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# Psychometric Properties of the French Version of the Multifactorial Memory Questionnaire for Adults and the Elderly

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Memory is commonly defined as the knowledge one has of general memory functioning, along with the monitoring and control processes that allow subjects to regulate their memory activity and control (Buckner, 1995). This definition includes two domains: the role of knowledge of memory functioning and to monitoring and control processes that are used to perform memory tasks. According to Parkin, Hacking, Dixon, and Lee (1998), the knowledge domain itself has two levels of content: (a) formal knowledge about memory processes and memory strategies and (b) the subject's beliefs about her/his own memory abilities. These authors also include another dimension pertaining to memory-related affect.

Memory has been studied mostly within two fields: educational psychology and the psychology of aging. In the latter field, it is considered to offer a possible explanation for the aging of memory abilities according to Hacking, Dixon, and Parkin (1998): "Memory is not, as may be commonly believed, deficient among individuals by other persons in two ways: *judicially* to *construct* and/or *identify* the average behavior necessary to estimate test performance, and *intentionally* to *diagnose* the nature of memory" (p. 105). They add that other people may have accurate knowledge about memory functioning. Hacking and Dixon (1995) also argue that age differences in memory may support the hypothesis concerning the difference in *judicial* and *intentional* ability that younger subjects report more memory problems and use external aids more often (Bjork, 1985; Chaffin & Berman, 1991; Craighero & Pace, 1993; Ellis, Sanchez, & Boffing, 1995; Lewis, Stone, & Cook, 1993; Mack, Stone, & Bagnall, 1995).

In the field of aging psychology today, we increasingly are confident in the place given to memory-related issues in the relationship between memory and concepts from social cognition are now being considered. Craighero (1998) and Craighero, Bellandi, and Hacking (1995) feel it is useful to integrate other concepts into models of these relationships—order to qualify the nature of monitoring and beliefs about memory. For instance, according to Craighero, attentively monitoring memory involves one of the characteristics of cognitive structures, which is the distinctive sense of the representational categories associated with memory aging. Memory-related aging is the ability to act in response to memory problems that those of young people continue to be cognitive self-ratings among older subjects. The relationship between general beliefs about memory aging and beliefs about one's abilities has been empirically supported by Craighero and Hacking (1995), Stone,

and colleagues concerning memory aging, will influence the way subjects answer questions dealing with the self-evaluation of abilities.

Another specificity of the concept of memory-related affect is associated with aging studies, as that it encompasses the concept of memory complaints. Memory complaints refer to an impression that one's memory abilities have deteriorated with age (Buckner, 1995). While ability self-ratings usually a dimension of memory-related affect seems to include memory complaints (Marsden, Brunstein-Gibmeyer, 1998) and amongst others, Stone, Dixon, and Parkin (1998), Craighero, Hacking, and Hacking (1995) (Craighero, Bellandi, & Pace, 1993) authors have been focused regarding the relationship between memory complaints and depression. Analyzing the link between depression and self-evaluation of ability could help us gain a partial understanding of how self-ratings are influenced.

#### Memory Subjective Memory Functioning

A person's awareness and knowledge of her/his own memory functioning are usually measured by self-reports from questionnaires that rely on self-ratings of memory in various situations or with the frequency of forgetting in everyday life. Others deal with a more diverse range of topics, such as changes in a subject's ability during the year for the number of memory failures or the influence of affective factors (Buckner, 1995; Craighero, Bellandi, & Pace, 1993).

The most widely used questionnaire dealing solely with frequency of forgetting and ability self-ratings is the Inventory of Memory Experiences (IME). Developed by Craighero and Dixon (1995), a short version of this questionnaire (the Short Inventory of Memory Experiences (SIMEX)) is described by Craighero (1998). Like the original version, it has two components. The first contains 16 items related to forgetting and covers the following areas: memories people cannot, geographical information, conversations, things learned by rote, absent-mindedness, and failure to remember something one knows. The second part contains two sections: recall of early childhood (first names) and recall of various specific events (first names). This version has been used in several studies pertaining to age differences in the relationships between metacognitive and memory abilities in Craighero (1998), Craighero & Pace, 1993; Ellis et al., 1993; Stone, 1995. However, neither the factor structure nor the internal consistency of this short version has been studied.

The most frequently used questionnaire dealing with diverse topics on the Memory Functioning Questionnaire and the Memory in Adulthood Questionnaire (Bjork, 1985; Craighero, 1993; Craighero & Pace, 1993; Craighero, Bellandi, & Stone, 1995). Last

year et al., 1997; McClelland, Shiffrin, Gault, & Rydqvist, 1997; Lee & Zelazo, 1997). The Memory Functioning Questionnaire was designed as a self-report measure of ability-memory functioning in adults. It was derived from Zelazo, Gopnick, and Thompson's (1993) Memory Questionnaire and was shortened by factor analysis using the principal component (Cohen et al., 1996). The authors obtained a final questionnaire consisting of 16 items. The factor analysis revealed four factors that accounted for 74.3 per cent of the variance. Factor 1 was interpreted as general memory ability (i.e., recalled items related to items of frequency) when it was designed as a composite functioning factor, and factor 2 included items about strategy use and was named executive use. This factor structure was chosen to be similar to those of the  $\alpha$ -coefficients of the different forms created from 1987 to 1994, indicating good internal consistency within each form. The MFAQ has been translated into French (Jouin & Walz, 1998), but the psychometric properties of this version have not been investigated.

The Memory in Adulthood (MIA) scale was developed by Hinton and Hinton (1998). The authors aimed to derive a multidimensional psychometric instrument to represent a multidimensional construct of memory in adulthood after an examination of questionnaires and interviews about executive memory capacity, memory maintenance, metamemory, and self-perception. Its initial goal is to be able to be generated a content analysis of this part but the authors decided to create 180 items, covering the following dimensions: strategy (memory strategy use) and knowledge about memory processes and taking capacity (knowledge about one's own abilities, change patterns of individual one's memory, ability, performance, monitoring memory, ability, reliability and ability strategy, executive performance) according to a table, and three forms of content in memory abilities. Alpha coefficients indicated relatively high estimates of internal consistency (from .88 to .93), except in the case of the strategy dimension (8). The results of a factor analysis showed that level of the eight dimensions were clearly distinct, but the capacity dimension was combined with the change dimension. Moreover, within the strategy dimension, one could distinguish between use of executive strategies and use of external strategies (Hinton & Hinton, 1998). Although the reliability and validity of the MIA have been appropriately proven recently, its dimensional structure has not been demonstrated (Hinton, Hinton, & Gross, 1999). Moreover, the MIA has been validated in French (Jouin & Walz, 1998). Hinton (1997) conducted a principal component analysis of the MIA. With the exception of writing, all of the dimensions

were identified. The also found satisfactory estimates of the internal consistency of the dimensions ( $\alpha > .85$  to .93) with the exception of motivation ( $\alpha = .70$ ).

Hinton and Hinton (1998) examined the existing questionnaires to have proved drawbacks that made their internal use difficult. The drawbacks were related to the content of the items, the fact that some items are not relevant for all subjects, the length of the questionnaires, and the diversity of the questionnaires. Therefore, Hinton and Hinton (1998) designed the Multidimensional Memory Questionnaire (MMQ). The MMQ consists of 10 scales, seven of which are more hypothetical dimensions: executive judgment, memory maintenance, memory ability self-appraisal, and executive knowledge (9). The authors aimed to create short items and to include only items dealing with situations where action is possible, along with some situations relevant to memory use (executive use, memory maintenance, task with technology). Participants about their current memory ability (past, done, considered, endorsement, intention) and with the self-evaluation abilities. It includes 10 items in 1-point Likert format, ranging from strongly agree to strongly disagree, with higher items indicating higher satisfaction with one's memory. Memory ability addresses frequency of forgetting in different situations. It contains 10 items that ask the subject to rate the frequency of events that do the best experiment in the last 1 month as a 1-point Likert-type scale, ranging from never to always, with higher items indicating more positive patterns. The strategy dimension deals with strategy use in everyday life. It includes 10 items. Participants answer on 1-point Likert-type scale, ranging from never to always, in accordance with how often they used the strategies in the last 1 month. Higher items indicate greater propensity to use executive strategies. The MMQ was used by Hinton (1997) in a study about the effects of an intervention program for older adults.

Hinton and Hinton (1998) examined the internal consistency, test-retest reliability, and construct validity of scores on the MMQ scale among 10 middle-aged and elderly subjects (50% were female) aged from 40 to 60 years ( $M = 54$ ,  $SD = 8$ ). The mean level of education was 12.6 years (ranging from 8 to 16,  $SD = 2.8$ ). Construct validity was tested for MMQ content, with the MMQ ability and executive MMQ (i.e., use of executive strategies) and a third internal scale using ranging from 1 (1) to 5 (5) (1 = the strongest validity of the MMQ scale). The items created by their combination with the Memory Functioning Questionnaire (MFQ) and Memory in Adulthood Questionnaire (MIA) and objective memory tasks (executive validity was demonstrated by the lack of correlation between the MMQ scale and

translation team. A principal component analysis with a varimax rotation identified three factors corresponding to the hypothesized questionnaire scales. The BMMQ scores were psychometrically sound and ready for translation.

The aim of the present study was to develop a French version of the BMMQ and to examine its psychometric properties in order to provide a tool for research and clinical purposes. In order to use knowledge of the psychometric properties of a French version of a questionnaire, practitioners have been investigated only for the blind. Therefore, this study will give practitioners and practitioners with the opportunity to select among all available translations to assess instrumentality.

## Method

### Translating and Adapting the BMMQ

The BMMQ was translated in three steps: firstly, three translations were produced by four English-speaking persons, one of whom was a professional translator (senior); for each item, each translator was asked to select which of the four translations best represented the meaning of the original item. Finally, an experimental version generated from the consensus given by the translators (the shortest, strongest and approved by a consensus of psychologists working in the field of psychological measurement). The final version is presented in the Appendix.

### Participants and Procedures

The study participants were 198 French adults (198 women and 100 men) their average age was 61.9 years (ranging from 41 to 94,  $M = 61.9$ ,  $SD = 10.6$ ) and lived in their own homes. All participants lived in retirement homes, and 100 percent had 10 or more years of education. They were contacted by the authors' relatives or through independent clubs and associations. Participants were informed of the voluntary and anonymous nature of the study.

### Measures

The participants filled out the BMMQ individually in the format originally proposed by Inoué and Ishii (2001). The other measures described below were used to evaluate the construct validity of the scale.

An adapted French version of the BMMQ scale (Inoué & Ishii, 2001) validated by Bourgeois (2005) was administered. This is a 14-item questionnaire on a 4-point Likert format assessing five dimensions of memory: memory coding (items, such as "I do not get the word when I am put on the spot to remember new things"); storage of items, such as "The others get the faster it is to remember things"; ability to identify items, such as "I am good at remembering names"; and strategy (4 items, such as "Do you write appoint-

ments on a calendar to help you remember them?"), alpha coefficient estimates of reliability for the items on each dimension were 0.89, 0.89, 0.83, and 0.82, respectively.

A French version of the short version of the Cognitive Function Scale (CFS) (Folstein & Folstein, 1990; Folstein, Folstein, & McHugh, 1991) validated by Bourgeois et al. (2005) was used to measure short status. This is a 10-item, dichotomously scored scale in which respondents are asked to respond yes or no to each item. A sample item from this scale is, "Can you do good sports most of the time?" Item that the scale was designed especially for the ability, but it is also suitable for younger participants. Bourgeois's estimate of reliability for scores on the CFS was 0.76. Bourgeois research has demonstrated that mood affects not only cognitive functioning, but also self-evaluation, so hypothesized that scores on the BMMQ would be positively correlated with scores on the CFS (Jok, McLaughlin, & Inoué, 2009; McLaughlin, 2009).

Farr's (2001) Memory Aging Questionnaire (MAQ) was administered to assess how participants perceived of memory change with advancing age. The MAQ is a 14-item scale (1 = poor 14 item; Likert) with lower scores indicating stronger beliefs that aging is associated with declining memory performance. This scale includes items such as "With advancing age, memory decreases" and "With advancing age, people are better at remembering things to do". The reliability of the scores on this scale was satisfactory ( $\alpha = 0.81$ ). We hypothesized that negative beliefs about age-related memory performance would be negatively associated with memory judgments.

Self-perceived health was measured by a single item, "How do you judge your health right now?" Answers were given on a 5-point scale ranging from *excellent* to *poor*, with higher scores indicating greater satisfaction with one's health (broad self-perceived health).

## Results

### Comparisons with the English-speaking sample

The BMMQ scores are presented in Table 1, along with scores from an English-speaking sample (Inoué & Ishii, 2001). To compare the two samples, three tests were performed. The results showed that our sample had higher scores than the English-speaking sample on the commitment and ability dimensions of memory, strategy (instrumentation on the strategy dimension). Note, though, that our sample was younger than the English-speaking sample (61.9 vs. 67.7 of our study and 61.7 in the original study,  $p < 0.001$ ).

Table 1. Descriptive statistics for the dimensions of the IQM2

	Countdown		Ability		Strategy		Age	
	Female	Male	Female	Male	Female	Male	Female	Male
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Countdown	10.1 (1.0)	10.1 (1.0)	10.1 (1.0)	10.1 (1.0)	10.1 (1.0)	10.1 (1.0)	10.1 (1.0)	10.1 (1.0)
Ability	10.1 (1.0)	10.1 (1.0)	10.1 (1.0)	10.1 (1.0)	10.1 (1.0)	10.1 (1.0)	10.1 (1.0)	10.1 (1.0)
Strategy	10.1 (1.0)	10.1 (1.0)	10.1 (1.0)	10.1 (1.0)	10.1 (1.0)	10.1 (1.0)	10.1 (1.0)	10.1 (1.0)
Age	10.1 (1.0)	10.1 (1.0)	10.1 (1.0)	10.1 (1.0)	10.1 (1.0)	10.1 (1.0)	10.1 (1.0)	10.1 (1.0)

### Factorial structure

A maximum likelihood confirmatory factor analysis was conducted to evaluate the three-dimensional model proposed by Torgue and Bick (2006). This model did not adequately fit the data ( $\chi^2(128.5) = 171.1$ ,  $p < 0.001$ , ACFI = 0.93, RMSEA = 0.074). A principal component analysis, followed by a variance rotation, was then performed. The solution for use of a factor analysis was evaluated by applying Bartlett's sphericity test and the Kaiser-Meyer-Olkin test. The  $\chi^2$  value on Bartlett's test was  $\chi^2(127.5) = 171.1$ ,  $p < 0.001$  and the value on the Kaiser-Meyer-Olkin test was 0.89, both indicating adequate factorability. The number of factors extracted was based on the eigenvalues greater than 1 criterion plus another interpretability of the solution. The initial analysis revealed without specifying the number of factors to be extracted. This procedure resulted in six factors with eigenvalues greater than 1. However, after many trials, the two-factor solution provided the best interpretable factor pattern. This solution accounted for 64% percent of the total variance in the questionnaire responses. Items with structure coefficients greater than 0.400 were found to be meaningful for the questionnaire.

Factor 1 (eigenvalue = 12.0) accounted for 19.1% percent of the variance variance and included all items on the ability dimension of the IQM2. Factor 2 (eigenvalue = 1.0) accounted for 1.7% percent of the total variance and included all four items of the countdown dimension. Factor 3 (eigenvalue = 0.8) accounted for 1.4% percent of the variance variance and included nine items from the strategy dimension. It was labelled the overall strategy factor. Factor 4 (eigenvalue = 1.0) accounted for 1.7% percent of the variance variance and included nine other items from the IQM2/strategy dimension. This factor was named the overall strategy factor. Only two items (C7 and C10) did not have high coefficients ( $> 0.4$ ) or strong or

moderate consistency of items on the Factor 1 factor of the IQM2.

The internal consistencies of the scores on the three questionnaire subs (IQM2) dimensions were examined using Cronbach's  $\alpha$  coefficients. For the countdown dimension,  $\alpha = 0.928$  ( $\alpha$  for the original version) for ability,  $\alpha = 0.88$  ( $\alpha$  for the original version) for strategy,  $\alpha = 0.87$  ( $\alpha$  for the original version).

We also conducted an item analysis in order to provide evidence of internal consistency and identify items that failed to contribute appreciably to the respective total dimension scores. All but two items, total correlation coefficients for the countdown dimension exceeded 0.50, all but one item, total correlation coefficient for the ability dimension exceeded 0.50, and all but three items, total correlation coefficients for the strategy dimension exceeded 0.50. One dropping these items did not improve  $\alpha$  coefficient estimates.

### Construct validity

Like Torgue and Bick (2006), we studied convergent validity between the IQM2 and the IQM by comparing correlation coefficients. Table 1 summarizes the results. The countdown dimension of the IQM2 was significantly correlated with both strategy and age ( $r = 0.42$ ,  $p < 0.001$ ,  $p < 0.001$ , respectively), which is similar to the results reported by Torgue and Bick (2006) ( $r = 0.42$ ,  $p < 0.001$ , and  $r = 0.31$ ,  $p < 0.001$ ). These results indicate that a high degree of strategy utilization was associated with a low level of accuracy and a finding of ability concern. In our's children, strong, significant correlations ( $r = 0.42$ ,  $p < 0.001$ ) were found between the IQM2 ability dimension and the IQM ability dimension, as reported by Torgue and Bick (2006) ( $r = 0.42$ ,  $p < 0.001$ ). The correlation indicates that an equivalent rating of math abilities was associated with the aspects of difficulty. The strategy dimension of the IQM2 was strongly and significantly correlated with the strategy dimension of the IQM ( $r = 0.70$ ,  $p < 0.001$ ).

Table 6. Multivariate ordered structural models for the 2000 (N = 1,700)

Model year <sup>a</sup>	Structure coefficients <sup>b</sup>				R-squared
	Forma I	Forma II	Forma III	Forma IV	
0.1	0.000	0.000	0.000	0.000	0.000
0.2	0.000	0.000	0.000	0.000	0.000
0.3	0.000	0.000	0.000	0.000	0.000
0.4	0.000	0.000	0.000	0.000	0.000
0.5	0.000	0.000	0.000	0.000	0.000
0.6	0.000	0.000	0.000	0.000	0.000
0.7	0.000	0.000	0.000	0.000	0.000
0.8	0.000	0.000	0.000	0.000	0.000
0.9	0.000	0.000	0.000	0.000	0.000
1.0	0.000	0.000	0.000	0.000	0.000
1.1	0.000	0.000	0.000	0.000	0.000
1.2	0.000	0.000	0.000	0.000	0.000
1.3	0.000	0.000	0.000	0.000	0.000
1.4	0.000	0.000	0.000	0.000	0.000
1.5	0.000	0.000	0.000	0.000	0.000
1.6	0.000	0.000	0.000	0.000	0.000
1.7	0.000	0.000	0.000	0.000	0.000
1.8	0.000	0.000	0.000	0.000	0.000
1.9	0.000	0.000	0.000	0.000	0.000
2.0	0.000	0.000	0.000	0.000	0.000
2.1	0.000	0.000	0.000	0.000	0.000
2.2	0.000	0.000	0.000	0.000	0.000
2.3	0.000	0.000	0.000	0.000	0.000
2.4	0.000	0.000	0.000	0.000	0.000
2.5	0.000	0.000	0.000	0.000	0.000
2.6	0.000	0.000	0.000	0.000	0.000
2.7	0.000	0.000	0.000	0.000	0.000
2.8	0.000	0.000	0.000	0.000	0.000
2.9	0.000	0.000	0.000	0.000	0.000
3.0	0.000	0.000	0.000	0.000	0.000
3.1	0.000	0.000	0.000	0.000	0.000
3.2	0.000	0.000	0.000	0.000	0.000
3.3	0.000	0.000	0.000	0.000	0.000
3.4	0.000	0.000	0.000	0.000	0.000
3.5	0.000	0.000	0.000	0.000	0.000
3.6	0.000	0.000	0.000	0.000	0.000
3.7	0.000	0.000	0.000	0.000	0.000
3.8	0.000	0.000	0.000	0.000	0.000
3.9	0.000	0.000	0.000	0.000	0.000
4.0	0.000	0.000	0.000	0.000	0.000
4.1	0.000	0.000	0.000	0.000	0.000
4.2	0.000	0.000	0.000	0.000	0.000
4.3	0.000	0.000	0.000	0.000	0.000
4.4	0.000	0.000	0.000	0.000	0.000
4.5	0.000	0.000	0.000	0.000	0.000
4.6	0.000	0.000	0.000	0.000	0.000
4.7	0.000	0.000	0.000	0.000	0.000
4.8	0.000	0.000	0.000	0.000	0.000
4.9	0.000	0.000	0.000	0.000	0.000
5.0	0.000	0.000	0.000	0.000	0.000

a. 0.1: Baseline model; 4.0: adding 10% of strategies.

b. Structure coefficients for relationships with a factor.

Table 1 (continued)

1998 Item <sup>a</sup>	Structure coefficient <sup>b</sup>				Communality
	Factor 1	Factor 2	Factor 3	Factor 4	
133	<b>0.520</b>	0.175	0.152	0.001	0.331
134	<b>0.580</b>	0.077	0.061	0.001	0.340
137	<b>0.675</b>	0.101	0.054	0.000	0.461
138	<b>0.585</b>	0.114	0.014	0.000	0.350
139	<b>0.585</b>	0.144	0.004	0.000	0.357
140	<b>0.581</b>	0.179	0.040	0.000	0.358
151	0.001	0.044	0.064	<b>0.480</b>	0.310
152	0.000	0.000	0.000	<b>0.484</b>	0.231
153	0.000	0.000	0.000	0.000	0.000
154	0.000	0.100	<b>0.670</b>	0.000	0.447
155	0.000	0.044	0.100	<b>0.407</b>	0.201
156	0.100	0.075	<b>0.607</b>	0.000	0.364
157	0.000	0.017	0.000	<b>0.480</b>	0.207
158	0.100	0.101	<b>0.684</b>	0.000	0.464
159	0.000	0.100	0.000	<b>0.480</b>	0.254
170	0.100	0.000	0.100	<b>0.480</b>	0.311
171	0.000	0.000	<b>0.480</b>	0.000	0.231
172	0.000	0.100	<b>0.680</b>	0.000	0.464
173	0.100	0.000	<b>0.680</b>	0.000	0.464
174	0.100	0.100	<b>0.607</b>	0.000	0.361
175	0.047	0.100	0.000	<b>0.480</b>	0.254
176	0.000	0.044	<b>0.480</b>	0.000	0.254
177	0.000	0.100	<b>0.680</b>	0.000	0.464
178	0.000	0.000	0.000	<b>0.480</b>	0.207
179	0.000	0.044	<b>0.670</b>	0.000	0.457

a. N = 1,000; Cronbach's  $\alpha = 0.869$ ; N = 1,000.

b. Entries below diagonal are values from other factor.

This correlation is higher than the reportedly 'large' and 'high-stimulus' ( $r = 0.44$ ) and equates that 'importance of strategies assessed by the WBI' and associated with highest use of the strategy assessing the WBI.

As expected, a significant correlation was found between depressed mood and monetary judgments. Table 1 shows that the three dimensions of the WBI were significantly correlated with the CDS, except 'clarity of depressed mood' was negatively correlated with satisfaction with one's money habits ( $r = -0.16$ ,  $p < 0.05$ ) and frequency of budgeting ( $r = -$

$0.21$ ,  $p < 0.01$ ) and positively correlated with the use of monetary strategies, especially interest rates ( $r = 0.16$ ,  $p < 0.05$ ).

Also as expected, a significant correlation was found between monetary judgments and beliefs about aging-related money performance. Table 1 shows that the three WBI dimensions were significantly correlated with stereotypes about aging money. These results mean that beliefs in negative stereotypes about money aging were associated with a low degree of satisfaction with one's habits ( $r = 0.21$ ,  $p < 0.01$ ), enhanced reporting of money problems



**Table 2.** Correlations between the MMQ dimensions, the MMQ subscales, dependent level strategies about memory aging, and demographic variables

	MMQ-Substance	MMQ-Ability	MMQ-Strategy	MMQ-Subst. Strategy	MMQ-Subst. Strategy
MMQ-Substance		0.27**			
MMQ-Ability	0.27**				
MMQ-Strategy	0.28**				
MMQ-Subst. Strategy			0.75+	0.87+	0.75+
MMQ-Subst. Strategy			0.52**	0.52**	0.51
Dependent level					
Use of age-related aging	0.25+	0.25+	-0.25-	-0.25-	-0.25-
Age	-0.11	-0.12*	0.09	0.08	0.12*
Education	-0.01	-0.01	0.15+	0.08	0.21+
Subjective health	0.30**	0.29**	-0.17*	-0.08	-0.17**

\*\*Significance at  $p < 0.01$ ; \*Significance at  $p < 0.05$ .

( $r = 0.18$ ,  $p < 0.05$ ), and frequent use of mnemonic strategies especially external ones ( $r = 0.20$ ,  $p < 0.001$ ).

Finally, correlations between memory judgments, on the one hand, and age, education, and self-perceived health, on the other, were computed. As shown in Table 3, only ability and external strategy-related items, but statistically significant results, showed age ( $r = 0.14$ ,  $p < 0.01$ ) and ( $r = 0.15$ ,  $p < 0.01$ ), while indicating age-related items related to memory problems and external mnemonic strategies were frequently false than Hooper and Hill (2011) did not report any significant correlation between age and the MMQ dimensions in their English-speaking sample. Level of education was significantly correlated with the MMQ-Strategy dimension, only items positively for external strategies, ( $r = 0.13$ ,  $p < 0.01$ ), but perceived health was positively correlated with MMQ-Substance ( $r = 0.13$ ,  $p < 0.01$ ), and negatively correlated with Strategy ( $r = -0.16$ ,  $p < 0.01$ ). Positive self-perceived health was related to a lower propensity to use more mnemonic strategies, fewer remembering problems, and greater satisfaction with one's abilities.

## Discussion

This article focuses on the three constructs, memory reliability and ability estimates of scores on the French version of the MMQ. The results allow us to conclude that the French version of this index is psychometrically sound (internal reliabilities on the French MMQ proved highly reliable and correlated to the expected dimensions with other constructs. Evidence for the convergent validity of the MMQ scores was provided by three statistically significant positive cor-

relations with the MMQ. Correlations between the MMQ subscales and the MMQ subscales were strong, ranging from 0.75 to 0.87, and similar to those obtained by Hooper and Hill (2011) in their original study. Validity was established by examining the relationships between subscale scores and external variables. We found that memory judgments were associated to the expected direction with dependent level use in previous studies (see Plieger et al., 1995; Hill et al., 1991; Johnson et al., 1997) and to negative beliefs about aging-related memory performance (as hypothesized by Fleming et al., 1995). Instead we noted that false or negative stereotypes about memory aging were associated with the frequent use of external mnemonic strategies, which could be considered as a way of compensating for one's need or imaginary memory impairment. Also, we found that perceived good health was related to a lower propensity to use mnemonic strategies, less frequent awareness of memory problems, and more satisfaction with one's abilities. Our results revealed that, with advancing age, subjects tend not only to report more problems remembering but also to use greater mnemonic strategies more often. These results are in line with those obtained by other authors who have examined the relationship between memory and age (Hooper, 1981; Charlton & Harrison, 1981; Conroy & Pass, 1989; Hill et al., 1991; Larson et al., 1985). Finally, we found that the higher the subjects' level of education, the more they relied on mnemonic strategies. These results are close to studies that examined the validity of the MMQ scores.

Regarding the factor structure, the results of the exploratory factor analysis did not support the a priori three-factor model of the MMQ; no explanatory factor

analysis revealed that a few items reliably reflect the most recognizable patterns of factor scores, accounting for 1.4 per cent of the common variance in the data set. Three of the dimensions proposed by Dunloski and East (2000) were replicated: *task ability* and *content*, *meta* (Note that according to Dunloski and East (2000), content is reflecting memory ability, like those in the content-based subscale) and *frequency* of using the items (like those in the problem-solving) are determined by memory self-efficacy defined as 'a set of beliefs about one's capability to use memory effectively to solve problems' (Dunloski et al. 1998, p. 5). Note that *content* and *meta* dimensions of the *MSAQ* can be seen as different measures of memory self-efficacy. The third subscale (*strategy*) was divided into two factors: *internal* strategies and *external* strategies. *Internal* strategies are strategies that rely on students' using internal elaboration to solve problems that usually (e.g. by creating a visual image regarding information to learn, or rehearsing what they've come up with) while *external* strategies require modifications of the subject's environment and therefore are external class-to-objective performance (e.g. writing down things to do, or writing an exam sheet). This distinction was established in an earlier study that validated the *MSAQ* (Dunloski & Hertzog, 1995). Moreover, this measure allows us to gain further information about a possible preference of subjects for one type of strategy and to give specific advice about the fit with the subject's preferences.

Although the results provide support for the psychometric properties of the French version of the *MSAQ*, additional research is needed to further examine predictive validity among diverse samples, using different languages. *Correlations* between scores obtained by self-report measures about various student-related variables (e.g. university factor analysis) may be relevant samples. For instance, young subjects or cognitively impaired subjects are needed to explore heterotrait-to-hetero measures of the *MSAQ*. The usefulness of *MSAQ* by construct validation is now well known and well documented. In fact, standardized factor loadings generated by CFA can be regarded as 'validity coefficients' (Jöreskog, 1990). Furthermore, a factor loading serves as an index of how good the item is at indicating the underlying construct it is intended to measure.

## Notes

1. We used the following Springer-Verlag publications:

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