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

Isabelle Fort, Linda Azeul, Delphine Hall, Jean Kadirov, and Karim Chariri  
University Nancy 2, France

## ABSTRACT

Fort, Isabelle, Azeul, Linda, Delphine Hall, Jean Kadirov, and Karim Chariri. Psychometric Properties of the French Version of the Multifactorial Memory Questionnaire for Adults and the Elderly. *Journal of Aging and Health*, 2007, 19(12), 1919-1927. DOI: 10.1177/0898010107315310. This article aims to explore the psychometric properties of the French version of the Multifactorial Memory Questionnaire (MMQ) (Fort et al., 2005). The MMQ includes several dimensions: memory, problem-solving, information processing, learning, and strategy. The study included 100 elderly participants (60-89 years old) and 100 younger participants (20-39 years old). The results showed that the French version of the MMQ is a reliable instrument with a high internal consistency (Cronbach's alpha = 0.93) and consists of five subscales: memory, problem-solving, information processing, learning, and strategy. Each subscale is composed of 10 items. The study also found that the MMQ is a valid instrument for measuring memory, problem-solving, information processing, learning, and strategy in elderly and young adults. The study also found that the MMQ is a valid instrument for measuring memory, problem-solving, information processing, learning, and strategy in elderly and young adults. The study also found that the MMQ is a valid instrument for measuring memory, problem-solving, information processing, learning, and strategy in elderly and young adults.

## KEYWORDS

The aim of the study was to explore the psychometric properties of the French version of the Multifactorial Memory Questionnaire (MMQ) (Fort et al., 2005). The MMQ includes several dimensions: memory, problem-solving, information processing, learning, and strategy. The study included 100 elderly participants (60-89 years old) and 100 younger participants (20-39 years old). The results showed that the French version of the MMQ is a reliable instrument with a high internal consistency (Cronbach's alpha = 0.93) and consists of five subscales: memory, problem-solving, information processing, learning, and strategy. Each subscale is composed of 10 items. The study also found that the MMQ is a valid instrument for measuring memory, problem-solving, information processing, learning, and strategy in elderly and young adults. The study also found that the MMQ is a valid instrument for measuring memory, problem-solving, information processing, learning, and strategy in elderly and young adults.

Keywords: memory, information processing, learning

Memory questionnaires, information processing, learning, memory, problem-solving, strategy

**MEMORY QUESTIONNAIRES:** Questionnaires to measure memory, problem-solving, information processing, learning, and strategy

**KEYWORDS:** aging, Multifactorial Memory Questionnaire, memory, information processing, learning, strategy, problem-solving, information processing, memory, information processing, learning, and strategy

### First Author Contact

Isabelle Fort, Psychologie des adultes

Université Nancy 2

54002

France

(email: fort@univ-nancy2.fr)

Metamemory 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 (Bjorklund, 1985). This definition includes two domains that refer to knowledge of memory functioning and to monitoring and control processes that are used to perform memory tasks. According to Flaherty, Hartung, Dixon, and Liu (1998), the knowledge domain itself has two levels of content: (a) factual 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.

Metamemory 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 Hartung, Cohen, and Flaherty (1998): "Metamemory is not only a contributing factor to deficient strategy utilization by older persons in two ways: *judicious to construct and/or identify the strategy* [inferior memory to optimize test performance, *and* *to recognize ability to characterize the nature of memory*" (p. 105). They add that older people may have accurate knowledge about memory functioning. Hartung et al. (1998) study adults about age differences in metamemory support this hypothesis demonstrating that older adults' judgments of self-estimated ability than younger subjects report more memory problems and use external aids more often (Bjork, 1985; Chaffin & Hartman, 1985; Craighero & Pass, 1985; Elder, Salthouse, & Balthazy, 1995; Lewis, Stone, & Cook, 1985; Mack, Stone, & Bagnall, 1985).

In the field of aging psychology today, we are witnessing an evolution in the place given to metamemory studies as the relationship between metamemory and concepts from social cognition are now being considered. Craighero (1988) and Craighero, Bellandi, and Hartung (1995) feel it is useful to integrate other concepts into research 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. "Metamemory shows again, the ability to act in response to memory problems that those of young people continue lack in 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 Hartung (1995), Stone,

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

Another specificity of the concept of metamemory is that it is considered an aging stability, so that it encompasses the concept of stability's complexity. Memory complexity refers to an impression that one's memory abilities have improved with age (Bjorklund, 1985). While ability self-ratings to itself a dimension of metamemory, it also seems to include memory complexity. However, Bjorklund (1985) and Craighero (1988) and Craighero, Bellandi, and Hartung (1995) disagree on this. Craighero and Hartung (1995) (Craighero, Bellandi, & Pass, 1985) authors have been focused regarding the relationship between memory complexity 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.

#### Metamemory 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. Cohen and his team define three types of topics, such as changes in a subject's ability during the year for the number of correctly failures on the collection of affective terms (Bjorklund, 1985; Craighero, Bellandi, & Pass, 1985).

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 Pass (1985), a short version of this questionnaire (the Short Inventory of Memory Experiences (SIMME)) is described by Craighero (1985). Like the original version, it has two components. The first contains 16 items related to forgetting and assess the following areas: memories people cannot, geographical information, conversations, things learned by rote, abstract conclusions, and beliefs to witness 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 metamemory and memory (Chaffin & Hartman, 1985; Craighero & Pass, 1985; Elder et al., 1985; Bjork, 1985). However, neither the former structure nor the internal consistency of this short version has been studied.

The most frequently used questionnaire dealing with abstract topics is the Memory Functioning Questionnaire and the Memory in Adulthood Questionnaire (Bjork, 1985; Craighero, 1985; Craighero & Pass, 1985; Craighero, Bellandi, & Stone, 1995). Lan-

van et al., 1997; McClelland, Shiffrin, Gault, & Bjorklund, 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 Functioning Questionnaire and was shortened by factor analysis using the principal-components method (Zelazo 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 (the total score included items related to ability memory). Factor 2 was interpreted as a composite functioning factor, and factor 3 included items about strategy use and was named executive use. This factor structure was chosen to be similar to that 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 (Gault & Walz, 1998), but the psychometric properties of this version have not been investigated.

The Memory in Adulthood (MIA) scale was developed by Hertz and Halberstam (1986). 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, episodic memory, memory metamonitoring, and self-perception. Its initial goal is 200 items, but presently a content analysis of this pool led the authors to create 140 items, covering the following dimensions: strategy (memory strategy use) and knowledge about memory processes and tasks; explicit knowledge about one's own abilities; change (perceptual evaluation of one's memory ability); performance monitoring (memory ability monitoring and one's own executive performance) as measured by a task; and three forms of control in memory abilities. Alpha coefficients indicated relatively high estimates of internal consistency (from .92 to .97), except in the case of the strategy dimension (86). The results of a factor analysis showed that level of the eight dimensions were clearly distinct, but the strategy 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 (Hertz & Halberstam, 1986). Although the reliability and validity of the MIA have been appropriately proven recently, its dimensional structure has not been demonstrated (Hertz, Halberstam, & Gross, 1995). Moreover, the MIA has been validated in French (Gault & Walz, 1998). Halberstam (1987) 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 .97), with the exception of motivation ( $\alpha = .70$ ).

Hertz and Hertz (1986) examined the existing questionnaires to have proved inadequate, that means their internal was 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 instruments. Therefore, Hertz and Hertz (1986) designed the Multidimensional Memory Questionnaire (MMQ). The MMQ consists of 10 items, seven of which are more hypothetical dimensions: structural memory judgments, memory monitoring, memory ability self-appraisal, and executive memory (9). The authors recommended to create short forms and to include only items dealing with situations where action is possible, along with some situations relevant to memory use (encompassing the memory component) such as the following: participants have about their current memory ability (past, done, satisfaction, 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 scores indicating higher satisfaction with one's memory. Memory ability addresses frequency of forgetting in different situations. It consists of 10 items that ask the subject to rate the frequency of events that do the best experiment in the last 2 weeks as a 1-point Likert-type scale, ranging from never to always, with higher scores indicating more positive opinions. 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 2 weeks. Higher scores indicate greater propensity to use executive strategies. The MMQ was used by Hertz (1991) in a study about the effects of an intervention program for older adults.

Hertz and Hertz (1986) 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, that is, for MMQ ability and internal MMQ content. The content correlations after a month interval were strong, ranging from .83 to .97 ( $p < .05$ ). The convergent validity of the MMQ scales was demonstrated by their correlations with the Memory Functioning Questionnaire (MFQ) by Zelazo in Adulthood Questionnaire (AAQ) and objective memory tasks. Dimensional validity was demonstrated by the lack of correlation between the MMQ scale and

translation team. A principal component analysis with a variance criterion identified three factors corresponding to the hypothesized dimensions 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 our knowledge, the psychometric properties of a French version of a measurement instrument have been investigated only for the BMMQ. Therefore, this study will provide researchers and practitioners with the opportunity to select among our self-report measures to assess well-being.

## Method

### Translation 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, shortest and approved by a committee of psychologists working in the field of psychological measurement). The final version is presented in the appendix.

### Participants and Procedure

The study participants were 196 French adults (198 women and 98 men) their average age was 61.9 years (ranging from 41 to 84,  $M = 61.9$ ,  $SD = 10.9$ ) and lived in their own homes. All participants lived in retirement homes, and the majority had 13 or more years of education. They were contacted by the authors' graduate 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 Ingle and Kirk (2001). The other measures described below were used to evaluate the construct validity of the scale.

An adapted French version of the BMMQ scale (Ingle & Kirk, 2001) validated by Beaudin (2007) was administered. This is a 14-item questionnaire in 4-point Likert format assessing five dimensions of well-being: vitality (1 item, *middle* "I do not get tired when I am put on the spot to remember new things"/4 items, *middle* "The doctor gets the better idea to remember things/4 items"/4 items, *low* "I am good at remembering names"/4 items, *middle* "Do you ever appear

stupid as a chicken to help you remember them?"/4 items, *middle* "I am confident in my ability to do things on each dimension: *low* 0.85, *middle* 0.83, and *high* 0.82, respectively).

A French version of the short version of the Cognitive Function Scale (CFS) (Stucki & Manning, 1998; Burke, Reuter, & Cheng, 1997) validated by Bourque et al. (2009) was used to measure short status. This is a 15-item, dichotomously scored scale, in which respondents are asked to respond *yes* or *no* to each item. A sample item from this scale is: "In your last year, you were at the time?" Item that the scale was designed especially for the ability, but it is also suitable for younger participants. Under Beaudin's estimate of reliability for scores on the CFS was 0.76. Previous 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 (de, Mahoney, & Ingle, 1999; Mahoney, 1999).

Fort'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 = *great* 4 = *little*), 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 4-point scale ranging from *excellent* to *poor*, with higher scores indicating greater satisfaction with one's health (broad self-perceived health).

## Results

### Comparison with the English-speaking sample

The BMMQ scores are presented in Table 1, along with scores for an English-speaking sample (Ingle & Kirk, 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 well-being (intercorrelation on the energy dimension: *Yes*, though, that our sample was younger than the English-speaking sample (61.9 vs. 67.1 of our study and 61.7 in the original study,  $p < 0.001$ ).

Table 1. Descriptive statistics for the dimensions of the BMAQ

	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 Bork (2004). This model did not adequately fit the data ( $\chi^2(128.5) = 171.1$ ,  $p < 0.001$ ,  $RMSEA = 0.071$ ) and principal component analysis, followed by 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 0.80, 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 64.3 per cent of the total variance in the questionnaire responses. Items with structure coefficients greater than 0.40 were found to be meaningful for the questionnaire.

Factor 1 (eigenvalue = 14.0) accounted for 21.9 per cent of the variance variance and included all items on the ability dimension of the BMAQ. Factor 2 (eigenvalue = 1.0) accounted for 1.5 per cent of the total variance and included all four test items of the countdown dimension. Factor 3 (eigenvalue = 0.8) accounted for 1.2 per cent of the variance variance and included nine items from the strategy dimension. It was labelled the overall strategy factor. Factor 4 (eigenvalue = 0.4) accounted for 0.6 per cent of the variance variance and included nine other items from the BMAQ 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 Structure of the BMAQ.

The internal consistencies of the scores on the three-countdown subs (BMAQ) dimensions were examined using Cronbach's  $\alpha$  coefficients. For the countdown dimension,  $\alpha = 0.74$  ( $\alpha$  in the original version) for ability scores, 0.68 ( $\alpha$  in the original version) for strategy scores and 0.77 ( $\alpha$  in 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 0.30, all but one item, total correlation coefficient for the ability dimension exceeded 0.40, and all but three items, total correlation coefficients for the strategy dimension exceeded 0.30. One dropping these items did not improve  $\alpha$  coefficients.

### Construct validity

Like Torgue and Bork (2004), we studied convergent validity between the BMAQ and the BMA by comparing correlation coefficients. Table 1 summarizes the results. The countdown dimension of the BMAQ was significantly correlated with both strategy and age ( $r = 0.40$ ,  $p < 0.001$ ,  $r = 0.30$ ,  $p < 0.001$ ), which is similar to the results reported by Torgue and Bork (2004) ( $r = 0.30$ ,  $p < 0.001$ , and  $r = 0.20$ ,  $p < 0.01$ ). 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 children, strong, significant correlations ( $r = 0.40$ ,  $p < 0.001$ ) were found between the BMAQ ability dimension and the BMA ability dimension, as reported by Torgue and Bork (2004) ( $r = 0.30$ ,  $p < 0.001$ ). The correlation indicates that an equivalent rating of math abilities was associated with the aspects of difficulty. The strategy dimension of the BMAQ was strongly and significantly correlated with the strategy dimension of the BMA ( $r = 0.30$ ,  $p < 0.001$ ).

Table 6. Minimum variance unbiased estimator for the GIGM ( $\theta = 1$ ,  $\beta = 0$ )

GIGM type <sup>a</sup>	Structure coefficient <sup>b</sup>				Normality
	Form I	Form II	Form III	Form IV	
0.1	0.0000	0.0000	0.0000	0.0000	0.000
0.2	0.0000	0.0000	0.0000	0.0000	0.000
0.3	0.0000	0.0000	0.0000	0.0000	0.000
0.4	0.0000	0.0000	0.0000	0.0000	0.000
0.5	0.0000	0.0000	0.0000	0.0000	0.000
0.6	0.0000	0.0000	0.0000	0.0000	0.000
0.7	0.0000	0.0000	0.0000	0.0000	0.000
0.8	0.0000	0.0000	0.0000	0.0000	0.000
0.9	0.0000	0.0000	0.0000	0.0000	0.000
1.0	0.0000	0.0000	0.0000	0.0000	0.000
1.1	0.0000	0.0000	0.0000	0.0000	0.000
1.2	0.0000	0.0000	0.0000	0.0000	0.000
1.3	0.0000	0.0000	0.0000	0.0000	0.000
1.4	0.0000	0.0000	0.0000	0.0000	0.000
1.5	0.0000	0.0000	0.0000	0.0000	0.000
1.6	0.0000	0.0000	0.0000	0.0000	0.000
1.7	0.0000	0.0000	0.0000	0.0000	0.000
1.8	0.0000	0.0000	0.0000	0.0000	0.000
1.9	0.0000	0.0000	0.0000	0.0000	0.000
2.1	0.0000	0.0000	0.0000	0.0000	0.000
2.2	0.0000	0.0000	0.0000	0.0000	0.000
2.3	0.0000	0.0000	0.0000	0.0000	0.000
2.4	0.0000	0.0000	0.0000	0.0000	0.000
2.5	0.0000	0.0000	0.0000	0.0000	0.000
2.6	0.0000	0.0000	0.0000	0.0000	0.000
2.7	0.0000	0.0000	0.0000	0.0000	0.000
2.8	0.0000	0.0000	0.0000	0.0000	0.000
2.9	0.0000	0.0000	0.0000	0.0000	0.000
3.0	0.0000	0.0000	0.0000	0.0000	0.000
3.1	0.0000	0.0000	0.0000	0.0000	0.000
3.2	0.0000	0.0000	0.0000	0.0000	0.000
3.3	0.0000	0.0000	0.0000	0.0000	0.000
3.4	0.0000	0.0000	0.0000	0.0000	0.000

a: 0.1: Unimodal, 0.2–0.9: U-shaped, 1.0–1.9: Bimodal

b: Structure coefficient for substructure with a form

Table 1 (continued)

1998 Item <sup>a</sup>	Structure coefficient <sup>b</sup>				Communities
	Factor 1	Factor 2	Factor 3	Factor 4	
133	<b>0.520</b>	0.175	0.152	0.001	0.001
134	<b>0.580</b>	0.097	0.001	0.001	0.001
137	<b>0.670</b>	0.101	0.001	0.001	0.001
138	<b>0.580</b>	0.114	0.014	0.001	0.001
139	<b>0.580</b>	0.144	0.001	0.001	0.001
140	<b>0.581</b>	0.179	0.001	0.001	0.001
151	0.001	0.001	0.001	<b>0.400</b>	0.001
152	0.001	0.001	0.001	<b>0.301</b>	0.001
153	0.001	0.001	0.001	0.001	0.100
154	0.001	0.100	<b>0.670</b>	0.001	0.001
155	0.001	0.001	0.100	<b>0.400</b>	0.001
156	0.100	0.070	<b>0.600</b>	0.001	0.001
157	0.001	0.001	0.001	<b>0.400</b>	0.001
158	0.100	0.101	<b>0.601</b>	0.001	0.001
159	0.001	0.100	0.001	<b>0.400</b>	0.001
170	0.101	0.001	0.101	<b>0.400</b>	0.001
171	0.001	0.001	<b>0.400</b>	0.001	0.001
172	0.001	0.101	<b>0.401</b>	0.001	0.001
173	0.001	0.101	<b>0.401</b>	0.001	0.001
174	0.100	0.100	<b>0.400</b>	0.001	0.001
175	0.100	0.100	<b>0.400</b>	0.001	0.001
176	0.100	0.100	<b>0.400</b>	0.001	0.001
177	0.001	0.100	<b>0.400</b>	0.001	0.001
178	0.001	0.001	0.001	<b>0.400</b>	0.001
179	0.001	0.001	<b>0.400</b>	0.001	0.001

a. N = 1,000; Cronbach's  $\alpha = 0.91$ ; SPSS 10.0.0.

b. Structure coefficient coefficients for each item within factor.

This correlation is higher than the reportedly 'large' and 'high-stability' ( $r = 0.44$ ) and implies that 'importance of strategies assessed by the WMI' was associated with 'highest use of the strategies assessed by the WMI'.

As expected, a significant correlation was found between 'depressed mood' and 'monetary judgments'. Table 1 shows that the three dimensions of the WMI were significantly correlated with the CDS, except 'clarity of depressed mood' was negatively correlated with 'confidence with one's money abilities' ( $r = -0.16$ ,  $p < 0.01$ ) and 'frequency of forgetting' ( $r = -$

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

As expected, a significant correlation was found between 'monetary judgments' and 'beliefs about aging-related money performance'. Table 1 shows that the three WMI 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 confidence with one's abilities ( $r = 0.21$ ,  $p < 0.01$ ), enhanced reporting of money problems



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

	MMQ- Substratum	MMQ-Ability	MMQ-Strategy	MMQ-Strat1 Strategies	MMQ-Strat2 Strategies
MMQ-Strategy		0.27**			
MMQ-Change	0.20**				
MMQ-Strategy	0.24**				
MMQ-Strategy			0.75+	0.87**	0.75+
Dependent level	0.24**	0.22**	0.32**	0.32**	0.31
Demographic about Aging	0.07+	0.03+	-0.03+	-0.02	-0.02+
Age	-0.11	-0.12*	0.02	0.02	0.12*
Education	-0.01	-0.01	0.13+	0.02	0.01+
Subjective health	0.16**	0.22**	0.17*	0.02	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 ( $r = 0.09$ ,  $p < 0.005$ ).

Finally, correlations between metamemory 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 ones, but statistically significant ones, ( $r = 0.14$ ,  $p < 0.01$ ) and ( $r = 0.15$ ,  $p < 0.01$ , MMQ-external) were found to relate more memory problems and more external mnemonic strategies more frequently than the frequent use of external strategies. In fact, frequent use of external strategies did not appear any significant correlation between age and the MMQ dimensions in their high-ability sample. Level of education was significantly correlated with the MMQ-Strategy dimension only (more precisely for external strategies,  $r = 0.13$ ,  $p < 0.01$ ). Self-perceived health was positively correlated with metamemory ( $r = 0.16$ ,  $p < 0.01$ ) and ability ( $r = 0.14$ ,  $p < 0.01$ ), 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 externalizing 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 our French version of this index is psychometrically sound (highly trustworthy 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 abilities and the MMQ subscores were strong, ranging from 0.75 to 0.79, and similar to those obtained by Lopez and Berk (2011) in their original study. Validity was established by examining the relationships between subscores across self-reported variables. We found that metamemory judgments were associated to the expected direction with dependent level use in previous studies (see Plieger et al., 1995; Balle et al., 1991; Johnson et al., 1997) and to negative beliefs about aging-related memory performance (as hypothesized by Fleming and, 1995). Instead to find that beliefs in 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 concerning 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 metamemory and age (Lopez, 1991; Charlton & Harrison, 1991; Cunningham & Pass, 1999; Balle et al., 1991; Lavenex et al., 1995). 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 with 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 pattern of factor scores, accounting for 16.4 per cent of the common variance in the data set. Three of the dimensions proposed by Deane and East (2000) were replicated: *task ability* and *strategy* (with 'I find that reflecting on my strengths and...') appears to reflecting memory ability (like those in the statement *strategy*) and to frequency of *reflecting* items (like those in the problem *reflecting*) are determined by memory self-efficacy defined as 'a set of beliefs about one's capability to use memory effectively to attain one's goals' (Zuckerman *et al.*, 1998, p. 50). *Task* (for *content*) and *ability* (dimension of the *MAQ*) can be seen as different measures of memory self-efficacy. The third *strategy* (memory) was divided into two factors: *internal* strategies and *external* strategies. *Internal* strategies are strategies that rely on 'reflecting' using mental elaboration to retain information that normally (e.g., by creating a visual image) regarding information to retain, or reflecting what they were secondary while *external* strategies require modifications of the subject's environment and therefore are external class to cognitive performance (e.g., writing down things to do, or writing in class notes). This distinction was established in an earlier study that validated the *MAQ* (Deane & Webb, 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 feedback to see that it suits the subject's preferences.

Although the results provide support for the psychometric properties of the French version of the *MAQ*, additional research is needed to further examine predictive validity among clinical samples, using different languages. Correlations between scores obtained by self-report measures about some clinical method (e.g., *Conformity Factor Analysis*) and an external sample (for instance young subjects or cognitively impaired subjects) are needed to achieve factor structure for measures of the *MAQ*. The usefulness of *MAQ* by construct validation is now well known and well documented. In fact, standardized factor loadings generated by CFA can be regarded as 'validity coefficients' (Deane, 1999). Furthermore, a factor loading score 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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## Appendix French version of the SRRQ

### SRRQ – Comprendre

- 1 Je regarde les aspects de ma vie que je considère positifs.
- 2 Ma situation financière est bonne.
- 3 Je regarde d'un œil positif ce que j'ai accompli au cours de ma vie.
- 4 Lorsque j'ai des problèmes, j'ai une façon positive de les résoudre.
- 5 Ma situation sociale est bonne, car elle m'a permis d'avoir des amis.
- 6 Je considère mes expériences comme positives dans la vie.
- 7 Je me considère fier de ce que j'ai accompli dans la vie.
- 8 Je suis fier de ce que j'ai accompli au cours de ma vie.
- 9 Je suis fier de ce que j'ai accompli au cours de ma vie.
- 10 Lorsque je suis dans une situation de difficulté, j'ai une façon positive de la résoudre.
- 11 Je suis fier de ce que j'ai accompli au cours de ma vie.
- 12 Ma situation sociale est bonne, car elle m'a permis d'avoir des amis.
- 13 Je suis fier de ce que j'ai accompli au cours de ma vie.
- 14 Je suis fier de ce que j'ai accompli au cours de ma vie.
- 15 Je suis fier de ce que j'ai accompli au cours de ma vie.
- 16 Je suis fier de ce que j'ai accompli au cours de ma vie.
- 17 Je suis fier de ce que j'ai accompli au cours de ma vie.
- 18 Je suis fier de ce que j'ai accompli au cours de ma vie.

### SRRQ – Sentir

- 1 Une situation de difficulté de ma vie m'a fait du bien.
- 2 Une situation de difficulté de ma vie m'a fait du bien.
- 3 Une situation de difficulté de ma vie m'a fait du bien.
- 4 Une situation de difficulté de ma vie m'a fait du bien.



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