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Original Research Article

Prevalence of Word Retrieval Complaint and Prediction of Dementia in a Population-Based Study of Elderly Subjects

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Word retrieval · Word finding · Memory

Abstract
There is agreement that elderly people complain about word finding difficulties, particularly proper names. However, few studies have focused on the prevalence of this complaint in the general population, nor is it clearly known whether it is predictive of dementia. The aim of this study was to fill this gap using the PAQUID cohort. 1,838 people aged 65 or more completed questionnaires and neuropsychological evaluation regularly during 13 years. Results show that the complaint about proper name retrieval concerns 64% of people aged above 65 years, and the complaint about common names 30%. The complaint was not associated with enhanced risk of dementia, whereas short naming tests were. Only a marginal relation was found between these naming tests and word retrieval complaint. This study emphasizes the importance of proper name retrieval complaint in the general population and suggests that elderly subjects can be reassured in the absence of other symptoms.

Introduction

Old age is often accompanied by cognitive complaints. Who has not heard a grandparent complaining about increasing difficulties? Specific studies have confirmed this impression. Westoby and Mallen [1] reported that the prevalence of general cognitive complaints in

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nondemented elderly people ranges from 27 to 34%. More detailed studies revealed that these cognitive complaints include particularly memory. Jonker et al. [2] conducted a meta-analysis of studies in the general population and found that the prevalence of subjective memory complaints 'defined as everyday memory problems' ranged between 25 and 50%. Memory complaints could thus concern up to half of the elderly population.

Among memory complaints, the difficulty in finding words is particularly familiar. The most common word retrieval failure is the tip-of-the-tongue state also known as TOT [3]. A TOT is the temporary inability to produce a well-known word despite a strong feeling that the recall of the word is imminent [3]. Burke et al. [4] conducted a study combining retrospective questionnaires, diary procedures, and a laboratory word retrieval task. They found more TOTs in their middle-aged group (mean age = 38.7 years) and older-aged group (mean age = 71.0 years) than in their younger group (mean age = 19.4 years). Similarly, Heine et al. [5] also found more TOTs in their oldest adult group (aged 82–92 years) than in their younger group (aged 60–74 years). Partial phonological information is usually accessible in a TOT state (for example, the first phoneme of the target word or its syllable length), but this is less true for elderly people. Moreover, they take more time than younger people to resolve their TOTs [3, 4]. Other word retrieval difficulties include either words that are not used frequently and thus take longer time to be retrieved from memory ('feeling of knowing' [6]) or 'word loss' which can happen under pathological conditions such as in semantic dementia [7, 8].

Among these difficulties, proper names seem to have a special status. For example, Semenza [9, 10] has emphasized that anomia could be limited to proper names and spare common names. Proper names are more difficult to retrieve than other information about people [11, 12]. TOTs also concern proper names more than common names [13]. Older adults report that their ability to retrieve proper names deteriorates as they age and that this is their most disturbing cognitive problem [14]. Indeed, they produce more TOTs for proper names than younger adults [4] and TOTs for proper names increase in old age more than for common names [4, 15, 16].

Word retrieval failure was also studied in patients suffering from Alzheimer's disease (AD). Astell and Harley [17], with a definition procedure, found that patients experienced more difficulties than matched controls. Interestingly, several studies at the predementia stage (i.e. corresponding to the mild cognitive impairment stage of the disease) have found a robust and convergent impairment of famous people naming [18–22]. These difficulties were increased in patients at the predementia stage that later converted to dementia of the AD type [23]. Such impairment has been related to the atrophy of brain structures involved early in the neurodegenerative process of this disease [21, 22, 24]. Furthermore, the studies by Adlam et al. [18] and Joubert et al. [20, 21] reveal that these difficulties could extend to common names at the predementia stage suggesting that word retrieval difficulties could be more pervasive than commonly thought. Such results may be important since they raise the possibility that complaint about word retrieval, in particular of proper names, could in fact reveal the onset of a pathological condition. To the best of our knowledge, however, we are not aware that any study has specifically assessed whether naming is a suitable predictor of dementia.

Identifying people at risk to develop dementia is a priority because it allows developing preventing strategies. Whether a cognitive complaint is predictive of dementia, and under which condition, remains to be discussed [25–27], although different studies have found that subjects with subjective complaints evolve differently than matched controls [28, 29]. Mitchell [30] has underlined that studies of subjective cognitive complaints show a close association with dementia but are not sufficient for a diagnosis. Memory complaints and performances are in fact determined by numerous factors such as memory abilities, personality, depressive

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moods, level of social and intellectual daily activities and meta-memory [31] that make the predictive power of complaint difficult to ascertain. Within this context, a more specific complaint about name retrieval, rather than a general complaint about cognitive or memory abilities, could be more informative. However, studies on the specific predictive power of a complaint about naming are lacking.

Overall, although it is well known that the elderly have difficulties with word retrieval and that it can sometimes be pathological, few studies have reported the prevalence of the complaint regarding this specific difficulty. This is surprising considering that it is probably held as a widely accepted fact. It is also unknown whether this specific complaint is a predictive symptom of dementia. The first objective of this study was therefore to estimate the prevalence in the elderly of the subjective complaint about word retrieval difficulties in a large community-based study, comparing proper names with common names and secondly, to assess whether such a complaint was predictive of future dementia (study 1). We hypothesized that the older the subjects would become, the higher their complaint would be [4, 5] and that a correlation between name retrieval complaint and dementia would be found. We then assessed objective naming performances using different short naming tests and determined whether they predicted dementia better, or differently, than name retrieval complaint (study 2). Lastly, we assessed whether an association between name retrieval complaint and performance on these short naming tests would be found.

Methods

Study Design and Sample

The PAQUID study is an epidemiological prospective study on cerebral and functional aging initiated in 1988. The methodology has been previously described in full [32]. Briefly, the initial sample included at baseline 3,777 community dwellers, aged 65 or more, who were randomly selected from the electoral rolls in two French administrative areas. The participants were representative in terms of age and sex of the elderly community dwellers of the area [33]. Subjects were evaluated at home at the initial visit (T0) and 1, 3, 5, 8, 10, and 13 years after the baseline (referenced hereinafter as T1, T3… in the Results section). At each visit, a trained psychologist administered a questionnaire collecting sociodemographic data and a neuropsychological evaluation. Not all tests were administered at each visit.

Dementia Cases

After the interview, the psychologist completed a dementia criteria checklist. Individuals who met the criteria for dementia were seen at home by a neurologist who rejected or confirmed the diagnosis. The available information was reviewed by a panel of neurologists specialized in dementia who applied the following criteria to establish the underlying etiology of dementia: NINCDS-ADRDA criteria for AD [34], NINDS-AIREN criteria for vascular dementia [35], standardized clinical criteria for frontotemporal dementia [36], Lewy body disease [37] and a history of Parkinson's disease for Parkinson dementia.

Materials

The questions and tasks related to subjective word finding complaints and objective naming abilities that are used for the present study were part of the neuropsychological assessment that was administered to participants.

(1) Subjective Word Finding Complaints

Cognitive complaints were assessed by a questionnaire requiring subjects to rate their own perception of their current cognitive difficulties including word finding difficulties, forgetfulness in activities of daily living, difficulties in learning new information and remembering old memories [38]. The general question for all the items was: 'Do you usually present the following symptoms?' The subject could answer by 'yes' or 'no'. For the present study, we selected from this scale the two following items that were assessed at the T1 follow-up visit: 'Do you have difficulty in finding words, especially common names?'; 'Do you have difficulty in finding proper names?'.

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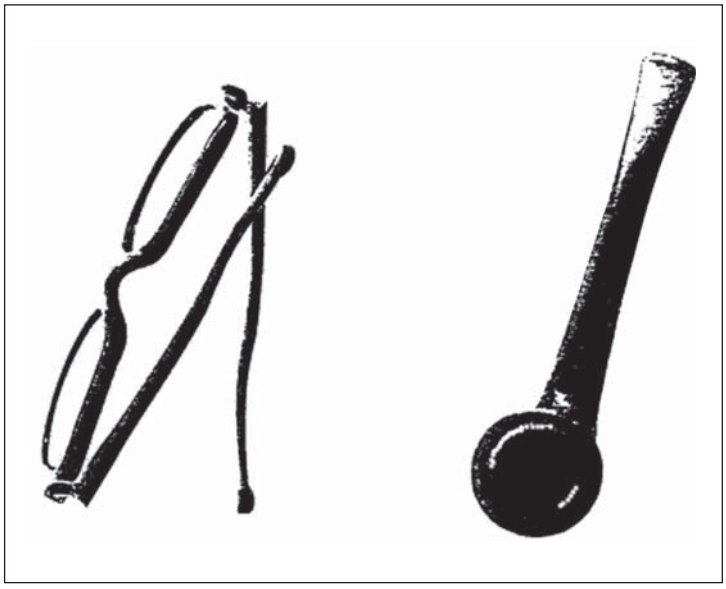

Fig. 1. Image of the glasses and pipe presented in the object naming task.

(2) Tasks of Person and Object Naming

The items assessing naming abilities were collected at the T3 follow-up visit.

- Items assessing proper name retrieval:

At the beginning of the interview, the psychologist gave her name and said 'My name is _____, I would like you to remember it. Can you repeat it?' After a 5-min delay, the subject was asked to recall the psychologist's name. Immediately after the psychologist asked the subject to repeat and remember her name, the subject was asked to give the name of the current president of the French Republic.

- Items assessing object naming:

The subject was shown two pictures of common objects (glasses/pipe) presented in an unusual view and asked to name each object (fig. 1).

Statistical Analyses

χ^2 tests were performed to analyze the difference in the proportion of complainants for each naming measure. The objective was to investigate the temporal relationship between naming deficits/complaints and dementia. For this, logistic regression analyses were performed at different times of follow-up adjusted for potential confounding variables (age, gender, education and MMSE score). Analyses were performed using SAS, version 9.1 (SAS Institute, Inc., Cary, N.C., USA). The level of education was assessed by distinguishing subjects who did not have their *certificat d'étude primaire* ('primary school certificate') and subjects who had it. The *certificat d'étude primaire* was an important diploma for French elderly people that they could pass at the age of 12.

Results

Study 1: Frequency of Word Finding Complaints and Prediction of Dementia

Sample Characteristics

1,838 participants of the PAQUID cohort answered at least to one of the two naming questions regarding word finding difficulties at the 1-year follow-up visit. Their mean age was 76.03 years (SD = 6.83); 58.4% of the participants were women and 70.1% had completed at least the primary level certificate. The predictive value of word finding complaints was estimated in this sample, of which 336 participants were excluded: 46 because of dementia at T1, 280 participants who refused all the follow-up between T3 and T10, and 10 participants for whom the MMSE score (adjustment variable) was missing.

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Table 1. Frequency of word finding complaints for proper and common names

	n	Frequency, %	95% CI	p value
Proper names				
Whole sample	1,175/1,838	63.93	61.73–66.12	
Gender				0.56
Men	495/765	64.71	61.32–68.09	
Women	680/1073	63.37	60.49–66.26	
Age				<0.001
<70	274/486	56.38	51.97–60.79	
70–79	582/846	68.79	65.67–71.92	
>80	319/506	63.04	58.84–67.25	
Education				0.80
Primary level	821/1288	63.74	61.12–66.37	
No diploma	354/550	64.36	60.36–68.37	
Dementia				0.62
Demented	31/46	67.39	53.84–80.94	
Nondemented	1,144/1792	63.84	61.61–66.06	
Common names				
Whole sample	552/1834	30.10	28.00–32.20	
Gender				0.02
Men	207/762	27.17	24.01–30.32	
Women	345/1072	32.18	29.39–34.98	
Age				0.18
<70	133/486	27.37	23.40–31.33	
70–79	271/845	32.07	28.92–35.22	
≥80	148/503	29.42	25.44–33.41	
Education				0.18
Primary level	375/1286	29.16	26.68–31.64	
No diploma	177/548	32.30	28.38–36.21	
Dementia				0.18
Demented	18/46	39.13	25.03–53.23	
Nondemented	534/1788	29.87	27.74–31.99	

Frequency of Word Finding Complaints

Firstly, we present the results regarding the frequency of complaints about proper name finding (table 1). Results show that 63.9% of participants report difficulty retrieving proper names. There was a significant difference between age groups, with a peak for participants aged 70–79 years. No significant difference was found according to gender or level of education or dementia.

Secondly, complaints about common name finding concerned 30.1% of participants (table 1). Women complained more than men. No significant difference was found according to age or level of education or dementia.

Association between Word Finding Complaints and the Risk of Developing Dementia 9 Years Later

We used a logistic regression analysis to investigate the association between word finding complaint and the risk of developing dementia in the 9 subsequent years. The results showed that after adjusting for age, gender, education and MMSE score, the complaint about both proper and common name retrieval difficulties was not associated with subsequent dementia during the follow-up (table 2). The same analysis was performed without adjusting for the MMSE score with similar results. Lastly, we performed the same analysis for the subjects diagnosed with AD only (rather than for any type of dementia). This did not change results either.

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Table 2. Word finding complaints and risk of dementia

	2 years later			4 years later			7 years later			9 years later		
	OR	95% CI	p value	OR	95% CI	p value	OR	95% CI	p value	OR	95% CI	p value
Complaint about proper name retrieval	1.69	0.86–3.32	0.13	1.44	0.76–2.74	0.27	1.17	0.63–2.16	0.61	0.82	0.52–1.29	0.39
Complaint about common name retrieval	1.29	0.69–2.42	0.43	1.23	0.66–2.28	0.52	1.09	0.60–1.99	0.78	0.90	0.56–1.47	0.68

Study 2: Frequency of Naming Accuracy and Prediction of Dementia

Sample Characteristics

2,347 participants completed at least 1 of the items on object and person naming at the 3-year follow-up visit. Their mean age was 77.7 years (SD = 6.4); 58.3% of participants were women and 69.1% had at least the primary level certificate. The predictive value of naming abilities was estimated in this sample, of which 479 participants were excluded: 127 because of dementia at T3, 352 participants who refused follow-up and 5 participants for whom the MMSE score (adjustment variable) was missing.

Frequency of Naming Accuracy

The results showed that 95.4% of participants retrieved the name of the President of the French Republic and 60.2% remembered the psychologist's name after a 5-min delay (table 3). Performance decreased with age, and men performed slightly more accurately. Regarding common object naming, the 'glasses' were accurately named by 95.7% of participants (table 3). Naming rates were slightly different according to gender and decreased with age. The 'pipe' presented in an unusual view was more difficult to name (65.8%) (table 3). A strong gender effect was observed with men performing higher than women. Performance decreased with age.

Association between Naming Abilities and the Risk for Dementia

We used a logistic regression analysis to investigate the association between the measures related to naming abilities and the risk of developing dementia in subsequent years. Analyses were performed separately 2, 4, 7 and 9 years after T1 and participants with a diagnosis of dementia were not included in subsequent analyses. The results showed that after adjusting for age, gender, education and MMSE score, the ability to retrieve the psychologist's name was significantly associated with the risk of subsequent dementia 2, 5, and 7 years thereafter; to name the pipe was associated with the risk of subsequent dementia at 2 and 5 years thereafter (table 4). They were no longer associated with any risk of developing dementia afterwards (table 4). The other naming abilities were not associated with subsequent dementia.

The same analysis was performed without adjusting for the MMSE, which may have concealed effects of a neurodegenerative disease starting long before diagnosis (table 5). Results remained similar except that a failure to name the pipe was associated with a risk of dementia 7 years later and that a failure to name the French President was now associated with a risk of dementia 2 and 5 years later.

Lastly, we performed a regression analysis to investigate a possible relation between complaint and performance on the short naming tasks (table 6). Only a moderately significant relationship was found between the complaint at T1 and naming the pipe at T3.

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Table 3. Frequency of naming accuracy for the psychologist's name, the President's name, the glasses and the pipe

	n	Frequency, %	p value
Psychologist's name			
Whole sample	1,411/2,342	60.2	
Gender			0.01
Men	620/976	63.5	
Women	791/1,366	57.9	
Age			<0.0001
<70	170/212	80.2	
70–79	855/1,302	65.7	
≥80	386/828	46.6	
Education			<0.0001
Primary level	1,110/1,618	41.6	
No diploma	301/724	68.6	
Dementia			<0.0001
Demented	13/113	10.3	
Nondemented	1,398/2,216	63.1	
President's name			
Whole sample	2,236/2,344	95.4	
Gender			<0.0001
Men	955/978	97.6	
Women	1,281/1,366	93.8	
Age			<0.0001
<70	210/212	99.1	
70–79	1,269/1,303	97.4	
≥80	757/829	91.3	
Education			<0.0001
Primary level	1,570/1,620	92.0	
No diploma	666/724	96.9	
Dementia			<0.0001
Demented	64/126	50.8	
Nondemented	2,172/2,218	97.9	
Glasses			
Whole sample	2,154/2,250	95.7	
Gender			0.08
Men	914/946	96.6	
Women	1,240/1,304	95.1	
Age			0.0001
<70	208/209	99.5	
70–79	1,225/1,270	96.5	
≥80	721/771	93.5	
Education			0.0001
Primary level	1,522/1,572	96.8	
No diploma	632/678	93.2	
Dementia			<0.0001
Demented	82/114	71.9	
Nondemented	2,072/2,136	97.0	
Pipe			
Whole sample	1,481/2,251	65.8	
Gender			<0.0001
Men	728/946	77.0	
Women	753/1,305	57.7	
Age			<0.0001
<70	165/209	79.0	
70–79	940/1,270	74.0	
≥80	376/772	48.7	
Education			<0.0001
Primary level	1,097/1,572	56.6	
No diploma	384/679	69.8	
Dementia			<0.0001
Demented	39/115	33.9	
Nondemented	1,442/2,136	67.5	

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Table 4. Naming abilities and risk of dementia (adjusted for age, gender, education and MMSE score)

	After 2 years				After 5 years				After 7 years				After 10 years			
	D/N	OR	95% CI	p value	D/N	OR	95% CI	p value	D/N	OR	95% CI	p value	D/N	OR	95% CI	p value
Psychologist's name	51/1762	2.34	1.15–4.76	0.02	84/1364	2.10	1.24–3.56	0.01	179/1238	1.48	1.01–2.16	0.04	195/910	1.09	0.75–1.58	0.66
President's name	52/1763	1.07	0.28–4.07	0.92	84/1364	2.70	0.74–9.85	0.13	178/1237	2.37	0.66–8.57	0.19	195/910	1.48	0.42–5.25	0.54
Glasses	52/1707	1.20	0.32–4.49	0.79	80/1328	1.45	0.41–5.13	0.57	167/1203	0.81	0.24–2.79	0.74	186/890	1.41	0.46–4.33	0.55
Pipe	52/1707	1.85	0.96–3.54	0.06	80/1328	1.82	1.10–3.02	0.02	167/1203	1.32	0.89–1.95	0.16	186/890	1.07	0.72–1.60	0.72

D/N = Number of demented/total number of participants.

Table 5. Naming abilities and risk of dementia (adjusted for age, gender, education but not MMSE score)

	After 2 years			After 5 years			After 7 years			After 10 years		
	OR	95% CI	p value	OR	95% CI	p value	OR	95% CI	p value	OR	95% CI	p value
Psychologist's name	4.35	2.24–8.45	<0.0001	3.27	2.00–5.35	<0.0001	2.06	1.44–2.94	<0.0001	1.32	0.92–1.89	0.1290
President's name	4.13	1.42–12.06	0.01	4.98	1.63–15.23	0.005	2.91	0.87–9.74	0.08	1.61	0.46–5.66	0.46
Glasses	2.09	0.69–6.36	0.19	1.50	0.43–5.18	0.53	1.08	0.34–3.43	0.89	1.65	0.55–4.96	0.37
Pipe	2.31	1.26–4.24	0.01	2.07	1.27–3.38	0.004	1.64	1.13–2.38	0.01	1.21	0.82–1.78	0.34

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Table 6. Logistic regression adjusted for age, level of education and MMSE score between complaint at T1 and naming at T3

	Psychologist's name			President's name		
	OR	95% CI	p value	OR	95% CI	p value
Complaint about proper name retrieval	1.14	0.88–1.49	0.32	1.34	0.58–3.06	0.50
	Glasses			Pipe		
	OR	95% CI	p value	OR	95% CI	p value
Complaint about common name retrieval	1.04	0.50–2.16	0.92	0.76	0.58–1.00	0.05

Discussion

In this study, we first aimed at estimating the prevalence of the complaint about word finding difficulties. The use of the results on almost 2,000 people from the PAQUID cohort allowed us to have a large representative population of people above 65 years of age. Our results indicate that 30% of elderly people complain about difficulties finding common names. However, this rate increases to 64% when the complaint refers to difficulties with proper names with a peak at 69% for the 70–79 age group. This is 2 persons out of 3 complaining. This prevalence is much higher than reported in previous studies on cognitive or memory complaints [2, 39–41]. This difference may reflect the use of questions specifically aimed at evaluating word naming complaints, whereas general complaint about memory was usually assessed in other studies. These results suggest that most elderly subjects experience a change in the way they process proper names compared to when they were younger, but that they deem it either as normal when aging or not related to memory difficulty. Else, they would have reported it when assessed about their memory complaint. In support of this hypothesis, the proper name retrieval complaint actually decreases above 80, a result already reported in some studies on memory [41], as if at a certain age it is considered normal to have difficulties with proper names and people are getting used to dealing with it. 64% of persons complaining about proper name retrieval is a lot and such a result merits further studies. It would be useful in particular to assess whether this number is relatively high across all age ranges, which would indicate that proper name retrieval is difficult in general, or whether it increases specifically at a certain age. Our data do not allow answering this question completely but it is interesting that the complaint increases from 56% for subjects less than 70 years old to 69% for subjects aged between 70 and 79 years. This suggests that there is a specific increase in the complaint when people are aged 70–79.

The difference in the complaint between proper and common names could be explained by the specific status of proper names [10]. Proper names are arbitrary, specific and unique [42]. They cannot be replaced by a synonym [43]. Furthermore, models hold that there is a unique link between the lexical node and the personal identity node that represents the concept of a person, which may explain why it is more prone to retrieval difficulties [4]. This unique link may make proper name retrieval more sensitive to any alteration in brain efficiency (all the more so as it probably requires the synchronization of vast networks of brain areas [10]).

We now have an idea of this complaint, but we also wanted to know if this complaint could be predictive of a greater risk of developing dementia. Our results indicated that this is not the case. A complaint is not predictive of a future conversion. If one puts forward the hypothesis that participants' complaint reflects the true perception that their efficiency is decreasing compared to when they were younger, these results suggest that difficulties with proper names reflect processes that are impaired by normal aging rather than by pathology. As such, it comes as good news as elderly people complaining about proper names can be reassured that it is not indicative of conversion to dementia. However, it remains to be understood which processes in normal aging affect proper name retrieval specifically. Increased proper name retrieval complaint may be associated with various conditions, some of which, such as depression, fatigue, pain or sleep disorder [1, 44, 45], may be treated efficiently. Interestingly, the level of complaint did not differ between demented and nondemented subjects. This could either be related to anosognosia in the demented subjects or support the claim that name retrieval complaint is indeed a poor predictor of the cognitive status of subjects.

In an attempt to contrast subjective complaint and objective naming abilities, we set out to determine if short naming tests could predict future dementia adjusting for the MMSE score (i.e. our results in this case were independent of the MMSE score since it is in itself an indicator of dementia). The ability to retrieve the psychologist's name and to name common objects like a pipe presented in an unusual view predicted future dementia, but only 2, 5 and 7 years after the test for the psychologist's name and 2 and 5 years after the test for the pipe. That difficulty retrieving the psychologist's name is a predictor of dementia is not a surprise as this quick test heavily relies on recent declarative memory, which is known to be impaired early in the course of dementia. Thus, there may be an interaction in this case between a proper name that is difficult to encode and declarative memory impairment. Furthermore, looking at objects viewed in unusual angles requires depth perception and mental rotation, processes that may also be impaired early in dementia [46]. In contrast, glasses are a useful very common object for old people, which could thus prevent naming difficulty. Interestingly, we found only a weak relation between naming complaint and objective naming (for the pipe only). This appears to lend further support to the idea that the complaint is not related to objective performance.

Results showing that proper name retrieval complaint or naming orally the name of the President were not predictors of dementia may appear at odds with the studies that have consistently shown that naming famous faces is impaired even at the predementia stage of AD [18–23]. In these tasks, however, patients have to name faces presented visually. The cross-modal nature of these tasks could make them more sensitive to AD. Also, several famous faces are used in such tasks, possibly leading to more sensitive measures. Importantly, naming famous faces, many that are not seen often, critically relies on semantic memory [21] whereas proper name difficulties reported by participants may mainly be related with personal acquaintances that are seen more often and whose knowledge may depend on different networks [47]. It is interesting that naming objects presented visually as we did for the pipe and glasses appeared to be more sensitive measures of conversion to dementia than naming the French President, supporting the view that a cross-modal task may help reveal impaired cognitive processes. Furthermore, the studies that have reported impaired object naming [18, 20, 21] have done so using difficult objects that have a low oral frequency. The fact that the use of common objects such as a pipe, but presented in an unusual view, was a predictor of dementia can be interpreted within this framework as it may rely more deeply on semantic processing to identify the objects correctly. Joubert et al. [21] have argued that naming difficulties regarding both famous faces and objects at the predementia stage are partly related to a central semantic memory impairment. Thus overall, assessing semantic memory with specific tools [48] may be more revealing than assessing a complaint about retrieval of proper

names, these probably being more related to TOT (lexical) phenomena. It is interesting in this context that when we carried out the analysis without adjusting for the MMSE score (table 5), we found out that a failure to name the French President was predictive of an increased risk for dementia 2 and 5 years thereafter, whereas such an outcome was not significant when adjusting for the MMSE score. This implies that subjects with low MMSE scores and being unable to name the President indeed have an increased risk for dementia, a finding this time in agreement with previous studies on the predementia stage of AD.

In conclusion, complaints about word retrieval difficulties are widespread and chronic in the general population of elderly people. We have evaluated it at approximately 30% for common names and approximately 65% for proper names. The importance of the complaint about the retrieval of proper names compared to common names is illustrative of their specific status. These complaints do not predict future dementia.

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