

Supplementary Table S1

Ten principal cognitive function tests used to compute global cognition scores.

No	Test	Reference
1	Wechsler Adult Intelligence Scale-III (WAIS-III) Digit Symbol-Coding	Wechsler, 2003
2	Trail Making Test A	Tombaugh, 2004
3	Boston Naming Test	Kaplan et al., 2001
4	Animal Fluency	Spreen, 1977
5	FAS Fluency	Benton, 1967
6	Trail Making Test B	Reitan and Wolfson, 1993
7	Wechsler Adult Intelligence Scale-Revised (WAIS-R) Block Design	Wechsler, 1981
8	Wechsler Memory Scale-III (WMS-III) Logical Memory Story A delayed recall	Wechsler, 1997
9	Rey Auditory Verbal Learning Test	Strauss et al., 2006
10	the Benton Visual Retention Test	Benton et al., 1996

Supplementary Table S2

G-Theory model estimates' calculation including component variances, formula for the design of person by item by occasion, express as $P \times I \times O$.

Indices	Characteristic (Formula)
$X =$	observed score of a person on a particular item across occasions
μ	grand mean of X
$+X_p$	person effect ($\mu_p - \mu$)
$+X_i$	item effect ($\mu_i - \mu$)
$+X_o$	occasion effect ($\mu_o - \mu$)
$+X_{pi}$	person x item effect ($\mu_{pi} - \mu_p - \mu_i + \mu$)
$+X_{po}$	person x occasion effect ($\mu_{po} - \mu_p - \mu_o + \mu$)
$+X_{io}$	item x occasion effect ($\mu_{io} - \mu_i - \mu_o + \mu$)
$+X_{pio}$	residual/person x item x occasion effect ($\mu_{pio} - \mu_{pi} - \mu_{po} - \mu_{io} + \mu_p + \mu_i + \mu_o - \mu$)
σ_p^2	person variance component ($MS_p - MS_{pi} - MS_{po} + MS_{pio}$) $n_i n_o$
σ_i^2	item variance component ($MS_i - MS_{pi} - MS_{io} + MS_{pio}$) $n_p n_o$
σ_o^2	occasion variance component ($MS_o - MS_{io} - MS_{po} + MS_{pio}$) $n_i n_p$
σ_{pi}^2	person x item variance component ($MS_{pi} - MS_{pio}$) n_o
σ_{po}^2	person x occasion variance component ($MS_{po} - MS_{pio}$) n_i
σ_{io}^2	item x occasion variance component ($MS_{io} - MS_{pio}$) n_p
σ_{pio}^2	residual/ person x item x occasion variance component: (MS_{pio})
σ_δ^2	relative error variance ($\frac{\sigma_{pi}^2}{n_i} + \frac{\sigma_{po}^2}{n_o} + \frac{\sigma_{pio}^2}{n_i n_o}$)
σ_Δ^2	absolute error variance ($\frac{\sigma_o^2}{n_o} + \frac{\sigma_i^2}{n_i} + \frac{\sigma_{pi}^2}{n_i} + \frac{\sigma_{po}^2}{n_o} + \frac{\sigma_{io}^2}{n_i n_o} + \frac{\sigma_{pio}^2}{n_i n_o}$)
G_r	relative G-coefficient ($\frac{\sigma_p^2}{\sigma_p^2 + \sigma_\delta^2}$)
G_a	absolute G-coefficient ($\frac{\sigma_p^2}{\sigma_p^2 + \sigma_\Delta^2}$)
SCI	state component index ($\frac{\sigma_{po}^2}{\sigma_{po}^2 + \sigma_p^2}$)
TCI	trait component index ($\frac{\sigma_p^2}{\sigma_{po}^2 + \sigma_p^2}$)

Note: MS stands for the mean of effect square; n_i : number of items; n_o : number of occasions; n_p : number of persons/participants

Supplementary Table S3

Variance components of Person (P), Occasion (O) and P x O interaction together with state component index (SCI) for each individual item of the MAC-Q and the IQCODE (n = 232x5).

Items	P	O	PxO	SCI
MAC-Q				
a: Remembering the name of a person just introduced to you?	0.092	0.001	0.040	0.30
b: Recalling telephone numbers or post codes that you use on a daily or weekly basis?	0.088	0.010	0.054	0.38
c: Recalling where you have put objects (such as keys) in your home or office?	0.095	0.002	0.027	0.22
d: Remembering specific facts from a newspaper or magazine article you have just finished reading?	0.104	0.001	0.018	0.15
e: Remembering the item(s) you intended to buy when you arrive at the supermarket store or pharmacy?	0.022	0.003	0.042	0.66
f: In general, how would you describe your memory as compared to 10 years ago?	0.073	0.007	0.059	0.45
IQCODE				
1. Remembering things about family and friends (e.g. occupations, birthdays, addresses)	0.112	0.003	0.024	0.18
2. Remembering things that have happened recently	0.121	0.001	0.021	0.15
3. Recalling conversations a few days later	0.072	0.005	0.026	0.27
4. Remembering his/her address and telephone number	0.083	0.006	0.054	0.39
5. Remembering what day and month it is	0.080	0.003	0.019	0.19
6. Remembering where things are usually kept	0.096	0.001	0.026	0.21
7. Remembering where to find things which have been put in a different place from usual	0.069	0.001	0.013	0.16
8. Knowing how to work familiar machines around the house	0.059	0.002	0.038	0.39
9. Learning to use a new gadget or machine around the house	0.150	0.005	0.063	0.30
10. Learning new things in general	0.129	0.002	0.021	0.14
11. Following a story in a book or on TV	0.155	0.001	0.027	0.15
12. Making decisions on everyday matters	0.054	0.003	0.037	0.41
13. Handling money for shopping	0.063	0.007	0.061	0.49
14. Handling financial matters e.g. the pension, dealing with the bank	0.058	0.003	0.022	0.28
15. Handling other everyday arithmetic problems (e.g. knowing how much food to buy, knowing how long between visits from family or friends)	0.060	0.002	0.027	0.31
16. Using his/her intelligence to understand what's going on and to reason things through	0.048	0.000	0.012	0.20

Note: Number in bold reflects item measuring dynamic (state) pattern

Supplementary Table S4

D-study reliability estimates and variance components for the Person (P) × Occasion (O) × Item (I) design including interactions for MAC-Q with subtracting an occasion

Facets	Without occasion 1		Without occasion 2		Without occasion 3		Without occasion 4		Without occasion 5	
	σ^2	%	σ^2	%	σ^2	%	σ^2	%	σ^2	%
P	0.041		0.045		0.041		0.047		0.048	
I	0.000	2.0	0.000	2.1	0.000	2.9	0.000	1.2	0.001	4.3
O	0.001	7.6	0.001	5.0	0.000	2.7	0.001	7.4	0.001	6.8
PI	0.006	37.1	0.005	31.3	0.004	31.6	0.004	25.6	0.005	29.1
PO	0.002	14.8	0.002	11.6	0.002	13.6	0.002	14.9	0.002	13.3
IO	0.000	2.4	0.001	4.7	0.000	3.8	0.001	4.4	0.001	3.8
PIO	0.006	36.0	0.007	45.3	0.006	45.4	0.007	46.5	0.007	42.5
GM	3.208		3.240		3.198		3.235		3.237	
SE	0.046		0.046		0.038		0.047		0.051	
Gr	0.75		0.77		0.77		0.79		0.78	
Ga	0.72		0.75		0.76		0.76		0.75	
TCI	0.95		0.96		0.95		0.96		0.96	
SCI	0.05		0.04		0.05		0.04		0.04	

Supplementary Table S5

Means, standard deviation (SD), Cronbach's alpha, and intraclass correlation coefficient (ICC) for the MAC-Q 5 and 6 item versions and the IQCODE (n=232).

	Occasion 1	Occasion 2	Occasion 3	Occasion 4	Occasion 5	ICC(95%CI)
MAC-Q (6-item)						
Mean (SD)	20.14 (2.45)	18.64* (2.00)	19.98 (2.03)	20.32 (2.16)	20.31 (2.29)	0.84(0.80-0.87)
Cronbach's alpha	0.73	0.57	0.76	0.76	0.75	
MAC-Q (5-item)						
Mean (SD)	16.51 (1.84)	16.09* (1.50)	16.04* (1.69)	16.36 (1.80)	16.36 (1.85)	0.81(0.77-0.84)
Cronbach's alpha	0.67	0.63	0.72	0.72	0.69	
IQCODE						
Mean (SD)	49.61 (3.32)	49.10 (3.49)	49.51 (4.38)	49.08 (5.88)	52.45* (6.82)	0.70(0.63-0.75)
Cronbach's alpha	0.84	0.88	0.92	0.95	0.95	

Note: *Mean differences are significant compared to occasion 1 (Bonferroni corrected); There were significant main effects of occasion observed on the MAC-Q (6-item) scale scores ($F(231,4)=50.58$, $p<0.001$); on the MAC-Q (5-item) scale scores ($F(231,4)=5.25$, $p<0.001$); and on the IQCODE scale scores ($F(231,4)=27.63$, $p<0.001$ with significance increase at the last occasion (5) compare to previous occasions.

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