Naming Improvements with Phonemic Cues: Which Alzheimer's Patients Benefit Most?

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Introduction

• Prior research has demonstrated that Boston Naming Test (BNT) performance varies widely among patients with mild Alzheimer's disease (AD).
• While some AD patients are able to correctly identify additional BNT items following phonemic cues, others exhibit no such improvement.
• The aims of the current study were:
1) to quantify phonemic cueing performance differences among a large sample of mild AD patients.
2) to examine possible correlates of cueing improvement, including demographic characteristics, level of premorbid functioning, performances on other neuropsychological tasks, and current everyday and psychosocial functioning.

Participants

• Participants in this study (N=250) were selected from a larger database of patients from the Baylor College of Medicine Alzheimer's Disease Center (see Doody *et al.*, 2005 for further description).
• Inclusion criteria included meeting NINCDS-ADRDA criteria for probable AD, completion of a comprehensive neuropsychological evaluation (including the BNT) at entry into a longitudinal study of AD, and MMSE ≥ 20.
• In order to avoid ceiling effects on the BNT phonemic cued improvement measure, only individuals whose baseline BNT scores were ≤ 50 were included.

Table 1: Participant Characteristics

Variable	M	SD
Age	75.48	7.24
Years of Education	13.72	3.01
% Female	68.80%	
% Caucasian	92.80%	
AMNART	107.31	13.34

Method

• To determine the benefit participants derived from phonemic cueing on the BNT, a Phonemic Cueing Improvement (PCI) index was calculated.
• This PCI index was then correlated with performances on other neuropsychological and everyday functioning/psychosocial measures, as well as with participant characteristics.

Table 2: Formula for Phonemic Cued Improvement (PCI)

$$PCI = \frac{\text{\# Correct with Phonemic Cue (PC) - \# Correct Without PC}}{\text{60 - \# Correct Without PC}}$$

Table 3: Naming and Other Neuropsychological Test Performances

Variable	M	SD
MMSE	23.73	2.53
BNT (without Phonemic Cues)	37.45	10.10
BNT (with Phonemic Cues)	45.06	11.03
PCI	0.40	0.21
Initial-Letter Fluency (FAS) - Raw	23.29	10.47
Category Fluency (Animals) - Raw	8.34	3.83
WAIS-R Vocabulary - Raw	39.95	14.41
WAIS-R Similarities - Raw	9.63	6.01
WAIS-R PIQ	85.85	13.50
Rey-Osterrieth CFT - Copy	27.31	13.14
WMS-R Visual Reprod - Immed	14.77	7.06

Table 4: Correlations between PCI and Neuropsychological Test Performances

Variable	r
MMSE	.12
Initial-Letter Fluency (FAS) - Raw	.23**
Category Fluency (Animals) - Raw	.18**
WAIS-R Vocabulary - Raw	.32**
WAIS-R Similarities - Raw	.38**
WAIS-R PIQ	.34**
Rey-Osterrieth CFT - Copy	.18*
WMS-R Visual Reprod - Immed	.08

* p ≤ .05, ** p ≤ .01

Table 5: Everyday Functioning/ Psychosocial Measures

Variable	M	SD
Physical Self-Maintenance Scale (PSMS)	7.31	2.11
Instrumental Act. of Daily Living (IADL)	13.66	5.37
Geriatric Depression Scale (GDS)	6.62	5.34

Table 6: Correlations between PCI and Everyday Functioning/Psychosocial Measures

Variable	r
Physical Self-Maintenance Scale (PSMS)	-.03
Instrumental Act. of Daily Living (IADL)	-.07
Geriatric Depression Scale (GDS)	-.05

Table 7: Correlations between PCI and Participant Characteristics

Variable	r
Age	-.03
Years of Education	.02
AMNART	.38**
Sex (t=1.714, p=.09)	.11

** p ≤ .01

Results

• On average, phonemic cues helped patients get the correct answer on 40% of the BNT items they initially missed.
• Given the considerable degree of PCI index variability (SD = 0.21), an examination of the possible correlates of these individual differences was warranted.
• Statistical analyses not only revealed significant correlations between the PCI index and its parent measure (BNT), but also between the PCI index and other verbal measures, including initial-letter fluency (FAS), category fluency (Animals), WAIS-R Vocabulary, and WAIS-R Similarities. However, there were also significant correlations with two of the three non-verbal measures (WAIS-R PIQ and Rey-Osterrieth, but not WMS-R Visual Reproduction) [Table 4].
• No significant relationship was found between PCI index scores and everyday functioning/psychosocial measures [Table 6].
• Although PCI index scores did not correlate with years of education (or any other participant characteristic), they were strongly correlated with AMNART scores [Table 7].

Conclusions

• Patients in this mildly-demented sample evidenced an average improvement of 40% in BNT scores when given phonemic cues, and there was also considerable variability in these scores.
• Patients who benefited from phonemic cueing appear to have higher premorbid verbal intellectual abilities and perhaps larger verbal cognitive reserves that can better withstand the effects of AD on semantic functioning. These patients also perform better on other neuropsychological tests of current language functioning, as well as on some tests of visuospatial functioning.
• Future studies could examine longitudinal changes in PCI and explore how these differences are related to other neuropsychological changes. These studies may ascertain whether baseline PCI scores have any additive value (beyond MMSE or baseline BNT scores) in predicting rates of cognitive decline or, perhaps more specifically, rates of semantic functioning decline.