BRIEF REPORT

Influence of Educational Level of Non Brain-Damaged Subjects on Visual Naming Capacities*

Alexandra Reis, Manuela Guerreiro, and Alexandre Castro-Calda
Language Research Laboratory, Centro de Estudos Egas Moniz, Hospital de Santa Maria, Lisboa, Portugal

ABSTRACT

Educational level of subjects is a variable often neglected in neuropsychological studies. However, there are pieces of evidence to suggest that illiterate subjects may perform worse than literate subjects in some tests. Visual naming is one of the tasks where a poor performance was reported in illiterate populations. The present study addresses this problem of comparing the performance in visual naming tasks of non-brain-damaged patients of different educational levels. The test materials were composed of three subjects: naming real objects, their photographs, and line drawings of the same objects.

Results revealed that there is a clear influence of educational level on the ability to name photographs and line drawings of the objects. Naming line drawings is particularly difficult for the lower educated non-brain-damaged subjects. Visual analysis of two dimensional representations is a task that requires special learning. These results have to be taken into consideration in test selection for poorly educated populations.

Tests of visual naming are currently used in batteries for the assessment of aphasia. Line drawings of objects are used in most of them, namely: Boston Diagnostic Aphasia Examination (Goodglass & Kaplan, 1972), Minnesota Test for Differential Diagnosis of Aphasia (Schuell, 1965), Porch Index of Communicative Ability (Porch, 1967), Western Aphasia Battery (Kertez, 1982). As pointed out by Borod, Goodglass, and Kaplan (1980) and also by Kremin et al. (1991), the performance on visual naming tasks of non-brain-damaged subjects is influenced by the level of education. Lecours and colleagues (1987a, 1987b, 1988) reported lower scores on visual naming of line drawings by illiterate subjects in comparison with literate subjects. This was found in control subjects and in patients with either left or right hemispheric lesions. The authors concluded that "when testing brain-damaged patients of different cultural backgrounds one runs the risk of over or underestimating the frequency of aphasia if one does not refer to norms which explicitly take educational level into account" (Lecours et al. 1987a, p. 231). Rosselli and Ardila (1990) also reported significant differences in several currently used neuropsychological tests when comparing performances of extreme groups of educational level.

Our experience on the study of illiterate subjects is that there is a great interindividual variability of performance in tasks requiring the
interpretation of drawings. This variability reflects the individual’s experience of life in the absence of formal training in school (Castro-Calda, Ferro, Guerreiro, Mariano, & Farrujola, in press).

In order to choose the correct test material to assess illiterate subjects we decided to compare the performance of illiterate and literate subjects in different tasks of visual naming.

METHOD

Subjects

Sixty-six neurologically healthy subjects were tested. All subjects were screened for dementia through a short test battery developed in our laboratory. Subjects with history of brain injury, psychiatric illness, or suggestion of dementia were not included in the study.

Twenty-two subjects were illiterate (2 males and 20 females who, for social reasons, had never attended school or had contact in their lives with written material); Twenty-two subjects were semi-literate (6 males and 16 females who had attended school for less than 4 years, and had learned to read and write but did not do so regularly); Twenty-two subjects were literate (8 males and 14 females with more than 4 years of school attendance and regular habits of reading and writing). The mean age of the subjects were respectively 70.8 (SD = 6.4), 71.2 (SD = 6.2) and 67.6 (SD = 5.8) (ANOVA F = 2.29, p = ns). All subjects lived in the same social community in the south of Portugal.

Materials

The test material was composed of the following set of 20 commonly used objects: cup, pencil, lamp, watch, book, screw, lighter, cigarette, pen, bottle, eye-glasses, spoon, penknife, scissors, ring, fork, key, glass, match box, and candle. These objects were photographed in color and line drawings of the same objects were made. Subjects were first asked to name the line drawings, then the photographs, and finally the real objects.

The answers were scored as correct or incorrect. Incorrect answers were classified into three possible types: Type A – absence of naming (“I don’t know”); Type B – acceptable names for the item but different from the one used for the real object (knife instead of penknife); and Type C – names reflecting no comprehension of the item (thermometer instead of cigarette). There was no time limit in stimulus presentation.

1 In Portuguese these words are different and have specific meaning, knife = faca; penknife = canivete.

Table 1. Comparison of Performance in Naming Drawings.

<table>
<thead>
<tr>
<th>Group</th>
<th>0 - 1 Errors</th>
<th>2 - 5 Errors</th>
<th>&gt; 6 Errors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Illiterate</td>
<td>2</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td>Semi-literate</td>
<td>9</td>
<td>10</td>
<td>3</td>
</tr>
<tr>
<td>Literate</td>
<td>17</td>
<td>5</td>
<td>0</td>
</tr>
</tbody>
</table>

$\chi^2 = 23.87; p < .0001$ (Illiterate vs. Semi-literate vs. Literate)

Illiterate vs. Semi-literate $\chi^2 = 6.91; p = .0316$

Semi-literate vs. Literate $\chi^2 = 7.13; p = .00253$

Illiterate vs. Literate $\chi^2 = 22.72; p < .0001$

Table 2. Comparison of Performance in Naming Photographs.

<table>
<thead>
<tr>
<th>Group</th>
<th>0 - 1 Errors</th>
<th>2 - 5 Errors</th>
<th>&gt; 6 Errors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Illiterate</td>
<td>9</td>
<td>11</td>
<td>2</td>
</tr>
<tr>
<td>Semi-literate</td>
<td>19</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Literate</td>
<td>21</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

$\chi^2 = 20.26; p = .0004$ (Illiterate vs. Semi-literate vs. Literate)

Illiterate vs. Semi-literate $\chi^2 = 10.14; p = .0063$

Semi-literate vs. Literate $\chi^2 = 1.02; p = 0.2943$ (ns)

Illiterate vs. Literate $\chi^2 = 15.13; p = .0005$

RESULTS

All 20 real objects were correctly named by all subjects. Errors became apparent on naming photographs and line drawings.

The comparison among groups was done on the basis of the distributions of subjects’ individual scores. Subjects were divided into three groups, according to the number of errors produced. Group 1 was composed of subjects who produced one or no errors. Group 2 was composed of subjects who produced more than one and less than 6 errors. Group 3 included subjects who produced 6 or more errors. The results on naming drawings showed a significant difference related to educational level ($\chi^2 = 23.87; p < .0001$). Illiterate subjects produced more errors than did the semi-literate ($\chi^2 = 6.91; p = .032$) and the latter produced more errors than did literate subjects ($\chi^2 = 7.13; p = .003$). On naming of photographs, there was also a significant difference related to educational level ($\chi^2 = 20.26; p = .0004$). There were differences between illiterate and semi-literate subjects ($\chi^2 = 10.14; p = .0063$), while semi-literate and literate subjects did not differ ($\chi^2 = 1.11; p = ns$ (Table 1 and 2)).

For each educational level, the mean scores obtained in naming line drawings were significantly lower than those obtained in naming photographs (illiterate, $t = 3.7, p = .0008$; semi-literate, $t = 3.5, p = .0002$; literate, $t = 2.3, p = .03$).

There was also an influence of the educational level on the type of errors produced naming both line drawings ($\chi^2 = 67.56; p < .0001$) and photographs ($\chi^2 = 40.83; p < .0001$). Type A and C errors were almost absent in literate subjects (Table 3).

DISCUSSION

Results showed that for illiterate subjects line drawings and photographs are difficult to name. The same results were obtained with semi-literate subjects. This may explain some results found in previous works with normal subjects and aphasics (Lecours et al., 1987a, 1988). On the other hand, line drawings are more difficult to name than photographs for all three groups of subjects.

Type of error was different according to the educational level: Type A and C errors denote the inability to recognize the stimuli and Type B represent a variation within the same semantic field, which implies the recognition of the stimulus. Literate subjects produced only Type
B errors, which means that these subjects do not have any difficulty in recognizing drawings or photographs but they occasionally use words different from those used in naming real objects.

Drawings represent a certain degree of abstraction of the real objects in which a certain amount of conventional representation is used and has to be learned. For the majority of subjects learning to draw needs training, which also occurs at school along with learning to read and write (although some exceptions may naturally be accepted, as for example, naive painters).

These results do not allow the discussion of a general theory on the influence of learning on the cognitive strategy for visual naming. However, we can conclude that when testing the capacity of naming of poorly educated persons, with or without brain lesions, one should use real objects instead of photographs or their line drawing representation.

REFERENCES
