

Which Presidents Are Most Memorable?

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Background/rationale. Episodic memory loss is a hallmark of Alzheimer's disease (AD), with recall of recent events becoming progressively difficult. A commonly used tool, the recollection of US presidents, was assessed in evaluating episodic versus semantic memory loss among AD patients compared with spouse controls. *Methods.* A total of 36 patients (12 men, 24 women) with possible or probable AD were asked to "give the names of 5 US presidents" and concurrently administered the Mini Mental State Examination (MMSE). Twenty-three spouses (12 men, 11 women) were controls. The year 1980 demarcated "remote" versus "recent" presidents.

Results. Patients were older, had lower MMSE scores ($P < .001$), and recalled fewer presidents than controls ($P < .005$), after controlling for age. Among patients, men were more educated than women ($P < .05$) and recalled more presidents ($P < .001$). No gender differences were observed in controls. *Conclusions.* Patients with AD preferentially recalled remote presidents, supporting retention of semantic memory in this group. There were no gender differences between groups.

Keywords: Alzheimer's disease; president recall; memory loss

Episodic memory loss is an early hallmark of Alzheimer's disease (AD) with the recall of recent material being more difficult for patients with AD than for nondemented individuals.¹ Semantic memory, on the other hand, concerns remote events and facts and is generally preserved until late in the course of the condition.²

The episodic memory system is dependent on the medial temporal lobes, including the hippocampus and the entorhinal and perirhinal cortexes, which are responsible for the retention of information, as well as the frontal lobes, which are responsible for encoding and the retrieval of information without cues.³ Atrophy of the hippocampus has been demonstrated to be the signature pattern of atrophy on magnetic resonance imaging studies in AD, which supports the clinical presentation of episodic memory loss in AD as linked to the hippocampus.⁴⁻⁶

Progressive disruption of semantic memory has also been increasingly associated with AD.⁷ Unlike episodic memory, semantic memory is not specific to the temporal lobes and therefore occurs much later in the progression of the disease.² In a study involving 52 AD patients, Hodges and Patterson⁷ found that although impairment in semantic memory varied based on dementia severity, all of the patients showed a profound deficit in episodic memory.

Women, in particular, may suffer more from such deficits. McPherson et al⁸ found that women were more severely impaired in both semantic and episodic memory than men. A community based study conducted by Buckwalter et al⁹ also found the existence of a significant deficit in semantic memory among women with AD after controlling for age, education, duration of dementia, and severity of dementia.

Such differences in semantic and episodic memory preservation are assumed in the use of a common neurocognitive evaluative tool—the recollection of US presidents. The recall of the current and recent presidents is an indicator of episodic memory, whereas the recall of remote presidents is an indicator of semantic memory.^{10,11} With this implicit assumption, the recall of presidents is commonly used in neurocognitive evaluations of patients with dementia. However, this

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widely used cognitive test has not been well studied. In most studies, this test is a component of a battery of neurocognitive tasks and has therefore not been separately examined.¹⁰ One study evaluated an extended and modified president recall test using photographs and generation of lists of presidential candidates among patients with unspecified vascular disease as compared with controls.¹² The authors found that this recall test was impaired in controls and was the “least sensitive test for brain disease.” Another study using this same modified test found patients with Alzheimer’s were impaired compared with patients with Parkinson’s disease and controls.¹³ A study amongst nondemented adults between ages of 50 of 97 years, poor president recall was found in adults older than 90 and education improved recall.¹⁴

We wished to assess the validity of the president recall tool in terms of its specificity and sensitivity in determining episodic versus semantic memory loss in a population of patients with AD, using their nondemented spouses as controls. We postulated that patients would be less likely than controls to recall recent presidents, consistent with the loss of episodic memory in early AD and that women would be disproportionately affected. We believed that there would be no difference in the recall of remote presidents between groups, and finally, that president recall could be considered a specific tool in evaluating the loss of episodic memory in patients with AD.

Methods

This study was approved by the Institutional Review Board of Lenox Hill Hospital in New York, NY (L05.10.71E). All participants were AD patients or the spouses of patients of our outpatient neurology office. Patients were selected by the principle investigator and were initially recruited for participation in the study in 2005. Additional patients, as well as spouse controls were recruited in 2007. Figure 1 shows the flow of participants through the study.

Inclusion criteria for patients included a diagnosis of possible or probable AD according to the National Institute of Neurological and Communicative Disorders and Stroke—Alzheimer’s Disease and Related Disorders (NINCDS-ADRDA) criteria.¹⁵ Patients without such a diagnosis were excluded, as were spouse controls with clinical evidence or a diagnosis of dementia.

After giving informed consent, all participants were asked to, in a nondirective fashion, “give the

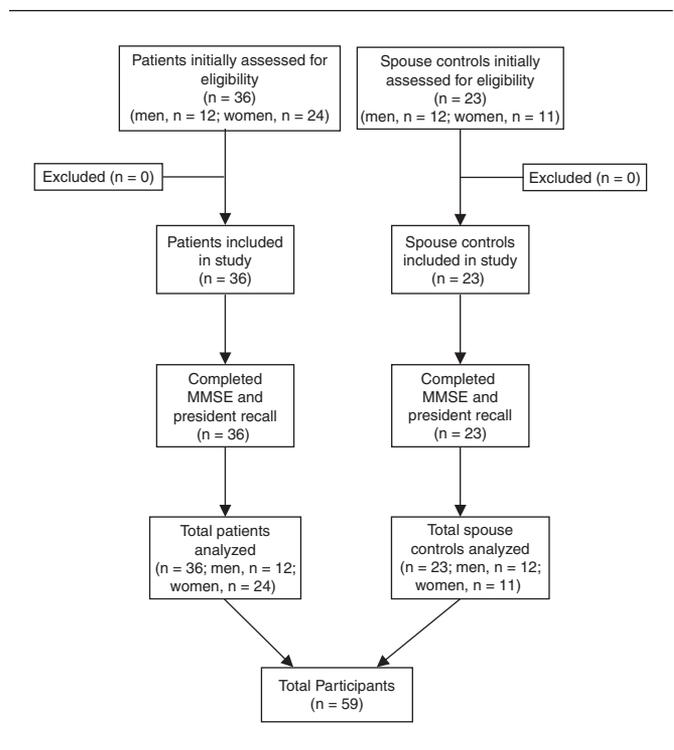


Figure 1. Flow of participants through study.

names of five US presidents” and were concurrently given the Mini Mental State Examination (MMSE). The MMSE was selected based on its ease of use and the fact that it is often given in conjunction with president recall. The year 1980 was used as a dividing line between “remote” and “recent” presidents. In a study among college students,¹⁶ students self-categorized presidents into the categories of “founding fathers,” “middle period presidents,” and “recent presidents.” While we chose “1980” arbitrarily as the dividing year, it is noteworthy that presidents in the ensuing years all served 2 terms (Reagan, Clinton) or shared the same last name (Bush).

Primary outcome measures included MMSE scores, the average number of presidents recalled, the percentage of remote versus recent presidents recalled, and the total percentage specific presidents were recalled. Student’s *t*-tests were used to evaluate the differences between patients and controls, as well as to evaluate differences between genders within groups. Demographic variables, including age and years of education, were analyzed between genders and groups and were controlled for as necessary. All data was analyzed using SPSS 11.0 (Chicago, IL). Specificity and sensitivity of the test of president recall for episodic memory loss were determined based on a positive test result of zero recent presidents recalled.

Table 1. Alzheimer's Patients Versus Controls: Demographics and President Recall Data

	Patients (N = 36)	Controls (N = 23)	<i>t</i>	<i>P</i> -Value
Age (years)	78.47 ± 9.24	73.52 ± 7.91	-2.12	.04
Education ^a	1.89 ± 0.67	2.26 ± 0.96	1.75	NS
MMSE scores ^a	24.53 ± 4.87	28.70 ± 1.66	3.95	.005
No. of presidents recalled (out of 5) ^b	3.50 ± 1.58	5.00 ± 0.00	4.55	<.001
Presidents most recalled				
Remote				
Washington	(18/36) 50%	(10/23) 44%		
Jefferson	(12/36) 33%			
Lincoln	(16/36) 44%	(9/23) 39%	1.28	NS
F. D. Roosevelt	(8/36) 22%			
Kennedy		(9/23) 39%		
Recent			3.74	<.001
Clinton		(14/23) 61%		
G. W. Bush	(11/36) 31%	(9/23) 39%		

Abbreviations: NS, nonsignificant; MMSE, Mini Mental State Examination.

^a0 = less than high school; 1 = high school; 2 = college; 3 = grad/med/law.

^bAge controlled for as appropriate but had no significant effect on MMSE and number of presidents recalled. *t* and *P* values are from Student's *t*-test.

Results

A total of 36 patients (12 men, 24 women) with a diagnosis of possible or probable AD according to NINCDS-ADRDA criteria participated in the study. A total of 23 nondemented spouses of patients (12 men, 11 women) were recruited as controls. There were no dropouts in either group and all participants were included in the final analysis (see Table 1).

Overall, patients were older than controls (78.47 ± 9.24 years vs 73.52 ± 7.91 years; *P* = .04). However, age did not have a significant effect on either MMSE scores or number of presidents recalled between groups. Patients had lower MMSE scores (*P* < .001) and recalled less presidents than controls (*P* < .005). In the control group, there were no demographic differences between genders; however, in the patient group, men were more educated than women (*P* < .05). Men with AD recalled more presidents than women with AD (*P* < .001), although this difference was lost once education was controlled for.

The presidents most recalled among both groups were Washington (48%), Lincoln (42%), Clinton (36%), George W. Bush (32%), and Kennedy (25%). Patients recalled Washington, Lincoln, F. D. Roosevelt, and G. W. Bush most frequently, whereas controls recalled Washington, Lincoln, Kennedy, Clinton, and G. W. Bush (Table 1). There were no significant differences in specific presidents recalled between genders in either group. Controls recalled more recent

presidents than patients (*P* < .001). However, recollection of remote presidents was not significantly different between groups, with Washington and Lincoln being the most recalled by both cohorts. Sensitivity of the test for indicating episodic memory loss was 64%. Specificity of the test was 78%.

Discussion

The recall of US presidents is a commonly used neurocognitive tool to assess cognitive impairment in patients with dementia. Such tests of general knowledge assume that episodic memory is preferentially lost in early Alzheimer's with preservation of factual, semantic memory until later in the course of the disease.^{1,7} Hence the common clinical rationale is that patients with AD will have a harder time recalling current or "recent" presidents (episodic memory) than "remote" presidents (semantic, factual memory). The validity of this assumption, built into the test of president recall, has not been specifically evaluated. We therefore chose to assess this instrument in our patients with AD as compared with their nondemented spouses.

President recall is often included in studies of cognition without much explanation for its inclusion, although it is used as an indicator of episodic and semantic memory preservation.^{10,11} Hagberg et al¹⁰ performed an analysis of cognitive functioning in

centenarians in Japan, Sweden, and the United States, using president recall and recognition to test semantic memory. They expected semantic memory to be better preserved in patients with dementia. Although they offered no clear reasoning for the use of president recall, their results indicated that based on this test and the recognition test, variability in semantic memory increased with age, indicating that older individuals and those in the later stages of dementia struggled more in this area. A study by Fama et al¹⁷ analyzed the free recall of presidential candidates dating back to 1920 and showed that deficits in remote memory for public events were most evident in AD patients. Recognition of presidential candidates based on pictures was better for this group; however, AD patients still did considerably worse than controls, indicating a possible loss of semantic memory as well as episodic in this case. In a study of non-dependent versus dependent AD patients, Sarazin et al¹⁸ and colleagues found a significant discrepancy in short term memory between groups, but no such difference in long-term memory, further supporting the idea that semantic memory loss occurs later than episodic in the progression of AD.

One study evaluated the ability of persons between the age of 40 and 79 to recall famous persons (semantic memory) as compared with their recall of the place of acquisition of such information (episodic memory).¹⁹ The authors found that semantic memory of names of famous persons was dependant on semantic scores on the neurocognitive battery, whereas episodic memory was dependant on executive performance. This suggests that a task such as naming 5 television shows, for example, would be more indicative of an episodic memory task (the place of acquisition of memory of many famous persons) than the names of famous persons. This is why "president recall" may be preferable to recall of "naming television shows" in distinguishing between episodic and semantic memory deficits.

Weiner and Lipton²⁰ have stated that assessment of remote memory is confounded by educational level when using general knowledge questions such as the names of remote presidents. We controlled for education in our study so as to eliminate this impact on the recollection of US presidents. When education was controlled for we also found no differences in the number of presidents recalled between genders, indicating that episodic and semantic memory were preserved similarly between men and women in our study. Age was also controlled for between

groups, as patients were significantly older than controls. As mentioned previously, semantic memory variability has been shown to increase with age.¹⁷

In our study, controls recalled more recent presidents than patients, as we had postulated, supporting evidence that semantic, remote and factual memory is better preserved than episodic, more recently acquired memory in AD.² Recollection of remote presidents, however, did not vary significantly between groups, with Washington and Lincoln being most recalled by both cohorts. This may be due to the fact that Washington and Lincoln are considered to be two of the "best" presidents and are the highest ranked by historians, possibly making them more memorable as well.²¹

We did not find the test of president recall to have particularly high specificity or sensitivity in this study. Dementia continues to be underdiagnosed with even moderate dementia not being diagnosed 50% of the time in internist practices.²² In this setting, the value of a quick yet sensitive screening test for dementia cannot be overestimated. More time consuming screening tests for dementia have sensitivities and specificities greater than 90%.^{23,24} However, even 1 year of college education can reduce sensitivity and specificity.²⁵ Our patient population was fairly well-educated, most with a college education. In addition, our president recall test generally took about 1 to 2 minutes to administer and this contributed to the relatively lower levels of sensitivity.

As this test is such a commonly used neurocognitive evaluative tool, it is important to keep in mind these low values, while noting that the majority of our patients with AD did not recall any recent presidents. Although sensitivity and specificity may have been low in this study, there was a significant difference in recent president recall between groups, indicating better preserved episodic memory in spouse controls.

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