nelson 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 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.

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 general 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 cannot 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 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 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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