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

Isabella Fort, Linda Auld, Delphine Hall, Jeff Cadden, and Carol Chase
(Shirley Moore J. Press)



Enfin, les résultats à long terme de la mise en œuvre de la stratégie de développement des services de soins de santé mentale ont été évalués en 2009 (Chapitre 10). Les résultats ont démontré que les indicateurs de la mise en œuvre, l'impact et les résultats positifs ont continué à se développer, mais que l'impact des soins de santé mentale par rapport à la santé physique et à la santé mentale des personnes atteintes de troubles mentaux n'a pas été amélioré. En outre, l'impact des services de soins de santé mentale sur la santé physique et la santé mentale des personnes atteintes de troubles mentaux n'a pas été amélioré. En outre, l'impact des services de soins de santé mentale sur la santé physique et la santé mentale des personnes atteintes de troubles mentaux n'a pas été amélioré.

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The aim of this study was to examine the psychometric properties of a Finnish version of the Mathematics Anxiety Questionnaire (MAAQ) (Hopson & Hall, 1981). The MAAQ was intended to measure adult secondary students' subjective feelings concerning math. After initial reliability findings, frequency of positive remembering in effort and attention and strategy use in studying like the questionnaire was administered to 1,070 Finnish adult university subjects (age 19 years and over). The results showed as expected that the Finnish version of the scale was psychometrically sound. Indeed, the results proved to be highly reliable (Cronbach's α for the entire sample from 1979 to 1982) and correlated to the expected direction with measures of other constructs (correlations with mathematics ranged from 0.30 to 0.57), consistent with previous findings (correlations provided by the statistically significant positive correlations from 0.31 to 0.57) with several dimensions of the questionnaire in subsequent years (1983) (i.e., the strategy change, capacity and strategy dimension). However, the Finnish version could not be compared with the original version, since the exploratory factor analysis revealed that a three-factor solution fitted the data better than the four-factor pattern for the latter version. To test the dimensionality proposed by Hopson and Hall (1981) was impossible using and confirming the multidimensional construct was obtained from the original data. The new strategy and capacity dimensions

Table 1

1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 2679, 26

1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 2679, 2680, 26

Keywords: aging, self-rated disability, depression, functional performance, proprioception, balance, French seniors

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Keywords: child sexual abuse; disclosure; social support

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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 content (Bjorklund, 1995). This definition includes two domains that relate 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 belief about her/his own memory abilities. These authors also believe another domain 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, Dixon, and Flaherty, 1998). "Metamemory is, thus, maybe a contributing factor to decline among individuals by either persons in two ways: perhaps to monitor and/or identify the average behavior necessary to optimize task performance, and/or inadequate ability to characterize elements of memory" (p. 105). They add that older people may have accurate knowledge about memory functioning. Hartung et al. (1998) study about age differences in metamemory support this hypothesis, demonstrating that older adults' judgments of self-estimated ability that younger adults, report more memory problems and use external aids more often (Bjork, 1980; Charles & Buschman, 1980; Craighero & Pass, 1989; Erikson, Finkelstein, & Boffinger, 1980; Larson, Thore, & Criss, 1987; Mace, Thore, & Boffinger, 1989).

In the field of aging psychology today, we are witnessing an evolution in the place given to metamemory research in the understanding of memory and aging. Some social cognition are now being considered. Craighero (1989) and Craighero, Faldut, and Hartung (1998) feel it is useful to integrate other concepts into models of these relationships—order to qualify the nature of knowledge and beliefs about memory. For instance, according to Craighero, elderly people's memory beliefs are one of the determinants of cognitive structures, which in turn determine some of the representational stereotypes associated with memory aging. "Metamemory shows up in the elderly as an increase in memory problems over those of young people, positive beliefs (negative 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 (1998). Thore,

conceives concerning memory aging, will influence the way subjects answer questions dealing with the evaluation of abilities.

Another specificity of the concept of metamemory is that it is considered in aging studies, is that it encompasses the concept of memory complaint. Memory complaint refers to an impression that one's memory abilities become impaired with age (Bjorklund, 1995). While ability self-rating is itself a dimension of metamemory, it also seems to include memory complaint. Memory complaint (Craighero, 1989) and memory problems (Mace, Dixon, & Boffinger, 1989; Mace, Craighero, Hartung, & Flaherty, 1998) (Craighero, Faldut, Hartung, & Dixon, 1998) authors have been focused regarding the relationship between memory complaint and depression. Studying the link between depression and self-evaluation of ability could help us gain a partial understanding of how self-ratings are influenced.

Measuring Subjective Memory Functioning

A person's awareness and knowledge of her/his own memory functioning are usually measured by self-report. Some measures deal only with self-ratings of memory in various situations or with the frequency of forgetting in everyday life. Others deal with a more global range of topics, such as changes in a subject's abilities during the past, his reaction to memory failure, or the influence of affective factors (Bjorklund, 1995; Craighero & Faldut, 1989).

The most widely used questionnaire dealing solely with frequency of forgetting and ability self-rating is the Inventory of Memory Experiences (IME). It was used by Craighero and Finkelstein (1980). A short version of this questionnaire (the Short Inventory of Memory Experiences (SIMEX)) is described by Craighero (1989). Like the original version, it has two components. The first contains 10 items related to forgetting and assesses the following areas: memories people cannot, geographical misdirection, common facts, things learned by rote, absent-mindedness, and failure to retrieve something one knows. The second part contains two sections: recall of early childhood (first names) and recall of location specific events (first names). This version has been used in several studies pertaining to age differences as to the relationship between metacognitive and memory (Charles & Finkelstein, 1980; Craighero & Pass, 1989; Erikson et al., 1980; Bjork, 1980). However, neither the longer version 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 Metamemory in Adulthood Questionnaire (Bjork, 1995; Craighero, 1989; Craighero & Pass, 1989; Craighero, Faldut, & Schain, 1998). Lee,

year et al., 1997; McDaniel/McDaniel, Good, & Bjorklund, 1999; Lee & Zelazo, 1999). The Memory Functioning Questionnaire was designed as a self-report measure of self-memory functioning in adults. It was derived from Zelazo (1996) and Thompson's (1998) Memory Questionnaire and was shortened by factor analysis using the principal-axis method (Cattell et al., 1966). The authors obtained a final questionnaire consisting of 10 items. The factor analysis revealed four factors that accounted for 74.3 per cent of the variance. Factor 1 was interpreted as a general frequency of forgetting factor, loaded from individual items of frequency. Factor 2 was interpreted as a cognitive functioning factor, and factor 3 included items about strategy use and was named memory use. This factor structure was chosen when using Memory, the α -coefficient of the different forms varied from .81 to .85, indicating good internal consistency within each form. The MFAQ has been translated into French (Jouin & Winograd, 1998), but the psychometric properties of this version have not been investigated.

The Memory in adulthood (MIA) scale was developed by Jouin and Pothier (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 various memory aspects (memory maintenance, metamemory, and self-perception), its initial pool of 100 items was generated. A content analysis of this pool led the authors to create 140 items, covering the following dimensions: strategy (memory strategy use), test (knowledge about memory processes and tasks), capacity (knowledge about one's own distinct change capacity of verbalized and/or memory activity, particularly monitoring memory activity, efficiency and accuracy, memory impairment), importance of remembering in a task, and levels of use of external memory devices. Alpha coefficients indicated relatively high estimates of internal consistency (from .88 to .93), except in the second frequency dimension (8). The results of a factor analysis showed that level of the eight dimensions were clearly distinct, but the capacity dimension was correlated with the change dimension. Moreover, within the strategy dimension, one could distinguish between use of internal strategies and use of external strategies (Jouin & Pothier, 1998). Although the reliability and validity of the MIA have been opportunity problems remain, its dimensionalizing has not been demonstrated (Pothier, Pothier, & Goss, 1999). Moreover, the MIA has been validated in French (Jouin & Pothier, 1998). Furthermore (1998) conducted a principal component analysis of the MIA. With the exception of writing, all of the dimensions

were identified. The dimensional validity estimates of the internal consistency of the dimensions (p < .01) but only with the exception of motivation (p < .05).

Boyer and Berk (1991) examined the existing questionnaires to have original 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 topics covered. From this, Boyer and Berk (1991) designed the Multidimensional Memory Questionnaire (MMQ). The MMQ consists of 10 items, about a memory, three hypothetical dimensions (memory judgments, memory maintenance, memory ability self-appraisal) and everyday living life. The authors were unable to create short items and to include only items dealing with situations where action is possible, along with some situations relevant to memory use in everyday life. Memory maintenance deals with the forgetting process, about their current memory ability (peak, decline, satisfaction, underestimation, inhibition) and with the self-rating of 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 recalls that are the less important in the last 1 week as a 1-point Likert-type scale, ranging from never to always, with higher items indicating more memory problems. 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 week. Higher items indicate greater propensity to use memorization strategies. The MMQ has been used by Boyer (1999) in a study about the effects of an intervention program for older adults.

Boyer and Berk (1991) examined the internal consistency, test-retest reliability, and construct validity of scores on the MMQ scale among 40 middle-aged and elderly subjects (70% were elderly) aged from 30 to 70 years ($M = 54.1$, $SD = 10$). The mean level of education was 13.6 years (ranging from 8 to 18, $SD = 2.5$). Construct validity was tested for MMQ content, since the MMQ validity and internal reliability (Cronbach's test) were calculated after a second internal test among ranging from 10 to 100 ($p < .01$). The convergent validity of the MMQ scales was demonstrated by their correlation with the Memory Functioning Questionnaire (MFAQ) and objective memory tasks. Dimension validity was demonstrated by the lack of correlation between the MMQ scales and

Table 1 Descriptive statistics for the dimensions of the IQM2

	Ability		Strategy		Age	
	Mean	Range	Mean	Range	Mean	Range
	Standard deviation	Standard deviation	Standard deviation	Standard deviation	Standard deviation	Standard deviation
	10.0 (20)	10.0 (10)	10.0 (20)	10.0 (10)	10.0 (20)	10.0 (10)
Mean	20.0	10.0	10.0	10.0	10.0	10.0
Standard deviation	14.0	9.0	11.0	10.0	10.0	9.0

Factorial structure

A maximum likelihood confirmatory factor analysis was conducted to evaluate the three-dimensional model proposed by Hooper and Burt (1999). This model did not adequately fit the data ($\chi^2(158.5)$ $df=158$, $p<0.001$, AIC=10.00, BIC=10.00). 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 dimension test and the Kaiser-Meyer-Olkin test. They yielded on Bartlett's test a result that $\chi^2(158)$, $p<0.001$ and the value on the Kaiser-Meyer-Olkin test was 0.88, both indicating adequate homogeneity. The number of factors extracted was based on the eigenvalues greater than 1 criterion and the interpretability of the solution. The initial analysis was not without specifying the number of factors to be extracted. This procedure resulted in fit better with eigenvalues greater than 1. However, after many trials, the four factor solution provided the best interpretability factor pattern. This solution accounted for that percent of the total variance in the questionnaire responses. Items with cross-loadings greater than 0.500 were treated as meaningful for the interpretation.

Factor 1 (age-related ability) accounted for 16.0 per cent of the variance variance and included all items on the ability dimension of the IQM2. Factor 2 (age-related strategy) accounted for 1.9 per cent of the total variance and included all item on items of the questionnaire dimension. Factor 3 (age-related ability) accounted for 4.9 per cent of the variance variance and included nine items from the strategy dimension. It was labelled the internal strategy factor. Factor 4 (age-related ability) accounted for 1.0 per cent of the variance variance and included nine other items from the ability-strategy dimension. This factor was named the external strategy factor. Only two items (Q7 and Q10) did not have high coefficients (>0.5) on either

Internal/Strategy or Items on the Factor Dimension of the IQM2.

The internal dimension of the items on the items containing only ability dimension were extracted using Cronbach's α coefficients for the questionnaire dimension, $\alpha=0.88$ (0.88 in the original version) for ability, $\alpha=0.88$ (0.88 in the original version) and for strategy $\alpha=0.88$ (0.88 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 item-total correlation coefficients for the questionnaire dimension exceeded 0.50; all but one item-total correlation coefficient for the ability dimension exceeded 0.50; and all but three item-total correlation coefficients for the strategy dimension exceeded 0.50. Thus, even dropping these items did not improve a coefficient estimate.

Construct validity

Like Hooper and Burt (1999), we studied convergent validity between the IQM2 and the IQM by comparing correlation coefficients. Table 1 summarizes the results. The questionnaire dimension of the IQM2 was significantly correlated with both ability and strategy on the IQM ($r=0.75$, $p<0.001$, and $r=0.65$, $p<0.001$), which is similar to the results reported by Hooper and Burt (1999) ($r=0.65$, $p<0.001$, and $r=0.65$, $p<0.001$). These results indicate that a high degree of internal consistency was associated with a low level of redundancy and a lack of redundancy concerning each's ability. Thus, significant correlations ($r=0.65$, $p<0.001$) were found between the IQM2 ability dimension and the IQM ability dimension (as reported by Hooper and Burt (1999) ($r=0.65$, $p<0.001$). The association indicates that an optimal rating of each's abilities was associated with low reports of difficulty. The strategy dimension of the IQM2 was strongly and significantly correlated with the strategy dimension of the IQM ($r=0.75$, $p<0.001$, $p<0.001$).

Table 10. Multivariate structural equation models for the 2004 (n = 1,984).

Model Year ^a	Structural coefficients ^b				R-squared ^c
	Factor I	Factor II	Factor III	Factor IV	
2004	0.0000	0.0000	0.0000	0.0000	0.0000
2005	0.0000	0.0000	0.0000	0.0000	0.0000
2006	0.0000	0.0000	0.0000	0.0000	0.0000
2007	0.0000	0.0000	0.0000	0.0000	0.0000
2008	0.0000	0.0000	0.0000	0.0000	0.0000
2009	0.0000	0.0000	0.0000	0.0000	0.0000
2010	0.0000	0.0000	0.0000	0.0000	0.0000
2011	0.0000	0.0000	0.0000	0.0000	0.0000
2012	0.0000	0.0000	0.0000	0.0000	0.0000
2013	0.0000	0.0000	0.0000	0.0000	0.0000
2014	0.0000	0.0000	0.0000	0.0000	0.0000
2015	0.0000	0.0000	0.0000	0.0000	0.0000
2016	0.0000	0.0000	0.0000	0.0000	0.0000
2017	0.0000	0.0000	0.0000	0.0000	0.0000
2018	0.0000	0.0000	0.0000	0.0000	0.0000
2019	0.0000	0.0000	0.0000	0.0000	0.0000
2020	0.0000	0.0000	0.0000	0.0000	0.0000
2021	0.0000	0.0000	0.0000	0.0000	0.0000
2022	0.0000	0.0000	0.0000	0.0000	0.0000
2023	0.0000	0.0000	0.0000	0.0000	0.0000
2024	0.0000	0.0000	0.0000	0.0000	0.0000
2025	0.0000	0.0000	0.0000	0.0000	0.0000
2026	0.0000	0.0000	0.0000	0.0000	0.0000
2027	0.0000	0.0000	0.0000	0.0000	0.0000
2028	0.0000	0.0000	0.0000	0.0000	0.0000
2029	0.0000	0.0000	0.0000	0.0000	0.0000
2030	0.0000	0.0000	0.0000	0.0000	0.0000
2031	0.0000	0.0000	0.0000	0.0000	0.0000
2032	0.0000	0.0000	0.0000	0.0000	0.0000
2033	0.0000	0.0000	0.0000	0.0000	0.0000
2034	0.0000	0.0000	0.0000	0.0000	0.0000
2035	0.0000	0.0000	0.0000	0.0000	0.0000
2036	0.0000	0.0000	0.0000	0.0000	0.0000
2037	0.0000	0.0000	0.0000	0.0000	0.0000
2038	0.0000	0.0000	0.0000	0.0000	0.0000
2039	0.0000	0.0000	0.0000	0.0000	0.0000
2040	0.0000	0.0000	0.0000	0.0000	0.0000
2041	0.0000	0.0000	0.0000	0.0000	0.0000
2042	0.0000	0.0000	0.0000	0.0000	0.0000
2043	0.0000	0.0000	0.0000	0.0000	0.0000
2044	0.0000	0.0000	0.0000	0.0000	0.0000
2045	0.0000	0.0000	0.0000	0.0000	0.0000
2046	0.0000	0.0000	0.0000	0.0000	0.0000
2047	0.0000	0.0000	0.0000	0.0000	0.0000
2048	0.0000	0.0000	0.0000	0.0000	0.0000
2049	0.0000	0.0000	0.0000	0.0000	0.0000
2050	0.0000	0.0000	0.0000	0.0000	0.0000
2051	0.0000	0.0000	0.0000	0.0000	0.0000
2052	0.0000	0.0000	0.0000	0.0000	0.0000
2053	0.0000	0.0000	0.0000	0.0000	0.0000
2054	0.0000	0.0000	0.0000	0.0000	0.0000
2055	0.0000	0.0000	0.0000	0.0000	0.0000
2056	0.0000	0.0000	0.0000	0.0000	0.0000
2057	0.0000	0.0000	0.0000	0.0000	0.0000
2058	0.0000	0.0000	0.0000	0.0000	0.0000
2059	0.0000	0.0000	0.0000	0.0000	0.0000
2060	0.0000	0.0000	0.0000	0.0000	0.0000
2061	0.0000	0.0000	0.0000	0.0000	0.0000
2062	0.0000	0.0000	0.0000	0.0000	0.0000
2063	0.0000	0.0000	0.0000	0.0000	0.0000
2064	0.0000	0.0000	0.0000	0.0000	0.0000
2065	0.0000	0.0000	0.0000	0.0000	0.0000
2066	0.0000	0.0000	0.0000	0.0000	0.0000
2067	0.0000	0.0000	0.0000	0.0000	0.0000
2068	0.0000	0.0000	0.0000	0.0000	0.0000
2069	0.0000	0.0000	0.0000	0.0000	0.0000
2070	0.0000	0.0000	0.0000	0.0000	0.0000
2071	0.0000	0.0000	0.0000	0.0000	0.0000
2072	0.0000	0.0000	0.0000	0.0000	0.0000
2073	0.0000	0.0000	0.0000	0.0000	0.0000
2074	0.0000	0.0000	0.0000	0.0000	0.0000
2075	0.0000	0.0000	0.0000	0.0000	0.0000
2076	0.0000	0.0000	0.0000	0.0000	0.0000
2077	0.0000	0.0000	0.0000	0.0000	0.0000
2078	0.0000	0.0000	0.0000	0.0000	0.0000
2079	0.0000	0.0000	0.0000	0.0000	0.0000
2080	0.0000	0.0000	0.0000	0.0000	0.0000
2081	0.0000	0.0000	0.0000	0.0000	0.0000
2082	0.0000	0.0000	0.0000	0.0000	0.0000
2083	0.0000	0.0000	0.0000	0.0000	0.0000
2084	0.0000	0.0000	0.0000	0.0000	0.0000
2085	0.0000	0.0000	0.0000	0.0000	0.0000
2086	0.0000	0.0000	0.0000	0.0000	0.0000
2087	0.0000	0.0000	0.0000	0.0000	0.0000
2088	0.0000	0.0000	0.0000	0.0000	0.0000
2089	0.0000	0.0000	0.0000	0.0000	0.0000
2090	0.0000	0.0000	0.0000	0.0000	0.0000
2091	0.0000	0.0000	0.0000	0.0000	0.0000
2092	0.0000	0.0000	0.0000	0.0000	0.0000
2093	0.0000	0.0000	0.0000	0.0000	0.0000
2094	0.0000	0.0000	0.0000	0.0000	0.0000
2095	0.0000	0.0000	0.0000	0.0000	0.0000
2096	0.0000	0.0000	0.0000	0.0000	0.0000
2097	0.0000	0.0000	0.0000	0.0000	0.0000
2098	0.0000	0.0000	0.0000	0.0000	0.0000
2099	0.0000	0.0000	0.0000	0.0000	0.0000
2100	0.0000	0.0000	0.0000	0.0000	0.0000

a. 2004 = Baseline year; 2010 = Aging 1000 Strategies.

b. Structural coefficients for relationships with a factor.

Table 2 (continued)

Item	Structure coefficient ^a		Communities		
	Factor 1	Factor 2	Factor 3	Factor 4	
1.01	0.500	0.175	0.104	0.001	0.001
1.02	0.500	0.007	0.001	0.001	0.000
1.03	0.500	0.175	0.004	0.000	0.001
1.04	0.500	0.114	0.014	0.140	0.000
1.05	0.500	0.144	0.004	0.110	0.004
1.06	0.500	0.175	0.000	0.107	0.000
1.07	0.000	0.004	0.004	0.400	0.000
1.08	0.000	0.001	0.140	0.400	0.004
1.09	0.001	0.000	0.000	0.000	0.100
1.10	0.000	0.100	0.400	0.000	0.400
1.11	0.000	0.004	0.100	0.400	0.001
1.12	0.100	0.075	0.400	0.001	0.004
1.13	0.004	0.017	0.001	0.400	0.007
1.14	0.100	0.175	0.400	0.007	0.004
1.15	0.004	0.017	0.001	0.400	0.007
1.16	0.100	0.175	0.400	0.007	0.004
1.17	0.004	0.100	0.000	0.400	0.004
1.18	0.100	0.000	0.100	0.400	0.010
1.19	0.000	0.100	0.400	0.000	0.400
1.20	0.000	0.100	0.400	0.000	0.400
1.21	0.000	0.100	0.400	0.000	0.400
1.22	0.000	0.100	0.400	0.000	0.400
1.23	0.000	0.100	0.400	0.000	0.400
1.24	0.000	0.100	0.400	0.000	0.400
1.25	0.000	0.100	0.400	0.000	0.400
1.26	0.000	0.100	0.400	0.000	0.400
1.27	0.000	0.100	0.400	0.000	0.400
1.28	0.000	0.100	0.000	0.400	0.075
1.29	0.000	0.100	0.400	0.000	0.400

a. All in community and using 100 strategies.

b. Structure factors coefficients for what items within factor.

This correlation is higher than the expected/ target and both (0.001 $p < 0.001$, $p < 0.001$) and again than frequency use of the strategies associated to the ability not associated with highest use of the strategies associated to the ability.

As expected, a significant correlation was found between degraded moral and metamemory judgments. Table 3 shows that the three dimensions of the (MMJ) were significantly correlated with the (CDS) scores. Clearly, a degraded moral was negatively correlated with correlation with one's memory abilities ($p < 0.01$, $p < 0.001$ and frequency of targeting ($p < 0.01$).

(MMJ) $p < 0.001$ negatively correlated with the use of metamemory strategies, especially internal cues ($p < 0.01$, $p < 0.001$).

Also as expected, a significant correlation was found between metamemory judgments and beliefs about aging-related memory performance. Table 4 shows that the three (MMJ) dimensions were significantly correlated with stereotypes about aging memory. These results mean that beliefs in negative stereotypes about memory aging were associated with a low degree of correlation with one's abilities ($p < 0.01$, $p < 0.001$), enhanced reporting of memory problems

Table 10 Correlations between the MMQ dimensions, the MMQ dimensions, dependent level strategies about memory aging, and demographic variables

	MMQ- Dimension	MMQ-Ability	MMQ-Strategy	MMQ-Global Strategy	MMQ-Global Strategy
MMQ-Depend		0.17**			
MMQ-Strategy	0.07**				
MMQ-Ability	0.04**				
MMQ-Strategy			0.75+	0.87+	0.75+
Dependent level	0.04**	0.02**	0.12*	0.12**	0.11
Demographic about Aging	0.07+	0.05+	-0.05+	-0.07	-0.05+
Age	-0.11	-0.12*	0.00	0.00	0.12*
Education	-0.01	-0.01	0.15+	0.00	0.05+
Self-perceived health	0.00**	0.00**	-0.17*	0.00	-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 ($r = 0.09$, $p < 0.001$).

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 1, only ability and external strategies exhibited small, but statistically significant, trends. Specifically, age ($r = 0.14$, $p < 0.01$) and $r = 0.15$, $p < 0.01$, while advancing age, subjects tended to report more memory problems and used external mnemonic strategies more frequently. None that depend and self-judged did not report any significant correlations between age and the MMQ dimensions. In fact, independent judgments, level of education was significantly correlated with the MMQ strategy dimension only (more precisely for external strategies, $r = 0.19$, $p < 0.01$). Self-perceived health was positively correlated with metamemory ratings ($r = 0.19$ and ability ($r = 0.18$), $p < 0.01$), and negatively correlated with strategy ($r = 0.16$, $p < 0.01$). Finally, 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 metamemory construct validity and reliability estimates of scores on the French version of the MMQ. The results allow us to conclude that our French version of this scale is psychometrically sound indeed, because 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 strategies were strong, ranging from 0.75 to 0.79, and similar to those obtained by Boppe and Bink (2010) in their original study. Validity was corroborated by examining the relationships between subscale scores and external variables. We found that metamemory judgments were associated to the expected direction with dependent level (as in previous studies see Plieger et al., 1995; Bink et al., 1991; Johnson et al., 1991) and to negative beliefs about aging about memory performance (as hypothesized by Florman et al., 1989). It should be noted 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 less frequent 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 external mnemonic strategies more often. These results are in line with those obtained by other authors who have examined the relationship between metamemory and age (Bink, 1991; Chaffin & Harman, 1989; Comstock & Pass, 1989; Bink et al., 1991; Lavenex et al., 1985). Finally, we found that the higher the subjects' level of education, the more they relied on mnemonic strategies. These results are contrary 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 task factor solution reflects the most parsimonious pattern of factor loadings accounting for the largest part of the common variance in the data set. One of the dimensions proposed by Singer and Chen (1991) was implemented (i.e. ability and cognitive state) that, according to Armstrong and (1991), accounts for self-rating memory ability. Also, there is the continuous subscale used to frequency of finger-tapping (i.e. like those in the previous subscale) was determined by a very self-rating defined as 'a set of beliefs about one's capability to use memory effectively in various situations' (Armstrong et al., 1991, p. 50). Hence, the continuous self-ratings dimension of the LIMA can be seen as different measures of memory subscales. The third subscale category was divided into two forms: internal strategies and external strategies. Internal strategies are strategies that rely on subjects' using mental elaboration in order to improve their memory (e.g., by creating a visual image, organizing information to retain, or rehearsing what they want to remember) while external strategies involve modifications of the subject's environment and the search for external cues to improve performance (e.g., writing down things to do or setting an alarm clock). This distinction was established in an earlier study that validated the LIMA (Lima et al., 1995). Moreover, this measure allows us to gain further information about a possible preference of subjects for one type of strategy and to gain specific characteristics that fit with the subject's needs.

Although the results provide support for the psychometric properties of the Finnish version of the BMMQ, additional research is needed to further examine predictive validity among clinical samples, using alternative measures. Correlations between scores obtained by self-report measures and/or other clinical methods (e.g., laboratory factor analysis (CFA)) in various samples (e.g., students, young adults, or cognitively impaired subjects) are needed to achieve construct validity (evidence of the BMMQ). The usefulness of CFA in construct validation is type, method, and scale dependent, but, in general, factor loadings generated by CFA can be regarded as "validity coefficients" (Jöreskog, 1990). Further work on factor loading scores as an index of their good fit to items is an interesting and useful endeavor. It is recommended to use

[illegible]

- [illegible]

- [illegible]

14. Vous arrive-t-il de ne pas reconnaître du tout d'une personne que vous savez de mémoire ?
15. Vous arrive-t-il d'oublier quelques choses que vous avez apprises de gens que vous avez ?
16. Vous arrive-t-il d'oublier des choses ?
17. Vous arrive-t-il d'oublier ce que vous avez fait par exemple d'oublier une phrase ou un mot que vous avez dit ?
18. Vous arrive-t-il d'oublier de faire une chose ?
19. Vous arrive-t-il d'être de l'attention à ce que vous faites ?
20. Vous arrive-t-il d'être de problèmes pour vous souvenant des choses d'un côté de la rue ou de l'autre que vous avez déjà fait ?
21. Vous arrive-t-il d'oublier de prendre un médicament ?
22. Vous arrive-t-il de ne pas reconnaître du tout d'une personne que vous connaissez depuis une longue ?
23. Vous arrive-t-il d'oublier de faire des choses ?
24. Vous arrive-t-il d'oublier ce que vous avez dit ou écrit d'une conversation ?
25. Vous arrive-t-il d'oublier un événement ou la date d'un événement important dont vous avez l'habitude de vous souvenir ?
26. Vous arrive-t-il d'oublier les nombres de téléphone que vous utilisez fréquemment ?
27. Vous arrive-t-il de oublier des fois une habitude ou un langage ou la même phrase que vous avez appris par vous la faire ou apprise ?
28. Vous arrive-t-il de ne pas reconnaître quelques choses que vous avez apprises à quelques ?
29. Vous arrive-t-il d'oublier quelques choses que vous avez apprises d'autres ?
30. Vous arrive-t-il d'oublier les dates d'une conversation récente ?

MMSE – 30 items

1. Vous arrive-t-il d'oublier les conversations que vous avez eues récemment ?
2. Vous arrive-t-il de demander à quelqu'un de vous aider à vous souvenir de quelques choses ou de vous rappeler de faire quelques choses ?
3. Vous arrive-t-il de voir une chose et de ne pas vous en souvenir ?

4. Vous arrive-t-il de voir une chose et de ne pas vous en souvenir ?
5. Vous arrive-t-il de voir une chose et de ne pas vous en souvenir ?
6. Vous arrive-t-il de voir une chose et de ne pas vous en souvenir ?
7. Vous arrive-t-il de voir une chose et de ne pas vous en souvenir ?
8. Vous arrive-t-il de voir une chose et de ne pas vous en souvenir ?
9. Vous arrive-t-il de voir une chose et de ne pas vous en souvenir ?
10. Vous arrive-t-il de voir une chose et de ne pas vous en souvenir ?
11. Vous arrive-t-il de voir une chose et de ne pas vous en souvenir ?
12. Vous arrive-t-il de voir une chose et de ne pas vous en souvenir ?
13. Vous arrive-t-il de voir une chose et de ne pas vous en souvenir ?
14. Vous arrive-t-il de voir une chose et de ne pas vous en souvenir ?
15. Vous arrive-t-il de voir une chose et de ne pas vous en souvenir ?
16. Vous arrive-t-il de voir une chose et de ne pas vous en souvenir ?
17. Vous arrive-t-il de voir une chose et de ne pas vous en souvenir ?
18. Vous arrive-t-il de voir une chose et de ne pas vous en souvenir ?
19. Vous arrive-t-il de voir une chose et de ne pas vous en souvenir ?
20. Vous arrive-t-il de voir une chose et de ne pas vous en souvenir ?
21. Vous arrive-t-il de voir une chose et de ne pas vous en souvenir ?
22. Vous arrive-t-il de voir une chose et de ne pas vous en souvenir ?
23. Vous arrive-t-il de voir une chose et de ne pas vous en souvenir ?
24. Vous arrive-t-il de voir une chose et de ne pas vous en souvenir ?
25. Vous arrive-t-il de voir une chose et de ne pas vous en souvenir ?
26. Vous arrive-t-il de voir une chose et de ne pas vous en souvenir ?
27. Vous arrive-t-il de voir une chose et de ne pas vous en souvenir ?
28. Vous arrive-t-il de voir une chose et de ne pas vous en souvenir ?
29. Vous arrive-t-il de voir une chose et de ne pas vous en souvenir ?
30. Vous arrive-t-il de voir une chose et de ne pas vous en souvenir ?

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