Brief report

Dementia does not explain correlation between age and scores on Boston Naming Test

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Abstract

The major purpose of this study was to determine if the correlation between age and performance on the Boston Naming Test that has been reported by some investigators results from inclusion of people in the early stages of dementia in those samples. The correlation between age and naming score was −.36 in 125 carefully evaluated nondemented individuals aged 60–88 years who were enrolled in the control group at an Alzheimer’s Disease Research Center between 1985 and 1998. All participants remained undemented for at least 2 years after testing. The magnitude of the correlation between naming scores and age was similar to that found in unscreened samples. Increased confrontation naming difficulty appears to occur with normal aging.

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1. Introduction

In their 1994 review Goulet, Ska, and Kahn concluded that the finding of a relation between age and picture naming was inconsistent. The same can be said of subsequent studies. Both poorer (e.g., MacKay, Connor, Albert, & Obler, 2002) and better (e.g., Schmitter-Edgecombe,
Vesneski, & Jones, 2000) performance on the Boston Naming Test (BNT) by older adults have been reported in cross-sectional studies of community-dwelling individuals. Longitudinal studies are also inconsistent. Au et al. (1995) reported greater decline over 7 years in the BNT scores of older people in the Boston area, but Cruice, Worrall, and Hickson (2000) reported no age-related change over 4 years in their Australian sample of approximately the same age range. Goulet et al. (1994) attributed this inconsistency to variability in research methodology and subject characteristics.

The major purpose of this project was to examine the influence of one subject characteristic—dementia—on the correlation between naming and age. Dementia affects performance on the BNT (e.g., Storandt & Hill, 1989). Dementia is age related. Therefore, as Sliwinski, Lipton, Buschke, and Stewart (1996) pointed out with respect to cognition in general, if people with dementia are included in the sample, poor performance on the BNT might be attributed to aging when it should be attributed to dementia.

To test this hypothesis, we examined the correlation of BNT scores with age in a sample that was examined longitudinally and determined to be nondemented for at least 2 years following assessment. We wanted to determine if the correlation was substantially reduced from the correlation typically reported in “healthy” older adults. The correlation was also computed for people with a diagnosis of very mild or mild dementia of the Alzheimer type (DAT) to determine if the correlation between age and naming remained or was attenuated by dementia.

2. Method

2.1. Samples

2.1.1. Nondemented

The 125 (58% women) nondemented individuals were enrolled in the control group of a longitudinal study of DAT at an Alzheimer’s Disease Research Center between 1985 and 1998. Although they were tested annually, the data reported here are from their first assessment. Only individuals who then remained nondemented for at least 2 years are included in the sample. Follow-up times ranged from 2 to 15 years ($M = 5.98$, S.D. = 3.93). Examination of the deciles of follow-up intervals revealed a flat distribution (skewness index = .00). These nondemented individuals ranged in age from 60 to 88 ($M = 73.78$, S.D. = 6.37) and in education from 8 to 23 years ($M = 14.97$, S.D. = 2.99). All had Clinical Dementia Ratings (CDR; Morris, 1993) of 0. See the next section for more detail about the CDR.

2.1.2. Demented

The 246 (65% women) people with a clinical diagnosis of DAT ranged in age from 60 to 90 years ($M = 75.5$, S.D. = 7.65). Their years of education ranged from 3 to 20 years ($M = 12.59$, S.D. = 3.37). Individuals with other potentially dementing conditions that could affect cognition (e.g., stroke, depression, drug reactions) were excluded. The diagnosis of DAT was based on a history of gradual onset and progressive cognitive impairment relative to the participant’s premorbid abilities as determined by research-trained clinicians after a 90-min semistructured interview with the participant and a knowledgeable collateral source (usually
a spouse or adult child) and a neurologic examination. The clinician was unaware of current performance on a battery of psychometric tests containing the BNT. Diagnostic accuracy for Alzheimer’s disease as verified by post-mortem examination in 207 individuals from the center is 93% (Berg et al., 1998).

Dementia severity was determined by the CDR, which is based on the clinician’s evaluation of the participant in six areas: memory, orientation, judgment and problem solving, community affairs, home and hobbies, and personal care. A value of 0 indicates no dementia; 0.5 represents very mild dementia; and 1, 2, and 3 denote mild, moderate, and severe dementia, respectively. Only people with CDRs of 0.5 (n = 108) and 1 (n = 138) were included in the demented sample. People with a CDR of 0.5 and a diagnosis of DAT at our center are often said by others to have mild cognitive impairment (Morris et al., 2001). Reliability of the CDR is good (Burke et al., 1988).

2.2. Measure

The focus of this report is on the BNT, which was included in a 1.5-h psychometric battery of measures of memory, naming, fluency, and psychomotor performance administered within a week or two of the clinical evaluation (Storandt & Hill, 1989). The BNT is administered in the second half of the battery; it includes 60 line-drawings of objects ranging from common ones such as a bed to relatively rare ones such as an abacus that the person is asked to name. All items are shown beginning with the first and allowing up to 30 s per item; no cues are provided. Informed consent was obtained from participants and their collateral sources. The data in the two samples reported here are archival; they have been included in numerous previous reports from this ongoing longitudinal study.

3. Results and discussion

The correlation between age and naming score in the nondemented group was −.36. This value is very similar to the −.40 reported by Connor, Spiro, Obler, and Albert (in press) in a sample of 240 individuals from the Boston Language in the Aging Brain longitudinal study who ranged in age from 30 to 87 and were not screened for dementia. It is possible that our slightly smaller correlation was due to the reduced age range in our sample, but, as can be seen in the left panel of Figure 1, poor naming scores were more prevalent after age 75, which appears to drive the correlation. The Boston and St. Louis samples were similar with regard to the upper age limit.

As can also be seen in Figure 1, some individuals above age 75 scored near ceiling. Clearly difficulty with naming is not a universal phenomenon in healthy aging, at least as assessed by the BNT. More difficult naming tests that provide room for errors by younger and middle-aged people might show comparable spread across the entire adult life span. This unanswered question reflects one of the problems that results when a test designed for one purpose (detection of aphasia in clinical populations) is put to different use. Finally, the correlation between naming and age was not spurious in terms of reflecting a correlation of both variables with education; the partial r between age and BNT controlling for education was −.35.
Fig. 1. The panel on the left shows the scattergram for the correlations ($r = -0.36$) between age and naming in nondemented individuals. The panel on the right shows the scattergram for individuals in the early stages of DAT ($r = -0.19$).

As expected, analysis of variance and subsequent pairwise comparisons of the number correct on the BNT revealed that the nondemented and two demented groups differed significantly from each other, $F(2, 370) = 107.99$, $P < .0001$. The mean BNT score was 54.97 (S.D. = 5.43) in the nondemented group, 45.19 (S.D. = 10.15) for the very mildly demented people (CDR = 0.5), and 37.17 (S.D. = 12.3) for the mildly demented group (CDR = 1). In addition to having lower mean levels of performance, the correlations between age and BNT scores were also lower in the very mildly ($r = -0.19$) and mildly ($r = -0.22$) demented individuals and did not change when education was statistically controlled. As can be seen in the right panel of Figure 1 showing the combined group of demented people ($r = -0.19$), 60-year-old people as well as 80-year-old people can have problems with naming if they have dementia. What is surprising, perhaps, is that some of them do not. The maximum observed BNT score in both CDR groups was 60. Indeed, the difference in the correlations between age and naming in the demented and combined nondemented groups was not statistically significant, $z = 1.69$, $P < .10$.

In summary, inclusion of people in the early stages of dementia does not appear to explain why studies may find correlations between age and naming. We need to look for other explanations.

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References


