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Supplementary Materials for

Dissecting motor skill acquisition: Spatial coordinates take precedence

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Supplementary Text

Scoring of the behavioral task

We instructed participants to execute the sequence as fast and as accurately as possible, so we tried to score performance in a way that would consider both aspects. Dan and colleagues (*77*) proposed a measure multiplying the exponential of speed times the exponential of accuracy:

$$\boldsymbol{PI} = \mathbf{exp}\left(-\left(\frac{\boldsymbol{BlockDuration}}{\mathbf{12}}\right)\right) * \mathbf{exp}\left(-\left(\frac{\boldsymbol{Errors}}{\mathbf{12}}\right)\right) * \mathbf{100}$$

In their equation, the "12" was the maximum number of correct sequences possible in their task per block, and Errors = 12 - CorrectSequences. We tried using this equation. In our case, it was the time that was fixed (*i.e.* BlockDuration) and the total number of sequences per block varied. We noticed that the equation weighted errors less severely if made at higher speeds, while weighting participants making mistakes at lower speeds more harshly. As data came from people from multiple age groups, some of them moving more slowly (*e.g.,* older adults) we chose not to apply this asymmetric weighting. Additionally, we noticed that the time constant used greatly changed the shape of the learning curve (*e.g.,* using either 90 seconds or 1.5 minutes).

We thought about a hypothetical case in which two persons generated five correct sequences, with the difference that the first person generated a total of 10 sequences (50% accuracy) and the second a total of 5 sequences (100% accuracy). Based on what we instructed in terms of speed and accuracy, we wanted to give higher credit to the person having higher accuracy. Directly multiplying speed and accuracy, namely 10*0.5 for the first and 5*1 for the second person, would yield scores of 5 for both. Therefore, we chose to multiply the number of correct sequences times the accuracy, which would yield 5*0.5 = 2.5 for the first and 5*1 = 5 for the second, placing the desired prime on both parameters. The resulting equation is:

$$\boldsymbol{score} = \boldsymbol{CorrectSequences} * \boldsymbol{PercentCorrect}$$

Correction for individual skill level at the beginning of training

We used a single baseline block as a benchmark (containing an independent sequence, the same for all subjects) for evaluating the initial motor capabilities of each subject. We do not use this block to normalize the performance during training under stimulation, for several reasons. First, it is a different sequence from the sequence people train on, and even if it is similar in structure and equivalent in complexity, previous research shows there is no transfer between different sequences (*6*), which we also see when comparing the training blocks to the catch blocks in this study (please see *Table S1*). Second, the training kicks in from the very first execution of a sequence (*78*). Third, the performance averaged over the whole block might benefit already from the stimulation, so penalizing it with a different sequence executed under different circumstances (i.e., without stimulation) does not seem adequate.

We used the baseline block as reference for initial skill levels. In the first experiment, we found significant differences in the scores of this block between age groups. Nevertheless, we found no significant differences in accuracy (please see *Table S1*). In the second experiment (placebo groups), we found no significant differences in neither the scores nor the accuracy in the baseline block, further supporting the notion of participants starting at the same skill level (please see *Table S2*).

As we confirmed all participants were healthy, we assumed all age groups could improve within the same range of values, allowing us to compare them within the same frame of reference. For this reason, we corrected individual performance by subtracting the score of the first training block. As participants' improvement is in the same order of magnitude, we consider absolute improvement to be an adequate measure.

<u>Catch block scores</u>

In the main manuscript, we mention that we see no generalization of learning to sequences different from the training sequence. The scores below show average scores of all blocks, including the catch blocks (please see *Figure S1*).

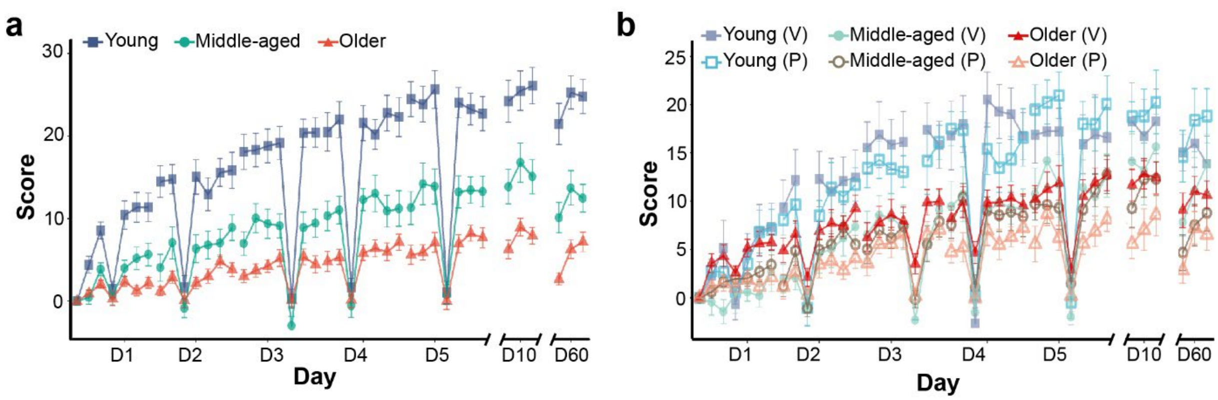

Figure S1. Primary outcome of all blocks (i.e. including catch blocks). a) *Average score for all blocks of the first experiment (i.e. training without stimulation). The vertical lines represent the standard error of the mean.* ***b)*** *Average scores for all blocks in the second experiment (i.e. training with either verum (V) or placebo (P) stimulation), with vertical bars describing the standard error of the mean. The error bars depict the standard error of the mean.*

It is clear to see that the improvement seen in the training sequence does not transfer to other sequences. Scores were not significantly different between catch blocks (*Table S1 and Table S2*).

Speed and accuracy

In the main article, we only show the normalized speed and accuracy for each group. The reason is that we were interested in discussing the dynamics of both parameters, and intended to show both processes in the same plot. Here, we show the average speed and accuracy for each group. We describe the speed as the total number of sequences generated within a block (*Figure S2*).

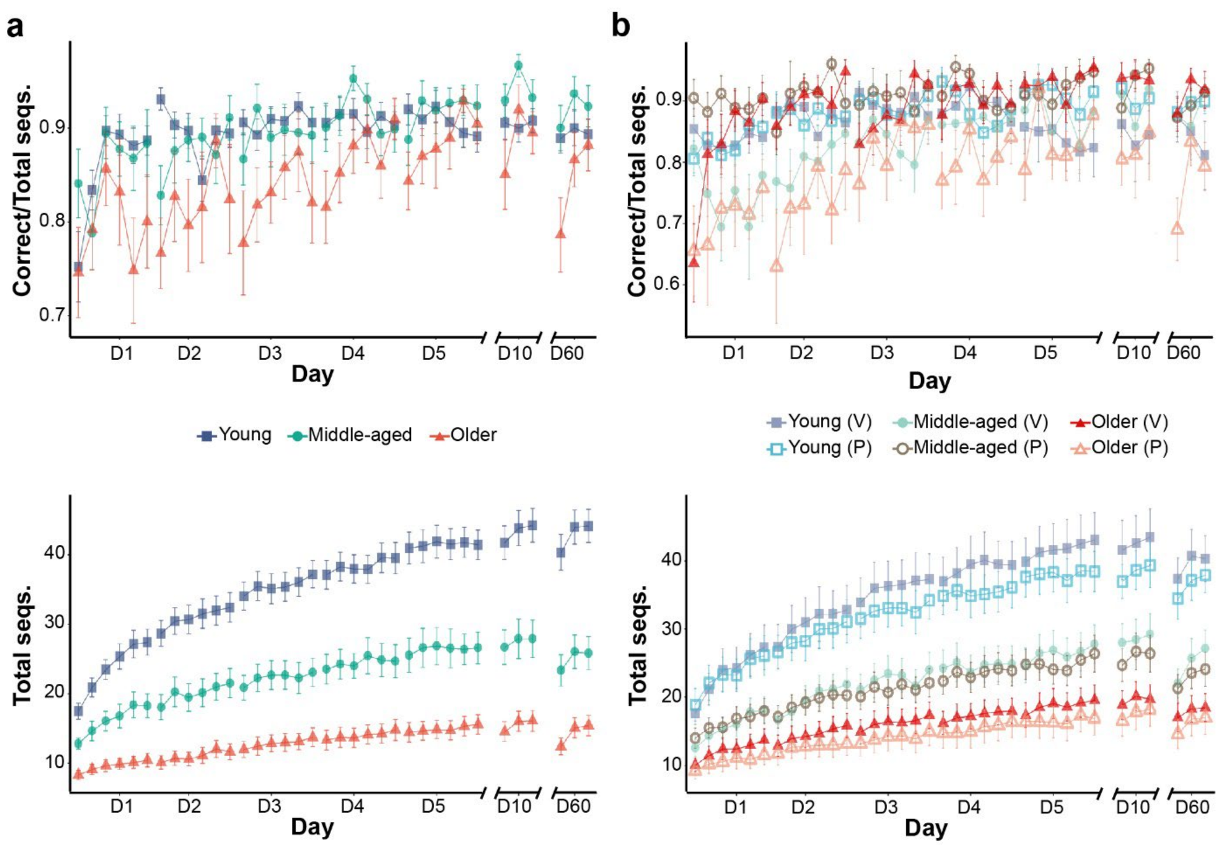

Figure S2. Group average accuracy and speed. *Accuracy (top) and speed (bottom) in the first* ***(a)*** *and second* ***(b)*** *experiments. We defined speeds to be the total number of correct sequences generated within a block, while accuracy corresponds to the ratio of correct sequences to total sequences in each block. The error bars depict the standard error of the mean. V: Verum; P: Placebo.*

Uncorrected scores

In the main manuscript, we present centered average scores for all groups of both experiments, which was necessary to compare the scores statistically. *Figure S3* shows the uncentered scores. Interestingly, the unstimulated groups and the groups receiving placebo stimulation look almost exactly the same, and the absence of an effect of atDCS in young and middle-aged adults is more evident.

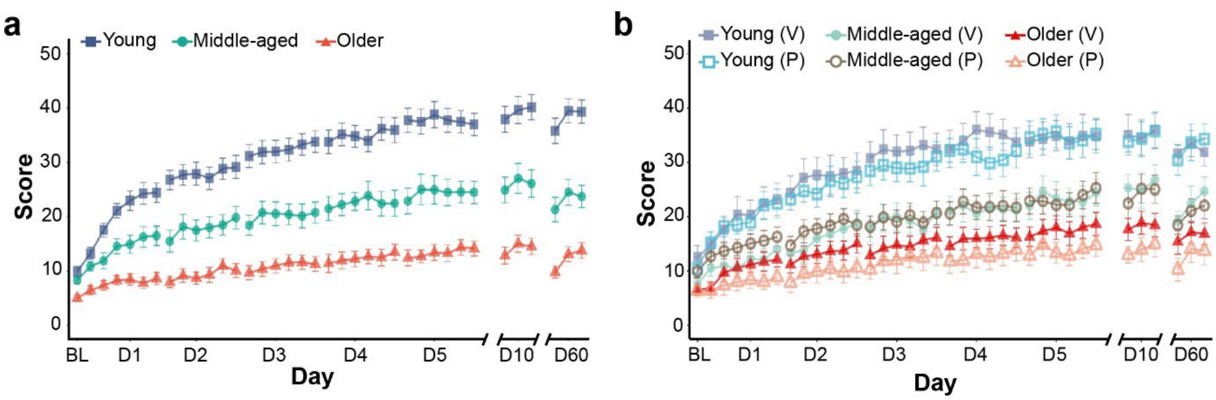

Figure S3. Uncorrected scores for both experiments. *The scores obtained by the three groups of the first experiment* ***(a)*** *match those obtained by the groups receiving placebo stimulation in the second experiment* ***(b)****. Please notice that without the correction, the verum and placebo groups of both young and middle-aged adults are even more similar, highlighting the absence of an effect reported in the main manuscript. In contrast, older adults receiving verum stimulation outscore the unstimulated and the placebo groups of older adults. V: Verum; P: Placebo.*

Motor chunk estimation from behavioral data

A common approach at extracting chunking patterns in the execution of discrete sequence production tasks is to average the inter-key intervals (IKIs) and detect statistically significant increases, assumed to separate adjacent chunks (*7, 9, 40*). Acuna and colleagues (*79*) implemented a probabilistic approach meant to estimate the likelihood of an individual performing a certain chunking pattern based on the IKIs and the errors generated during the execution of the task, as well as the correlation of these two components. The model they propose uses expectation maximization to estimate the most likely chunking pattern generated on each trial (*i.e.* sequence execution). For each trial (t), the model uses prior knowledge on the chunking pattern executed in the preceding trial (t-1). This approach stands on an assumption that makes its use difficult in our dataset. The model assumes that improvement is steady and consistent during training, with similar chunking patterns between adjacent trials. This could be the case in young adults, with average scores monotonically increasing between days. In contrast, middle-aged and older adults often show diminished performance at the beginning of a training session with respect to the previous day. On the other hand, the use of a catch block presented in the middle of training sessions often disrupted performance in the subsequent training block (as reported by several participants and as observed in the "dips" in the learning curves of each day, *Figure S1*), which probably had an impact on the executed chunking pattern. Additionally, errors in older adults, more frequent than in young, would likely obstruct finding the chunking pattern implemented by a participant, as errors cause participants to slow down (*80*). Furthermore, the probabilistic approach enforces the notion of chunks eventually being fully concatenated by the end of training, while chunk formation is likely constrained by the computational cost of retrieving a certain amount of sequence elements (*41*).

For these reasons, we decided to use the approach proposed by Song & Cohen (*70*). In their method, chunking strategies are detected by applying a k-means clustering algorithm to the IKIs, forcing two clusters to label IKIs as either "fast" or "slow".

Each sequence had nine IKIs, with the first one reflecting the interval between the last key press of the previous sequence and the first key press of the current sequence. After removing incorrect sequences from each block, we normalized the IKIs of each sequence to the total duration the sequence (*i.e.* divided each IKI by its sequence duration), to account for the gradual increase in speed during training. After normalization, we applied the K-means clustering algorithm to sequences of each block (Sklearn, https://scikit-learn.org/) enforcing the notion of two clusters being present (*i.e.*, "fast" and "slow"), labeling the IKIs of each sequence based on their proximity to them (*Figure S4a*). The outcome of this step was a chunking pattern for each individual sequence (*Figure S4b*).

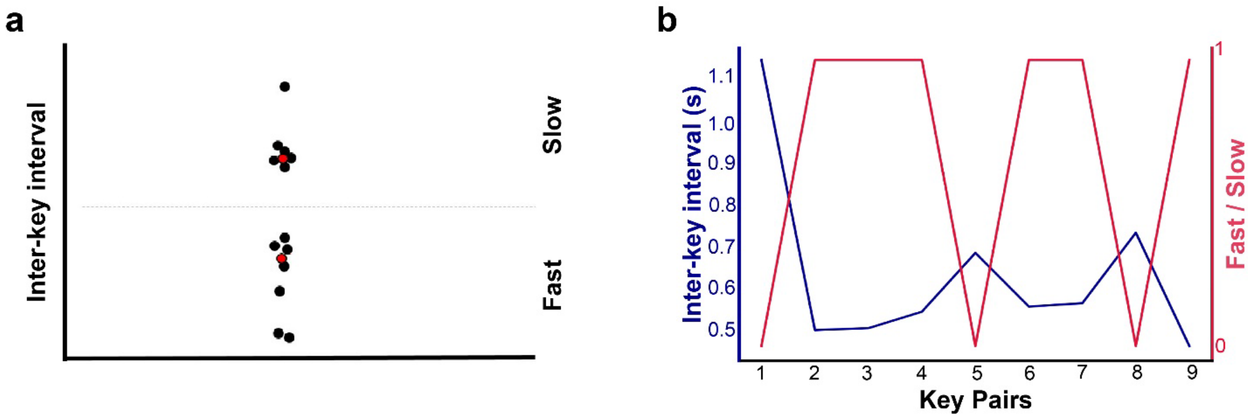

Figure S4. Extraction of chunking patterns from inter-key intervals (IKIs). a) *We applied k-means clustering on IKIs from each block, defining two cluster centroids (i.e. "fast" and "slow").* ***b)*** *After estimating the centroids, we labelled each IKI of the block as either "1" (i.e. fast) or "0" (i.e. slow), interpreting adjacent "1"'s as intervals belonging to the same motor chunk.*

Labelling each sequence in this way results in many different patterns. *Figure S5a* shows an example of such variability, in which each histogram bin corresponds to a different sequence pattern. As sequences are binary (i.e. consist of ones and zeros), we converted them to decimal to represent them as a single number.

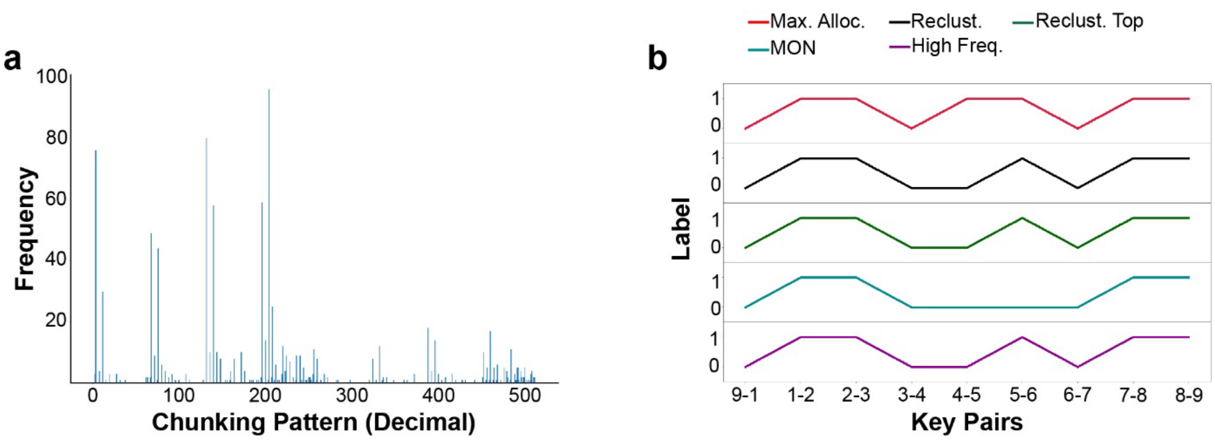

Figure S5. Chunking patterns generated by a single subject. a) *Binary chunking patterns (e.g. [011011011]) are represented in decimal form (e.g. to* $(0)2^8+(1)2^7+(1)2^6+(0)2^5+(1)2^4+(1)2^3+(0)2^2+(1)2^1+(1)2^0=219$*).* ***b)*** *Output from each criterion for pattern selection. The criteria are called, from top to bottom: "Maximum allocation", "Reclustering", "Reclustering top", "More-often-than-not" and "Highest frequency". Please refer to the Methods section in the main article for further details.*

Because each participant generates multiple sequences, we defined the criteria described in the main text to determine a single pattern for each participant, on each day of training. *Figure S5b* shows the output from the five criteria for a single participant on the first day of training. As some patterns are slightly different from one criterion to the next, we perform a majority vote using the five criteria. In this example, the resulting pattern would be [0 1 1 0 0 1 0 1 1].

<u>SICI measurements</u>

In the main text, we mention that we used TMS to measure intra-cortical inhibition at rest in all participants of the second experiment. We applied the SICI paradigm before and after the first training day, to quantify the interneuronal GABAergic inhibition within the primary motor cortex, directly involved in the learning and execution of the motor sequence. We repeated these measurements on the fifth and sixtieth days. We show the group results in *Figure S6*.

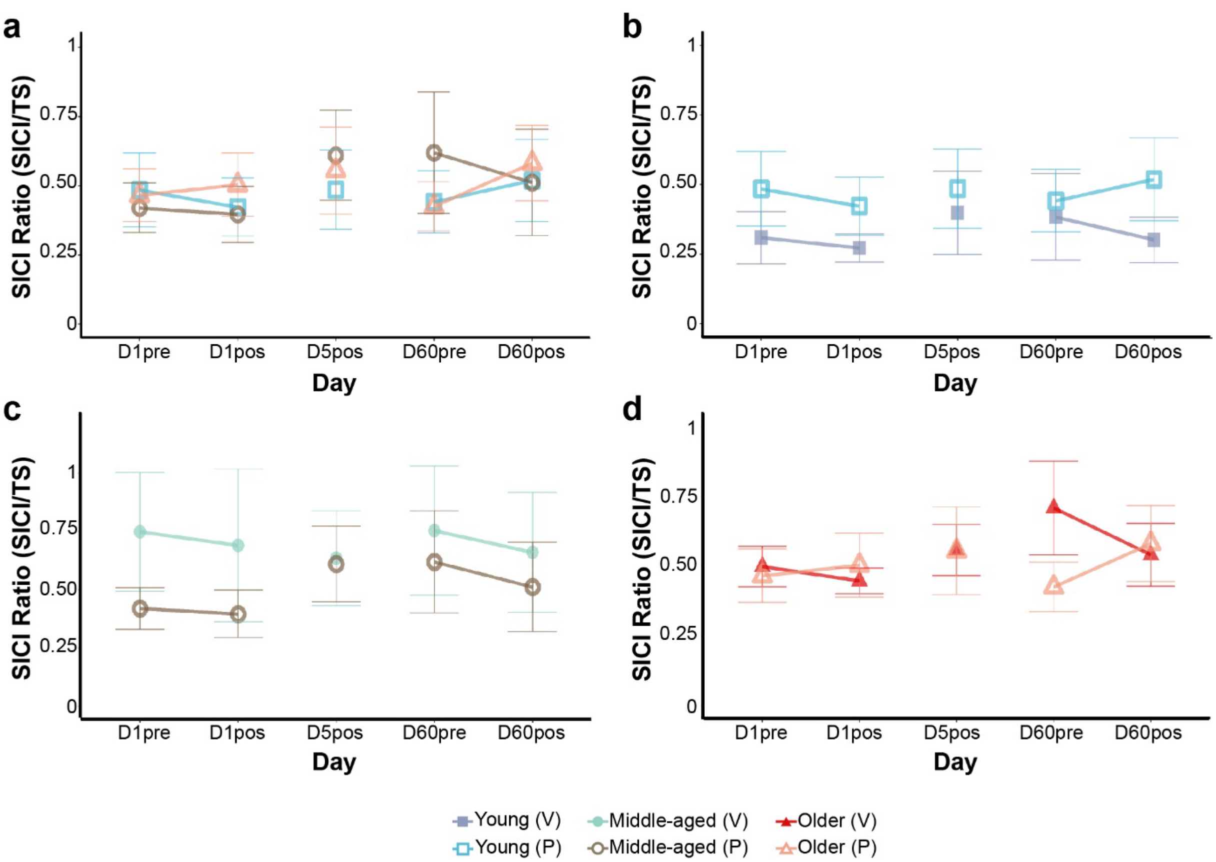

Figure S6. SICI measurements at rest in participants of the second experiment. *Inhibitory efficiency, quantified as the ratio of the amplitude resulting from the short-interval intracortical inhibition (SICI) paradigm divided by the amplitude of the test stimulus (TS). Each marker corresponds to the average ratio per group, with its corresponding standard error.* ***a)*** *SICI at rest in all groups receiving placebo stimulation. Panels* ***b*** *to* ***d*** *show SICI measurements at rest in young* ***(b)****, middle-aged* ***(c)*** *and older* ***(d)*** *adults receiving verum (V) and placebo (P) stimulation. Recordings were performed either before (i.e., "pre") or after (i.e., "pos") performing the finger-tapping task.*

Self-reports on attention and fatigue

We used a visual analogue scale (VAS) to inquire about the state of attention and fatigue in all participants before and after each training block. This scale is presented as an ungraded line, with attention ranging from “completely attentive” (0) to “completely inattentive” (10), and fatigue ranging from “awake” (0) to “tired” (10).

In *Figure S7* we show the scores reported by the participants over the course of training, averaged per age and stimulation group, with the error bars representing the standard error of the mean. *Figure S8* shows the difference in attention and fatigue between the last block of a training day and the first block of the following training day, plotted against the score difference between the same blocks (i.e., offline learning).

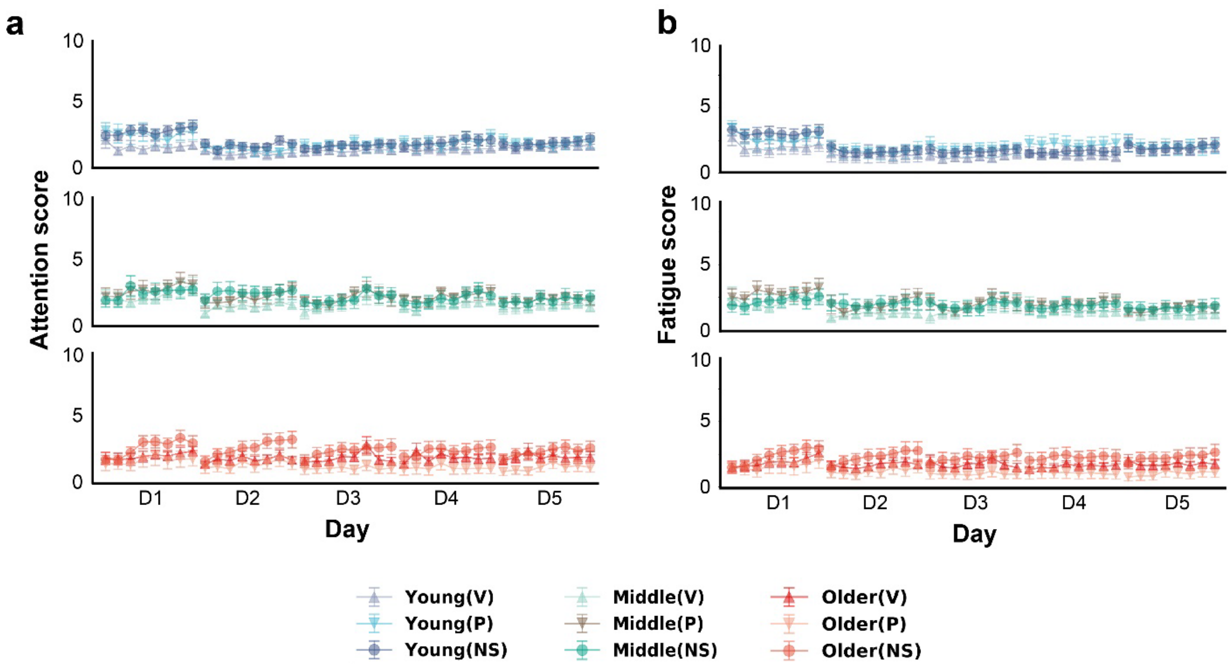

Figure S7. Self-reports on the state of attention and fatigue over the course of training. *Average attention (**a**) and fatigue (**b**) scores provided by the participants of all groups of the first and the second experiments, with young adults at the top and older adults at the bottom panels. The error bars correspond to the standard error of the mean. V: Verum; P: Placebo; NS: No stimulation.*

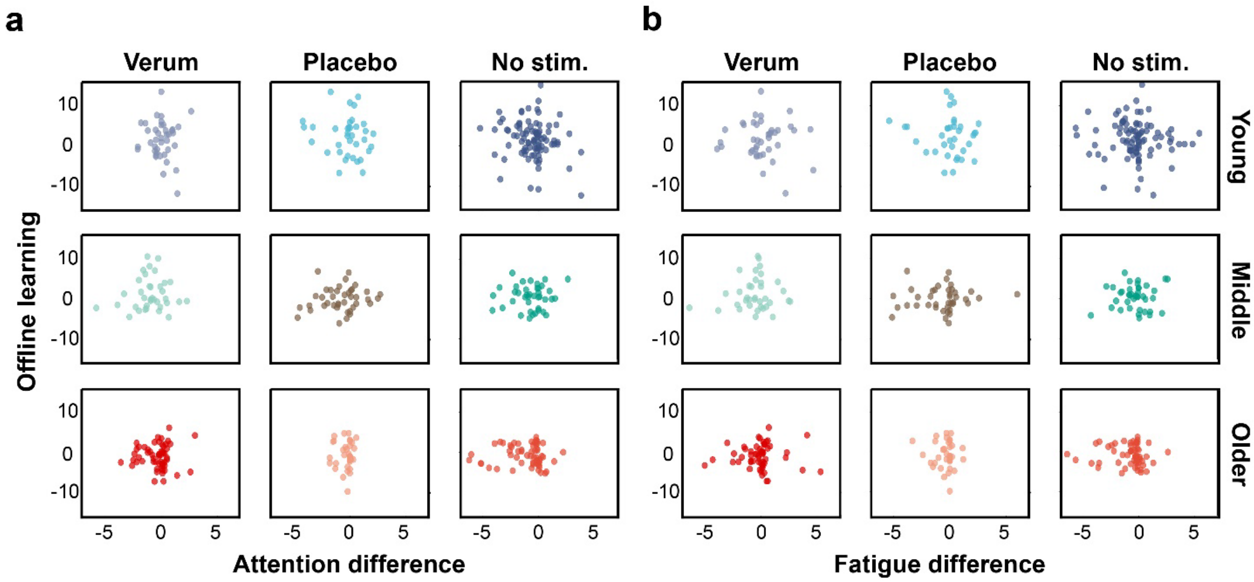

Figure S8. Offline learning as a function of attention and fatigue. *The difference in attention and fatigue was calculated between the last block of a training session and the first block of the following training session. Please note that the figures depicting the relationship between offline learning and attention (**a**) and offline learning and fatigue (**b**) share the same y-axis. Please note as well that the top row shows the young adults and the bottom row shows the older adults for both attention and fatigue.*

Statistical analysis of the main results

This subsection enlists all the statistical tests we ran for both experiments. In each table and for each aspect tested, we specify whether we fitted a linear model (LM) or a linear mixed-effect model (LMER) accounting for individual variation within each group; whenever between-subject variability warranted it, we used a linear mixed-effect model with random intercepts for individuals. The parameter (1 + 1|ID) in the random column is used to specify a random effect of intercept between individuals, allowing the intercept of the fitted model to vary, as defined in the lmer package in R (*72*). We did not include a random effect of slope per day because inter-individual variability in each group did not justify it. We defined the factor "Day" as categorical, to fit individual lines per training day.

Below, we show tables with the results of all the statistical tests we ran. *Table S1* contains a key explaining the different aspects assessed in the execution of our motor task, while *Table S2* contains a key with the parameters reported for each statistical test. *Table S3* shows the results of the tests ran on the data from the first experiment, in which our groups of young, middle-aged and older adults trained without stimulation. *Table S4* contains the tests we ran including all groups of the second experiment and serves as a preamble, alongside the results reported on *Table S3*, justifying the testing of the effects of the intervention (i.e., atDCS) on each age group separately. The results shown in *Table S3* (and confirmed in *Table S5*) show clear age-related differences in the overall performance, as well as on the speed and on the accuracy, which alongside significant interactions found between the age groups and the intervention over the course of training (*Table S4*), suggest the mechanisms involved to be different, justifying a separate comparison for each age group. Our tests on the effect of stimulation for each age group are summarized on *Table S6*, while the subsequent tests done in the groups of older adults taking their generated chunking patterns into account are summarized in *Table S7*. *Table S8* and *Table S9* outline the results of the statistical tests we ran on the reported scores for attention and fatigue in the first and in the second experiment, respectively.

Table S1. Key describing the aspects tested for in the assessment of the behavioral and electrophysiological data of both experiments.

Aspect	Definition
Baseline	First exercise block presented to all subjects, lasting 90 seconds and containing a different sequence to that presented during the training or the catch blocks. It served as a measure of initial skill level.
Training	Set of blocks containing the main training sequence. On each training day, the training sequence was present in six out of seven blocks.
Online learning	Measure of performance change taking place over the course of a training session, quantified as the difference between the last and the first training block of each session.
Online slope	Slope of the straight lines fitted to the scores of each participant on each training day, reflecting the rate of change in performance on each day.
Offline learning	Measure of performance change occurring overnight (i.e., between training sessions), quantified as the difference in score between the last block of a training session and the first training block of the following session.
Speed	Speed of execution of the sequences, quantified as the total number of sequences generated per block.
Accuracy	Measure of precision in the execution of the sequence, quantified as the ratio of correct to total number of sequences.
FU scores	Scores obtained during the follow-up (FU) sessions.
Catch block scores	Scores obtained in the "catch" blocks presented halfway through each training session, containing a sequence different to the training sequence and different on each session.
D1 / D2-D5	Specification of whether an aspect concerns the first training day (D1) or the rest of the training week (D2-D5).
SICIrest	Short-interval intracortical inhibition (SICI) measured when individuals where at rest, quantified as the ratio of the magnitude of the conditioning to the test pulse commonly used in the SICI TMS paradigm (please refer to the Methods). The specification "change Tr. D1" refers to the change in SICIrest after the first training session, while "change Tr. Week" refers to the change after the training week.
Attention	Subjective measure of attention reported by each participant before and after each training block, captured using a visual analog scale in the form of an ungraded 10 cm straight line ranging from "completely attentive" (0) to "completely inattentive" (10).
Fatigue	Subjective measure of fatigue reported by each participant before and after each training block, captured using a visual analog scale in the form of an ungraded 10 cm straight line ranging from "awake" (0) to "tired" (10).
Label	The "label" parameter in *Table S7* corresponds to a classification we did within older adults receiving verum stimulation, grouping them according to whether they generated "young-like" or "old-like" chunking patterns on day 1.

Table S2. Key describing the parameters reported for each statistical test.

ANOVA parameters	Description
DF num.	Numerator degrees of freedom.
DF den.	Denominator degrees of freedom. Only applicable when fitting mixed-effects models (i.e., LMER).
F	F-value in an ANOVA, calculated as the ratio of the variance explained by a model to the unexplained variance.
p	Classical p-value, representing the likelihood of observing the current or more extreme data given that the null hypothesis is true (i.e., the true means of the compared groups are not different).

Post-hoc test parameters	Description
Estimate	Estimated difference between the models fitted to each group.
DF	Degrees of freedom.
t	T ratio, calculated as the estimate divided by the standard error of the estimate.
p	Classical p-value, as described above.
d	Effect size, calculated as the difference of the means divided by the standard deviation.
Cl	Confidence level, calculated as the estimate ± the value of the inverse cumulative density function of the Student t distribution given the degrees of freedom.

Table S3. Statistical tests run on behavioral data of the first experiment.

					ANOVA					PostHoc tests								
Aspect	Model	Dependent	Independent	Random	ANOVA param.	DF num.	DF den.	F	p	Level	Contrast	Estimate	DF	t	p	d	CI	
Baseline	LM	Score	AGE	NA	AGE	2		9.796767	**0.000264**	B0	Young - Middle	1.642424	49	1.476524	0.310889	0.494407	-0.19425	1.183064
											Young - Older	4.909091	49	4.413228	**0.000163**	1.477748	0.674939	2.280557
											Middle - Older	3.266667	49	2.692989	**0.025719**	0.983341	0.19382	1.772861
Baseline accuracy	LM	Per. Correct	AGE	NA	AGE	2		0.946997	0.394888									
Block 1 accuracy	LM	Per. Correct	AGE	NA	AGE	2		1.545493	0.223419									
Training	LMER	Score	AGE,DAY	(1 + 1|ID)	AGE	2	49	22.96936	**9.17E-08**	day 1	Young - Middle	4.49989	55.33501	2.170226	0.085361	1.092034	0.033397	2.15067
					DAY	4	1496	309.6215	**3.95E-194**		Young - Older	6.203192	55.33501	2.991701	**0.011355**	1.505391	0.403381	2.607401
					AGE:DAY	8	1496	30.80038	**6.01E-45**		Middle - Older	1.703302	55.33501	0.753302	0.732914	0.413357	-0.69293	1.519643
										day 2	Young - Middle	8.07949	55.33501	3.89661	**0.000766**	1.960731	0.797897	3.123566
											Young - Older	11.78042	55.33501	5.681512	**1.53E-06**	2.858874	1.543574	4.174174
											Middle - Older	3.700933	55.33501	1.636774	0.238972	0.898143	-0.23295	2.029232
										day 3	Young - Middle	10.21638	55.33501	4.927198	**2.34E-05**	2.479312	1.233054	3.72557
											Young - Older	14.85153	55.33501	7.16266	**5.92E-09**	3.604172	2.137729	5.070615
											Middle - Older	4.635155	55.33501	2.049943	0.109952	1.12486	-0.02379	2.27351
										day 4	Young - Middle	10.08712	55.33501	4.86486	**2.92E-05**	2.447944	1.20711	3.688778
											Young - Older	15.63477	55.33501	7.540401	**1.42E-09**	3.794247	2.286533	5.30196
											Middle - Older	5.547643	55.33501	2.4535	**0.044959**	1.346303	0.177046	2.515559
										day 5	Young - Middle	10.77967	55.33501	5.198863	**8.88E-06**	2.616011	1.345595	3.886426
											Young - Older	17.07833	55.33501	8.236606	**1.08E-10**	4.14457	2.558394	5.730745
											Middle - Older	6.298658	55.33501	2.785644	**0.019675**	1.528559	0.339907	2.717211
Online learning	LMER	ΔScore	AGE,DAY	(1 + 1|ID)	AGE	2	48.98015	0.816388	0.447949	day 1	Young - Middle	5.726304	244.9911	3.141517	**0.005344**	1.05351	0.325554	1.781465
					DAY	4	195.9789	8.045557	**5.02E-06**		Young - Older	9.151834	244.9911	5.020802	**2.96E-06**	1.683729	0.861894	2.505564
					AGE:DAY	8	195.9789	4.486743	**5.10E-05**		Middle - Older	3.42553	244.9911	1.723325	0.198532	0.630219	-0.11299	1.373425
										day 2	Young - Middle	-3.49969	244.9911	-1.91997	0.135206	-0.64386	-1.33036	0.042632
											Young - Older	-1.24583	244.9911	-0.68348	0.773348	-0.22921	-0.89309	0.434679
											Middle - Older	2.253854	244.9911	1.133875	0.494159	0.414658	-0.31566	1.144971
										day 3	Young - Middle	-0.10921	244.9911	-0.05992	0.998023	-0.02009	-0.68066	0.640471
											Young - Older	0.917291	244.9911	0.503236	0.869821	0.168761	-0.49359	0.831115
											Middle - Older	1.026504	244.9911	0.516416	0.863415	0.188853	-0.53355	0.911255
										day 4	Young - Middle	0.925097	244.9911	0.507519	0.867752	0.170197	-0.49219	0.832582
											Young - Older	-0.51353	244.9911	-0.28173	0.957198	-0.09448	-0.75559	0.566629
											Middle - Older	-1.43863	244.9911	-0.72375	0.74966	-0.26468	-0.98908	0.459731
										day 5	Young - Middle	-3.75057	244.9911	-2.0576	0.10096	-0.69002	-1.35066	-0.02938
											Young - Older	-3.85119	244.9911	-2.11281	0.089324	-0.70853	-1.36928	-0.04778
											Middle - Older	-0.10062	244.9911	-0.05062	0.998588	-0.01851	-0.73885	0.701825
Online slope	LM	Slope	AGE,DAY	NA	AGE	2		0.467166	0.627333	day 1	Young - Middle	0.88315	245	2.979489	**0.008888**	0.997667	0.277289	1.718045
					DAY	4		12.64101	**2.29E-09**		Young - Older	1.599765	245	5.397138	**4.78E-07**	1.807205	0.964321	2.650089
					AGE:DAY	8		4.776151	**1.80E-05**		Middle - Older	0.716615	245	2.217011	0.07031	0.809538	0.052857	1.566218
										day 2	Young - Middle	-0.4177	245	-1.40919	0.33772	-0.47186	-1.14549	0.201768
											Young - Older	-0.29685	245	-1.0015	0.576616	-0.33535	-1.00204	0.331348
											Middle - Older	0.120844	245	0.373859	0.925878	0.136514	-0.58381	0.856836
										day 3	Young - Middle	0.227412	245	0.767223	0.723468	0.256901	-0.40685	0.92065
											Young - Older	0.123662	245	0.417198	0.908566	0.139697	-0.52109	0.800486
											Middle - Older	-0.10375	245	-0.32098	0.944806	-0.1172	-0.83724	0.602831
										day 4	Young - Middle	0.123356	245	0.416167	0.908996	0.139351	-0.52143	0.800134
											Young - Older	-0.09555	245	-0.32236	0.944342	-0.10794	-0.76823	0.552345
											Middle - Older	-0.21891	245	-0.67724	0.776961	-0.24729	-0.9701	0.475514
										day 5	Young - Middle	-0.45778	245	-1.54442	0.272071	-0.51714	-1.17794	0.14366
											Young - Older	-0.7003	245	-2.36259	**0.049438**	-0.7911	-1.45178	-0.13042
											Middle - Older	-0.24251	245	-0.75027	0.733748	-0.27396	-0.99758	0.449656
										Young	day 1 - day 2	1.724773	245	6.462189	**5.52E-09**	1.948423	1.128125	2.768721
											day 1 - day 3	1.459651	245	5.468858	**1.11E-06**	1.648923	0.886021	2.411824
											day 1 - day 4	1.656072	245	6.204786	**2.31E-08**	1.870814	1.065898	2.675729
											day 1 - day 5	2.18587	245	8.189772	**1.93E-13**	2.469309	1.675861	3.262757
											day 2 - day 3	-0.26512	245	-0.99333	0.85819	-0.2995	-0.89972	0.30072
											day 2 - day 4	-0.0687	245	-0.2574	0.999028	-0.07761	-0.67192	0.516703
											day 2 - day 5	0.461096	245	1.727583	0.418962	0.520886	-0.07432	1.116095
											day 3 - day 4	0.196421	245	0.735928	0.947895	0.221891	-0.37548	0.819262
											day 3 - day 5	0.726218	245	2.720914	0.05377	0.820386	0.22462	1.416152
											day 4 - day 5	0.529797	245	1.984986	0.276395	0.598496	0.004363	1.192628
										Middle	day 1 - day 2	0.423926	245	1.31151	0.68433	0.478896	-0.25366	1.21145
											day 1 - day 3	0.803914	245	2.487089	0.096898	0.908156	0.142093	1.67422
											day 1 - day 4	0.896278	245	2.772839	**0.046791**	1.012498	0.235481	1.789514
											day 1 - day 5	0.844939	245	2.614009	0.070924	0.954501	0.183701	1.725302
											day 2 - day 3	0.379988	245	1.175579	0.765347	0.429261	-0.30069	1.159215
											day 2 - day 4	0.472353	245	1.461329	0.588596	0.533602	-0.20213	1.269338
											day 2 - day 5	0.421013	245	1.302499	0.689924	0.475606	-0.25677	1.207979
											day 3 - day 4	0.092365	245	0.285751	0.998535	0.104341	-0.61553	0.82421
											day 3 - day 5	0.041025	245	0.126921	0.999941	0.046345	-0.67301	0.765701
											day 4 - day 5	-0.05134	245	-0.15883	0.999856	-0.058	-0.77742	0.661431
										Older	day 1 - day 2	-0.17185	245	-0.53164	0.984018	-0.19413	-0.91556	0.527309
											day 1 - day 3	-0.01645	245	-0.0509	0.999998	-0.01859	-0.73784	0.700665
											day 1 - day 4	-0.03924	245	-0.12141	0.999951	-0.04433	-0.76368	0.675012
											day 1 - day 5	-0.11419	245	-0.35328	0.996646	-0.129	-0.8492	0.591207
											day 2 - day 3	0.155393	245	0.480743	0.989055	0.175542	-0.54549	0.896578
											day 2 - day 4	0.1326	245	0.410229	0.994024	0.149794	-0.57075	0.870339
											day 2 - day 5	0.057654	245	0.178365	0.999772	0.06513	-0.65435	0.784609
											day 3 - day 4	-0.02279	245	-0.07051	0.999994	-0.02575	-0.74502	0.693521
											day 3 - day 5	-0.09774	245	-0.30238	0.998171	-0.11041	-0.83036	0.609532
											day 4 - day 5	-0.07495	245	-0.23186	0.999356	-0.08466	-0.80432	0.634986
Offline learning	LM	ΔScore	AGE,NIGHT	NA	AGE	2		8.27757	**0.000354**	AGE	Young - Middle	2.536574	196	3.342873	**0.002843**	0.559672	0.21987	0.899474
					NIGHT	3		0.079903	0.970857	AGE	Young - Older	2.637295	196	3.47561	**0.001809**	0.581895	0.243562	0.920229
					AGE:NIGHT	6		1.753384	0.110611	AGE	Middle - Older	0.100721	196	0.121721	0.991865	0.022223	-0.3379	0.382343
Speed	LMER	Seq. Number	AGE,DAY	(1 + 1|ID)	AGE	2	48.99997	28.30728	**6.74E-09**	day 1	Young - Middle	2.769697	53.16693	1.619623	0.246343	0.989968	-0.27039	2.250327
					DAY	4	1496	734.2932	**0**		Young - Older	4.869697	53.16693	2.84763	**0.016918**	1.740568	0.41101	3.070125
					AGE:DAY	8	1496	84.18678	**3.80E-115**		Middle - Older	2.1	53.16693	1.126096	0.502437	0.750599	-0.60453	2.105733
										day 2	Young - Middle	6.169192	53.16693	3.607529	**0.001945**	2.205044	0.816527	3.59356
											Young - Older	10.72475	53.16693	6.27146	**1.97E-07**	3.833328	2.163674	5.502982
											Middle - Older	4.555556	53.16693	2.442854	**0.046412**	1.628284	0.207383	3.049186
										day 3	Young - Middle	8.530303	53.16693	4.988225	**2.03E-05**	3.048972	1.527227	4.570716
											Young - Older	13.49697	53.16693	7.89256	**4.85E-10**	4.824199	2.943273	6.705125
											Middle - Older	4.966667	53.16693	2.663306	**0.027159**	1.775227	0.339019	3.211436
										day 4	Young - Middle	9.204545	53.16693	5.382499	**5.01E-06**	3.289965	1.724945	4.854986
											Young - Older	15.21566	53.16693	8.897588	**1.07E-11**	5.438506	3.416337	7.460676
											Middle - Older	6.011111	53.16693	3.223375	**0.00604**	2.148541	0.668412	3.62867
										day 5	Young - Middle	10.33232	53.16693	6.041984	**4.57E-07**	3.693065	2.051288	5.334842
											Young - Older	17.34343	53.16693	10.14184	**0**	6.199034	3.993788	8.40428
											Middle - Older	7.011111	53.16693	3.759612	**0.001218**	2.50597	0.977487	4.034452
										Week	Young - Middle	7.401212	49	4.41725	**0.000161**	2.645403	1.209166	4.081639
											Young - Older	12.3301	49	7.358949	**5.52E-09**	4.407127	2.631304	6.18295
											Middle - Older	4.928889	49	2.69757	**0.025425**	1.761724	0.349317	3.174132
										Young	day 1 - day 2	-7.31061	1496	-21.2283	**7.44E-13**	-2.61302	-3.42419	-1.80184
											day 1 - day 3	-11.8939	1496	-34.5372	**7.44E-13**	-4.25123	-5.53237	-2.97009
											day 1 - day 4	-14.7348	1496	-42.7865	**7.44E-13**	-5.26665	-6.8435	-3.68981
											day 1 - day 5	-17.8182	1496	-51.7397	**7.44E-13**	-6.36872	-8.26813	-4.46932
											day 2 - day 3	-4.58333	1496	-13.3089	**7.44E-13**	-1.63821	-2.18193	-1.0945
											day 2 - day 4	-7.42424	1496	-21.5582	**7.44E-13**	-2.65363	-3.47626	-1.83101
											day 2 - day 5	-10.5076	1496	-30.5115	**7.44E-13**	-3.7557	-4.89341	-2.618
											day 3 - day 4	-2.84091	1496	-8.24932	**8.04E-13**	-1.01542	-1.40415	-0.6267
											day 3 - day 5	-5.92424	1496	-17.2026	**7.44E-13**	-2.11749	-2.79056	-1.44442
											day 4 - day 5	-3.08333	1496	-8.95326	**7.86E-13**	-1.10207	-1.51091	-0.69323
										Middle	day 1 - day 2	-3.91111	1496	-9.37768	**7.93E-13**	-1.39794	-1.90811	-0.88777
											day 1 - day 3	-6.13333	1496	-14.7059	**7.44E-13**	-2.19223	-2.90611	-1.47834
											day 1 - day 4	-8.3	1496	-19.9009	**7.44E-13**	-2.96665	-3.89347	-2.03984
											day 1 - day 5	-10.2556	1496	-24.5898	**7.44E-13**	-3.66563	-4.79006	-2.54119
											day 2 - day 3	-2.22222	1496	-5.32823	**1.14E-06**	-0.79429	-1.17449	-0.41408
											day 2 - day 4	-4.38889	1496	-10.5232	**7.93E-13**	-1.56871	-2.1206	-1.01683
											day 2 - day 5	-6.34444	1496	-15.2121	**7.44E-13**	-2.26768	-3.00189	-1.53348

Aspect	Model	Dependent	Independent	Random	ANOVA					PostHoc tests								
Aspect	Model	Dependent	Independent	Random	ANOVA param.	DF num.	DF den.	F	p	Level	Contrast	Estimate	DF	t	p	d	CI	
											day 3 - day 4	-2.16667	1496	-5.19502	**2.31E-06**	-0.77443	-1.15103	-0.39782
											day 3 - day 5	-4.12222	1496	-9.88386	**7.90E-13**	-1.4734	-2.00181	-0.94499
											day 4 - day 5	-1.95556	1496	-4.68884	**2.95E-05**	-0.69897	-1.06244	-0.3355
											day 1 - day 2	-1.45556	1496	-3.48999	**0.00452**	-0.52026	-0.85649	-0.18402
											day 1 - day 3	-3.26667	1496	-7.83249	**8.84E-13**	-1.1676	-1.62433	-0.71087
											day 1 - day 4	-4.38889	1496	-10.5232	**7.93E-13**	-1.56871	-2.1206	-1.01683
											day 1 - day 5	-5.34444	1496	-12.8144	**7.44E-13**	-1.91026	-2.54938	-1.27113
										Older	day 2 - day 3	-1.81111	1496	-4.3425	**0.000146**	-0.64734	-1.00235	-0.29233
											day 2 - day 4	-2.93333	1496	-7.03326	**3.14E-11**	-1.04846	-1.47917	-0.61775
											day 2 - day 5	-3.88889	1496	-9.3244	**7.93E-13**	-1.39	-1.89827	-0.88173
											day 3 - day 4	-1.12222	1496	-2.69075	0.055781	-0.40111	-0.72276	-0.07947
											day 3 - day 5	-2.07778	1496	-4.98189	**6.96E-06**	-0.74266	-1.11362	-0.37169
											day 4 - day 5	-0.95556	1496	-2.29114	0.148234	-0.34154	-0.65712	-0.02597
					AGE	2	72.52015	5.837485	**0.00446**		Young - Middle	-0.00122	75.56009	-0.0468	0.998793	-0.01294	-0.56385	0.537963
					DAY	4	1481	10.23586	**3.55E-08**	day 1	Young - Older	0.06209	75.56009	2.390027	0.050087	0.661015	0.076918	1.245112
					BLOCK	1	1481	19.87458	**8.89E-06**		Middle - Older	0.063306	75.56009	2.234595	0.071861	0.673958	0.041443	1.306473
					AGE:DAY	8	1481	2.510816	**0.010367**		Young - Middle	0.019482	75.69673	0.749573	0.734812	0.207406	-0.34708	0.76189
					AGE:BLOCK	2	1481	3.748352	**0.02378**	day 2	Young - Older	0.077628	75.69673	2.986752	**0.010492**	0.82643	0.224228	1.428631
					DAY:BLOCK	4	1481	1.115982	0.34729		Middle - Older	0.058146	75.69673	2.051518	0.107076	0.619024	-0.00887	1.246922
					AGE:DAY:BLOCK	8	1481	3.131654	**0.00162**		Young - Middle	0.014007	75.8786	0.538613	0.852564	0.149124	-0.40405	0.702301
										day 3	Young - Older	0.076204	75.8786	2.930189	**0.012299**	0.81127	0.210566	1.411974
											Middle - Older	0.062197	75.8786	2.193101	0.078833	0.662146	0.030144	1.294149
											Young - Middle	-0.007	75.69673	-0.26946	0.960785	-0.07456	-0.62612	0.477003
										day 4	Young - Older	0.040223	75.69673	1.547597	0.274792	0.428218	-0.13708	0.993511
											Middle - Older	0.047227	75.69673	1.666264	0.22484	0.502778	-0.1161	1.121654
											Young - Middle	-0.01204	75.56009	-0.46357	0.888484	-0.12821	-0.68039	0.423968
										day 5	Young - Older	0.021121	75.56009	0.813021	0.69616	0.224859	-0.32998	0.779696
											Middle - Older	0.033164	75.56009	1.170647	0.474273	0.353069	-0.25656	0.962701
											day 1 - day 2	-0.0376	1481	-3.24898	**0.010396**	-0.40034	-0.67249	-0.1282
											day 1 - day 3	-0.05016	1481	-4.32868	**0.000156**	-0.53405	-0.82557	-0.24252
											day 1 - day 4	-0.05014	1481	-4.3323	**0.000153**	-0.53383	-0.82507	-0.24259
											day 1 - day 5	-0.04937	1481	-4.26905	**0.000202**	-0.52555	-0.81529	-0.2358
										Young	day 2 - day 3	-0.01256	1481	-1.08272	0.815519	-0.1337	-0.38278	0.115376
											day 2 - day 4	-0.01254	1481	-1.08231	0.815724	-0.13349	-0.38226	0.115281
											day 2 - day 5	-0.01176	1481	-1.01609	0.848043	-0.1252	-0.37338	0.122974
Accuracy	LMER	Per. Correct	AGE,DAY,BLOCK	(1 + 1|ID)							day 3 - day 4	2.02E-05	1481	0.001738	1	0.000215	-0.24575	0.246179
											day 3 - day 5	0.000798	1481	0.068888	0.999995	0.008499	-0.23726	0.254255
											day 4 - day 5	0.000778	1481	0.067232	0.999995	0.008284	-0.23717	0.253736
											day 1 - day 2	-0.01691	1481	-1.20617	0.747838	-0.17999	-0.4819	0.121911
											day 1 - day 3	-0.03494	1481	-2.4896	0.09349	-0.37198	-0.68901	-0.05495
											day 1 - day 4	-0.05593	1481	-3.99019	**0.000661**	-0.59545	-0.94031	-0.25058
											day 1 - day 5	-0.06019	1481	-4.2982	**0.000178**	-0.64081	-0.99239	-0.28924
										Middle	day 2 - day 3	-0.01803	1481	-1.28373	0.701327	-0.19198	-0.49515	0.111182
											day 2 - day 4	-0.03902	1481	-2.78143	**0.04351**	-0.41545	-0.73701	-0.0939
											day 2 - day 5	-0.04329	1481	-3.08802	**0.017498**	-0.46082	-0.78742	-0.13422
											day 3 - day 4	-0.02099	1481	-1.49426	0.566373	-0.22347	-0.52849	0.081553
											day 3 - day 5	-0.02525	1481	-1.79927	0.37431	-0.26883	-0.57674	0.03907
											day 4 - day 5	-0.00426	1481	-0.304	0.998144	-0.04537	-0.34291	0.252174
											day 1 - day 2	-0.02207	1481	-1.57429	0.514196	-0.23493	-0.54007	0.070216
											day 1 - day 3	-0.03605	1481	-2.56866	0.076765	-0.38379	-0.70203	-0.06555
											day 1 - day 4	-0.07201	1481	-5.13729	**3.14E-06**	-0.76663	-1.13951	-0.39374
											day 1 - day 5	-0.09033	1481	-6.45053	**1.50E-09**	-0.9617	-1.37153	-0.55188
										Older	day 2 - day 3	-0.01398	1481	-0.99539	0.857507	-0.14886	-0.44993	0.152206
											day 2 - day 4	-0.04994	1481	-3.55969	**0.003513**	-0.5317	-0.8677	-0.1957
											day 2 - day 5	-0.06827	1481	-4.87022	**1.22E-05**	-0.72677	-1.09271	-0.36084
											day 3 - day 4	-0.03596	1481	-2.5599	0.078489	-0.38284	-0.70123	-0.06445
											day 3 - day 5	-0.05428	1481	-3.86788	**0.001083**	-0.57791	-0.92052	-0.23531
											day 4 - day 5	-0.01832	1481	-1.30722	0.686775	-0.19507	-0.49779	0.107638
					AGE	2	48.99998	27.97434	**7.87E-09**		Young - Middle	10.0237	57.78333	4.067446	**0.000423**	2.222246	0.946917	3.497575
					DAY	2	410	10.36045	**4.08E-05**	day 5	Young - Older	15.71304	57.78333	6.376083	**9.82E-08**	3.483569	1.982418	4.98472
					AGE:DAY	4	410	1.726828	0.143117		Middle - Older	5.689342	57.78333	2.117046	0.095219	1.261322	0.011863	2.510782
											Young - Middle	10.0269	57.78333	4.068742	**0.000421**	2.222955	0.947518	3.498391
										day 10	Young - Older	17.54548	57.78333	7.119656	**5.63E-09**	3.88982	2.304128	5.475511
											Middle - Older	7.518588	57.78333	2.797722	**0.018852**	1.666865	0.376669	2.95706
											Young - Middle	11.75296	57.78333	4.76915	**3.82E-05**	2.605622	1.268568	3.942676
										day 60	Young - Older	18.45429	57.78333	7.488433	**1.37E-09**	4.0913	2.462034	5.720567
											Middle - Older	6.701326	57.78333	2.493612	**0.040554**	1.485679	0.214914	2.756443
											Young - Middle	10.60119	49	4.483804	**0.000129**	2.350274	1.087538	3.613011
FU scores	LMER	Score	AGE,DAY	(1 + 1|ID)						All	Young - Older	17.2376	49	7.290697	**7.03E-09**	3.821563	2.275052	5.368074
											Middle - Older	6.636418	49	2.573952	**0.034474**	1.471289	0.242662	2.699915
											day 5 - day 10	-1.92449	410	-2.51073	**0.033209**	-0.43706	-0.80866	-0.06547
										Young	day 5 - day 60	-0.50385	410	-0.65734	0.788305	-0.11443	-0.46454	0.235687
											day 10 - day 60	1.42064	410	1.853397	0.153786	0.322635	-0.03862	0.683894
											day 5 - day 10	-1.9213	410	-2.06973	0.09745	-0.43634	-0.87758	0.004909
										Middle	day 5 - day 60	1.225407	410	1.320077	0.38479	0.278297	-0.15166	0.708249
											day 10 - day 60	3.146705	410	3.389806	**0.00221**	0.714634	0.242825	1.186443
											day 5 - day 10	-0.09205	410	-0.09916	0.994594	-0.02091	-0.44298	0.401173
										Older	day 5 - day 60	2.237392	410	2.410243	**0.043171**	0.508124	0.060234	0.956014
											day 10 - day 60	2.329443	410	2.509406	**0.033326**	0.529029	0.079036	0.979023
					AGE	2	48.99995	16.57653	**3.17E-06**									
Catch block scores	LMER	Score	AGE, DAY	(1 + 1|ID)	DAY	5	245	1.233546	0.293915									
					AGE:DAY	10	245	0.807684	0.621469									

Table S4. Statistical tests run on behavioral data of the second experiment.

					ANOVA				
Aspect	**Model**	**Dependent**	**Independent**	**Random**	**ANOVA param.**	**DF num.**	**DF den.**	**F**	**p**
Baseline	LM	Score	AGE,STIM	NA	AGE	2		6.108802	**0.00402**
					STIM	1		0.001996	0.964523
					AGE:STIM	2		1.104202	0.33871
Training	LMER	Score	AGE,DAY,STIM	(1 + 1|ID)	AGE	2	54.99973	12.39233	**3.61E-05**
					DAY	4	1745	392.5667	**2.70E-241**
					STIM	1	54.99973	1.622449	0.208107
					AGE:DAY	8	1745	22.91452	**1.39E-33**
					AGE:STIM	2	54.99973	0.680037	0.510806
					DAY:STIM	4	1745	2.72677	**0.027954**
					AGE:DAY:STIM	8	1745	5.243177	**1.67E-06**
Speed	LMER	Seq. Number	AGE,DAY,STIM	(1 + 1|ID)	AGE	2	54.99969	26.35831	**9.38E-09**
					DAY	4	1745	1152.315	**0**
					STIM	1	54.99969	4.571259	**0.036971**
					AGE:DAY	8	1745	92.13703	**9.04E-128**
					AGE:STIM	2	54.99969	0.510373	0.603087
					DAY:STIM	4	1745	11.20811	**5.58E-09**
					AGE:DAY:STIM	8	1745	2.193037	**0.025422**
Accuracy	LMER	Per. Correct	AGE,DAY,STIM	(1 + 1|ID)	AGE	2	55	5.36158	**0.00746**
					DAY	4	1745	7.115792	**1.11E-05**
					STIM	1	55	0.029438	0.864402
					AGE:DAY	8	1745	6.245986	**5.45E-08**
					AGE:STIM	2	55	7.31263	**0.001527**
					DAY:STIM	4	1745	2.190772	0.067767
					AGE:DAY:STIM	8	1745	6.361158	**3.66E-08**

Table S5. Statistical tests run on behavioral and electrophysiological data from the placebo groups of the second experiment.

					ANOVA					PostHoc tests								
Aspect	**Model**	**Dependent**	**Independent**	**Random**	**ANOVA param.**	**DF num.**	**DF den.**	**F**	**p**	**Level**	**Contrast**	**Estimate**	**DF**	**t**	**p**	**d**	**CI**	
Baseline	LM	Score	AGE	NA	AGE	2		2.2342	0.128025									
Baseline accuracy	LM	Per. Correct	AGE	NA	AGE	2		0.959892	0.396603									
Block 1 accuracy	LM	Per. Correct	AGE	NA	AGE	2		7.07238	**0.00368**	B1	Young - Middle	-0.09889	25	-1.48365	0.315589	-0.68169	-1.65036	0.28698
											Young - Older	0.150828	25	2.20547	0.08977	1.039668	0.018751	2.060585
											Middle - Older	0.249722	25	3.746412	**0.002633**	1.721358	0.640295	2.802421
Training	LMER	Score	AGE,DAY	(1 + 1|ID)	AGE	2	24.99991	12.6383	**0.000161**	day 1	Young - Middle	2.079861	32.63027	1.18927	0.467897	0.564413	-0.4163	1.545122
					DAY	4	800	185.2798	**2.44E-112**		Young - Older	2.503491	32.63027	1.395257	0.355068	0.679373	-0.33245	1.691193
					AGE:DAY	8	800	15.42003	**3.32E-21**		Middle - Older	0.42363	32.63027	0.242233	0.968203	0.114961	-0.85163	1.081548
										day 2	Young - Middle	5.084451	32.63027	2.907303	**0.017414**	1.37977	0.328791	2.430748
											Young - Older	6.968115	32.63027	3.883501	**0.001343**	1.89094	0.748907	3.032973
											Middle - Older	1.883664	32.63027	1.077084	0.534798	0.511171	-0.46691	1.489247
										day 3	Young - Middle	7.55981	32.63027	4.32272	**0.00039**	2.051509	0.906022	3.196995
											Young - Older	8.244156	32.63027	4.594669	**0.000179**	2.23722	1.040148	3.434292
											Middle - Older	0.684346	32.63027	0.391311	0.91927	0.185711	-0.78187	1.153289
										day 4	Young - Middle	7.001167	32.63027	4.003287	**0.000962**	1.89991	0.778219	3.021601
											Young - Older	9.812826	32.63027	5.468927	**1.40E-05**	2.662911	1.389787	3.936034
											Middle - Older	2.811659	32.63027	1.607714	0.256801	0.763001	-0.22974	1.75574
										day 5	Young - Middle	9.204791	32.63027	5.263325	**2.56E-05**	2.497908	1.275189	3.720627
											Young - Older	12.6187	32.63027	7.032711	**1.51E-07**	3.424343	1.996659	4.852026
											Middle - Older	3.413913	32.63027	1.952085	0.140464	0.926435	-0.07875	1.931621
Online learning D1	LM	ΔScore	AGE	NA	AGE	2		3.21531	0.057192									
Online learning D2-D5	LMER	ΔScore	AGE,DAY	(1 + 1|ID)	AGE	2	25	0.518973	0.601404									
					DAY	3	75	2.0123	0.119427									
					AGE:DAY	6	75	0.415053	0.866847									
Online slope D1	LM	Slope	AGE	NA	AGE	2		3.057761	0.064869									
Online slope D2-D5	LMER	Slope	AGE,DAY	(1 + 1|ID)	AGE	2	24.99995	0.825421	0.449639									
					DAY	3	75.00003	4.078163	**0.009714**									
					AGE:DAY	6	75.00004	1.332544	0.253411									
Offline learning	LM	ΔScore	AGE,NIGHT	NA	AGE	2		4.129986	**0.018906**	AGE	Young - Middle	2.19457	100	2.000396	0.117382	0.459559	-0.00344	0.922554
					NIGHT	3		0.620068	0.603626		Young - Older	3.148837	100	2.797554	**0.016858**	0.65939	0.191201	1.127578
					AGE:NIGHT	6		0.378325	0.891285		Middle - Older	0.954267	100	0.869834	0.660507	0.199831	-0.25969	0.65935
Speed	LMER	Seq. Number	AGE,DAY	(1 + 1|ID)	AGE	2	25	13.7418	**9.42E-05**	day 1	Young - Middle	2.133333	27.4524	1.334487	0.388703	1.046805	-0.5923	2.685907
					DAY	4	800	600.4129	**3.67E-239**		Young - Older	2.962963	27.4524	1.806523	0.186234	1.453895	-0.25368	3.161472
					AGE:DAY	8	800	40.8779	**7.82E-55**		Middle - Older	0.82963	27.4524	0.518967	0.862775	0.407091	-1.20588	2.020059
										day 2	Young - Middle	4.896296	27.4524	3.062833	**0.013082**	2.402562	0.637909	4.167215
											Young - Older	6.611111	27.4524	4.030805	**0.001124**	3.244004	1.324549	5.163459
											Middle - Older	1.714815	27.4524	1.072686	0.538656	0.841442	-0.78682	2.469699
										day 3	Young - Middle	6.72963	27.4524	4.209657	**0.000701**	3.30216	1.409288	5.195032
											Young - Older	9.111111	27.4524	5.555059	**1.90E-05**	4.470728	2.337861	6.603596
											Middle - Older	2.381481	27.4524	1.489714	0.311299	1.168568	-0.47804	2.815173
										day 4	Young - Middle	6.97963	27.4524	4.366042	**0.000462**	3.424832	1.512145	5.33752
											Young - Older	10.25926	27.4524	6.255087	**2.95E-06**	5.034113	2.789462	7.278763
											Middle - Older	3.27963	27.4524	2.051542	0.119009	1.60928	-0.07095	3.289512
										day 5	Young - Middle	8.214815	27.4524	5.138701	**5.81E-05**	4.030925	2.013176	6.048674
											Young - Older	11.77778	27.4524	7.180931	**2.70E-07**	5.779234	3.376166	8.182302
											Middle - Older	3.562963	27.4524	2.228778	0.084	1.748309	0.055431	3.441187
										Young	day 1 - day 2	-5.7963	800	-14.7788	**0**	-2.84418	-3.79017	-1.89819
											day 1 - day 3	-9.62963	800	-24.5527	**0**	-4.72516	-6.20704	-3.24328
											day 1 - day 4	-12.1296	800	-30.9269	**0**	-5.95188	-7.79385	-4.10992
											day 1 - day 5	-14.8148	800	-37.7733	**0**	-7.26948	-9.50213	-5.03682
											day 2 - day 3	-3.83333	800	-9.77384	**0**	-1.88098	-2.57307	-1.18888
											day 2 - day 4	-6.33333	800	-16.1481	**0**	-3.1077	-4.12663	-2.08877
											day 2 - day 5	-9.01852	800	-22.9945	**0**	-4.42529	-5.82001	-3.03058
											day 3 - day 4	-2.5	800	-6.37425	**0**	-1.22672	-1.7682	-0.68524
											day 3 - day 5	-5.18519	800	-13.2207	**0**	-2.54432	-3.40875	-1.67988
											day 4 - day 5	-2.68519	800	-6.84641	**0**	-1.31759	-1.87824	-0.75694
										Middle	day 1 - day 2	-3.03333	800	-8.15244	**0**	-1.48843	-2.07371	-0.90314
											day 1 - day 3	-5.03333	800	-13.5277	**0**	-2.4698	-3.30499	-1.63462
											day 1 - day 4	-7.28333	800	-19.5748	**0**	-3.57386	-4.71722	-2.43049
											day 1 - day 5	-8.73333	800	-23.4719	**0**	-4.28536	-5.63379	-2.93693
											day 2 - day 3	-2	800	-5.37524	**9.91E-07**	-0.98138	-1.45901	-0.50375
											day 2 - day 4	-4.25	800	-11.4224	**0**	-2.08543	-2.8186	-1.35226
											day 2 - day 5	-5.7	800	-15.3194	**0**	-2.79693	-3.72158	-1.87228
											day 3 - day 4	-2.25	800	-6.04714	**1.51E-08**	-1.10405	-1.60555	-0.60255
											day 3 - day 5	-3.7	800	-9.94419	**0**	-1.81555	-2.47988	-1.15123
											day 4 - day 5	-1.45	800	-3.89705	**0.000998**	-0.7115	-1.14321	-0.27979
										Older	day 1 - day 2	-2.14815	800	-5.47713	**5.69E-07**	-1.05407	-1.56124	-0.54691
											day 1 - day 3	-3.48148	800	-8.87673	**0**	-1.70833	-2.35823	-1.05843
											day 1 - day 4	-4.83333	800	-12.3235	**0**	-2.37167	-3.19001	-1.55332
											day 1 - day 5	-6	800	-15.2982	**0**	-2.94414	-3.91767	-1.9706
											day 2 - day 3	-1.33333	800	-3.3996	**0.006351**	-0.65425	-1.09562	-0.21289
											day 2 - day 4	-2.68519	800	-6.84641	**0**	-1.31759	-1.87824	-0.75694
											day 2 - day 5	-3.85185	800	-9.82106	**0**	-1.89006	-2.58442	-1.19571
											day 3 - day 4	-1.35185	800	-3.44681	**0.005387**	-0.66334	-1.10594	-0.22074
											day 3 - day 5	-2.51852	800	-6.42146	**0**	-1.23581	-1.77918	-0.69245
											day 4 - day 5	-1.16667	800	-2.97465	**0.0251**	-0.57247	-1.00332	-0.14162
Accuracy	LMER	Per. Correct	AGE,DAY	(1 + 1|ID)	AGE	2	24.99996	6.075138	**0.007075**	day 1	Young - Middle	-0.06364	35.37045	-1.55259	0.27931	-0.6517	-1.52556	0.222155
					DAY	4	800	17.144	**1.68E-13**		Young - Older	0.124837	35.37045	2.968616	**0.014414**	1.278457	0.324453	2.232462
					AGE:DAY	8	800	4.508314	**2.25E-05**		Middle - Older	0.188473	35.37045	4.598326	**0.000153**	1.930162	0.901015	2.959308
										day 2	Young - Middle	-0.03252	35.37045	-0.79335	0.709508	-0.33301	-1.19064	0.524622
											Young - Older	0.14517	35.37045	3.452149	**0.004066**	1.486695	0.506044	2.467345
											Middle - Older	0.177687	35.37045	4.335181	**0.000332**	1.819706	0.808736	2.830676
										day 3	Young - Middle	-0.01486	35.37045	-0.36248	0.930278	-0.15215	-1.00519	0.700889
											Young - Older	0.061324	35.37045	1.458285	0.322883	0.628022	-0.26591	1.52195
											Middle - Older	0.076181	35.37045	1.85865	0.165728	0.780174	-0.10306	1.663407
										day 4	Young - Middle	-0.02676	35.37045	-0.65289	0.791957	-0.27405	-1.12982	0.581711
											Young - Older	0.080799	35.37045	1.92139	0.147543	0.827461	-0.08089	1.735809
											Middle - Older	0.107559	35.37045	2.624194	**0.033275**	1.101514	0.18815	2.014877
										day 5	Young - Middle	-0.01066	35.37045	-0.26	0.963459	-0.10914	-0.96159	0.743315
											Young - Older	0.071427	35.37045	1.698545	0.219854	0.731492	-0.16945	1.632436
											Middle - Older	0.082084	35.37045	2.002672	0.126358	0.840628	-0.04756	1.728812
										Young	day 1 - day 2	-0.04374	800	-2.32756	0.13722	-0.44794	-0.86085	-0.03503
											day 1 - day 3	-0.05876	800	-3.12669	**0.015702**	-0.60173	-1.03178	-0.17168
											day 1 - day 4	-0.05397	800	-2.87216	**0.033935**	-0.55275	-0.97687	-0.12862
											day 1 - day 5	-0.07742	800	-4.11972	**0.000402**	-0.79284	-1.24979	-0.33589
											day 2 - day 3	-0.01502	800	-0.79913	0.930852	-0.15379	-0.54704	0.239457
											day 2 - day 4	-0.01023	800	-0.54459	0.982589	-0.10481	-0.49661	0.286998
											day 2 - day 5	-0.03368	800	-1.79215	0.378822	-0.3449	-0.74885	0.059053
											day 3 - day 4	0.004783	800	0.254535	0.999075	0.048985	-0.34184	0.439809
											day 3 - day 5	-0.01866	800	-0.99302	0.858529	-0.19111	-0.58582	0.203605
											day 4 - day 5	-0.02344	800	-1.24756	0.723353	-0.24009	-0.63719	0.157008
										Middle	day 1 - day 2	-0.01262	800	-0.70791	0.954707	-0.12925	-0.50177	0.243273
											day 1 - day 3	-0.00998	800	-0.55967	0.980728	-0.10218	-0.47395	0.269585
											day 1 - day 4	-0.0171	800	-0.95904	0.873316	-0.1751	-0.54929	0.199097
											day 1 - day 5	-0.02444	800	-1.37079	0.646622	-0.25027	-0.62827	0.127727
											day 2 - day 3	0.002643	800	0.148248	0.999891	0.027066	-0.34353	0.397661
											day 2 - day 4	-0.00448	800	-0.25112	0.999123	-0.04585	-0.41661	0.324912
											day 2 - day 5	-0.01182	800	-0.66288	0.964192	-0.12102	-0.4933	0.251247
											day 3 - day 4	-0.00712	800	-0.39937	0.994636	-0.07291	-0.44406	0.298234
											day 3 - day 5	-0.01446	800	-0.81113	0.927235	-0.14809	-0.52124	0.225056
											day 4 - day 5	-0.00734	800	-0.41176	0.993967	-0.07518	-0.44637	0.296012
										Older	day 1 - day 2	-0.02341	800	-1.24553	0.724568	-0.2397	-0.63678	0.157377
											day 1 - day 3	-0.12227	800	-6.50646	**0**	-1.25217	-1.79337	-0.71097
											day 1 - day 4	-0.09801	800	-5.2156	**2.31E-06**	-1.00374	-1.49642	-0.51107
											day 1 - day 5	-0.13083	800	-6.96183	**0**	-1.33981	-1.89948	-0.78013
											day 2 - day 3	-0.09886	800	-5.26092	**1.82E-06**	-1.01247	-1.50673	-0.5182
											day 2 - day 4	-0.07461	800	-3.97007	**0.000745**	-0.76404	-1.21658	-0.3115
											day 2 - day 5	-0.10742	800	-5.7163	**1.46E-07**	-1.1001	-1.61086	-0.58934
											day 3 - day 4	0.024258	800	1.290853	0.696966	0.248425	-0.14913	0.645984
											day 3 - day 5	-0.00856	800	-0.45538	0.991132	-0.08764	-0.47906	0.30379
											day 4 - day 5	-0.03282	800	-1.74623	0.406178	-0.33606	-0.73935	0.067223
					AGE	2	25	12.07554	**0.000214**	day 5	Young - Middle	7.681741	31.64578	2.953826	**0.015768**	1.911783	0.473198	3.350368
					DAY	2	218	10.40153	**4.85E-05**		Young - Older	11.81251	31.64578	4.427201	**0.000305**	2.939823	1.323855	4.555791
					AGE:DAY	4	218	1.377101	0.24284		Middle - Older	4.130771	31.64578	1.588387	0.265335	1.02804	-0.32658	2.382655
										day 10	Young - Middle	8.009999	31.64578	3.080049	**0.011538**	1.993478	0.544917	3.442039
											Young - Older	12.22752	31.64578	4.582741	**0.000196**	3.043107	1.409969	4.676245
											Middle - Older	4.217519	31.64578	1.621744	0.25147	1.049629	-0.30648	2.405739
											Young - Middle	10.30596	31.64578	3.962904	**0.001119**	2.564881	1.037311	4.092451

					ANOVA					PostHoc tests								
Aspect	**Model**	**Dependent**	**Independent**	**Random**	**ANOVA param.**	**DF num.**	**DF den.**	**F**	**p**	**Level**	**Contrast**	**Estimate**	**DF**	**t**	**p**	**d**	**CI**	
FU scores	LMER	Score	AGE,DAY	(1 + 1|ID)						day 60	Young - Older	11.73988	31.64578	4.399979	**0.00033**	2.921747	1.308741	4.534753
											Middle - Older	1.433923	31.64578	0.55138	0.84652	0.356866	-0.96641	1.680145
										Young	day 5 - day 10	-0.60415	218	-0.55244	0.845334	-0.15036	-0.70682	0.406107
											day 5 - day 60	1.403806	218	1.283668	0.405902	0.34937	-0.2151	0.913843
											day 10 - day 60	2.007953	218	1.836113	0.160307	0.499727	-0.07486	1.074318
										Middle	day 5 - day 10	-0.27589	218	-0.26593	0.961775	-0.06866	-0.59523	0.457908
											day 5 - day 60	4.028022	218	3.882544	**0.000402**	1.002468	0.396191	1.608746
											day 10 - day 60	4.303911	218	4.148469	**0.000142**	1.07113	0.454343	1.687917
										Older	day 5 - day 10	-0.18914	218	-0.17295	0.983646	-0.04707	-0.60188	0.507735
											day 5 - day 60	1.331174	218	1.217252	0.444252	0.331294	-0.23219	0.894782
											day 10 - day 60	1.520315	218	1.390207	0.347788	0.378366	-0.18779	0.944524
Catch blocks	LMER	Score	AGE,DAY	(1 + 1|ID)	AGE	2	25	8.715846	**0.001343**									
					DAY	5	125	2.02342	0.079779									
					AGE:DAY	10	125	0.783287	0.644731									
SICIrest at Baseline	LM	SICI ratio (SICI/Test)	AGE	NA	AGE	2		0.097957	0.907064									
SICIrest change Tr. D1	LM	ΔSICI ratio	AGE,TimePoint	NA	AGE	2		0.268557	0.765672									
					TimePoint	1		0.02577	0.873166									
					AGE:TimePoint	2		0.111119	0.895071									
SICIrest change Tr. Week	LM	ΔSICI ratio	AGE,TimePoint	NA	AGE	2		0.034383	0.966226									
					TimePoint	1		0.803903	0.374499									
					AGE:TimePoint	2		0.244467	0.784112									

Table S6. Statistical tests run on data from the second experiment, comparing verum and placebo groups for each age group.

						ANOVA					PostHoc tests								
Aspect	**Age Group**	**Model**	**Dependent**	**Independent**	**Random**	**ANOVA param.**	**DF num.**	**DF den.**	**F**	**p**	**Level**	**Contrast**	**Estimate**	**DF**	**t**	**p**	**d**	**CI**	
Baseline	Young	LM	Score	STIM	NA	STIM	1		0.52376	0.479083									
	Middle						1		1.849072	0.191654									
	Older						1		0.015125	0.903289									
Block 1 accuracy	Young	LM	Per. Correct	STIM	NA	STIM	1		1.229327	0.282978									
	Middle						1		2.850293	0.109615									
	Older						1		0.038756	0.845826									
Training	Young	LMER	Score	STIM,DAY	(1 + 1|ID)	STIM	1	17	0.090493	0.767199	day 1	Verum vs. Placebo	0.582313	20.04746	0.196147	0.84647	0.116902	-1.12665	1.360452
						DAY	4	543	151.4861	**6.11E-87**	day 2		1.5869	20.04746	0.534534	0.598851	0.318578	-0.92831	1.565463
						STIM:DAY	4	543	5.150391	**0.000444**	day 3		2.201949	20.04746	0.741708	0.466866	0.442052	-0.80839	1.692493
											day 4		2.597604	20.04746	0.874981	0.391947	0.521482	-0.73185	1.774814
											day 5		-2.68403	20.04746	-0.90409	0.376683	-0.53883	-1.79286	0.715193
	Middle	LMER	Score	STIM,DAY	(1 + 1|ID)	STIM	1	17	0.027385	0.870515	day 1	Verum vs. Placebo	-1.45057	20.31419	-0.71386	0.483438	-0.41001	-1.61351	0.793501
						DAY	4	543	140.4404	**2.48E-82**	day 2		-0.36435	20.31419	-0.1793	0.859477	-0.10298	-1.3003	1.094332
						STIM:DAY	4	543	3.380069	**0.009564**	day 3		1.051544	20.31419	0.517486	0.610406	0.297221	-0.90315	1.497596
											day 4		0.787435	20.31419	0.387513	0.702407	0.22257	-0.97628	1.421418
											day 5		1.583947	20.31419	0.779492	0.444677	0.447705	-0.75707	1.652481
	Older	LMER	Score	STIM,DAY	(1 + 1|ID)	STIM	1	20.99994	4.997128	**0.03638**	day 1	Verum vs. Placebo	2.771352	24.74045	1.682165	0.105118	0.934891	-0.24504	2.114822
						DAY	4	659	95.52916	**4.39E-64**	day 2		4.138842	24.74045	2.512208	**0.018897**	1.396202	0.174931	2.617473
						STIM:DAY	4	659	2.719338	**0.028847**	day 3		2.583184	24.74045	1.56795	0.129596	0.871414	-0.30402	2.046852
											day 4		3.622439	24.74045	2.19876	**0.03747**	1.221998	0.018087	2.425908
											day 5		4.558031	24.74045	2.766649	**0.010556**	1.537611	0.300761	2.774462
Online learning D1	Young	LM	ΔScore	STIM	NA	STIM	1		0.005869	0.93983									
	Middle	LM	ΔScore	STIM	NA	STIM	1		0.091144	0.766389									
	Older	LM	ΔScore	STIM	NA	STIM	1		9.192547	**0.006341**	day 1	Verum vs. Placebo	3.619165	21	3.031921	**0.006341**	1.295378	0.322132	2.268624
Online learning D2-D5	Young	LMER	ΔScore	STIM,DAY	(1 + 1|ID)	STIM	1	17	0.170196	0.685094									
						DAY	3	51	1.493668	0.227352									
						STIM:DAY	3	51	0.228043	0.876449									
	Middle	LM	ΔScore	STIM,DAY	NA	STIM	1		0.130912	0.71861									
						DAY	3		3.70962	**0.015589**									
						STIM:DAY	3		0.282582	0.837797									
	Older	LMER	ΔScore	STIM,DAY	(1 + 1|ID)	STIM	1	21	0.007162	0.933356									
						DAY	3	63	1.337383	0.270225									
						STIM:DAY	3	63	0.504896	0.6803									
Online slope D1	Young	LM	Slope	STIM	NA	STIM	1		0.007103	0.933821									
	Middle	LM	Slope	STIM	NA	STIM	1		0.226887	0.639907									
	Older	LM	Slope	STIM	NA	STIM	1		7.228349	**0.013754**	day 1	Verum vs. Placebo	3.499548	21	2.688559	**0.013754**	1.148678	0.192907	2.104449
Online slope D2-D5	Young	LMER	Slope	STIM,DAY	(1 + 1|ID)	STIM	1	17	0.001108	0.973835									
						DAY	3	51	2.221858	0.096831									
						STIM:DAY	3	51	0.61681	0.607289									
	Middle	LM	Slope	STIM,DAY	NA	STIM	1		1.038524	0.311777									
						DAY	3		7.939899	**0.000129**									
						STIM:DAY	3		1.413525	0.246378									
	Older	LMER	Slope	STIM,DAY	(1 + 1|ID)	STIM	1	21.00008	0.229233	0.637041									
			Slope			DAY	3	62.99986	1.757451	0.16441									
			Slope			STIM:DAY	3	62.99986	0.49405	0.687702									
Offline learning	Young	LM	ΔScore	STIM,NIGHT	NA	STIM	1		0.0229	0.880166									
						NIGHT	3		0.147828	0.930739									
						STIM:NIGHT	3		0.447888	0.719593									
	Middle	LM	ΔScore	STIM,NIGHT	NA	STIM	1		0.210953	0.647487									
						NIGHT	3		1.281362	0.2878									
						STIM:NIGHT	3		0.125095	0.944954									
	Older	LM	ΔScore	STIM,NIGHT	NA	STIM	1		0.040191	0.841592									
						NIGHT	3		1.314234	0.275203									
						STIM:NIGHT	3		1.630893	0.188352									
Speed	Young	LMER	Seq. Number	STIM,DAY	(1 + 1|ID)	STIM	1	17	2.078396	0.167566	day 1	Verum vs. Placebo	1.416667	18.36444	0.536224	0.59824	0.462183	-1.35172	2.276081
						DAY	4	543	511.9617	**1.21E-182**	day 2		3.103704	18.36444	1.174786	0.255089	1.012572	-0.82261	2.847754
						STIM:DAY	4	543	6.612859	**3.35E-05**	day 3		4.52037	18.36444	1.71101	0.103918	1.474755	-0.39015	3.339664
											day 4		4.787037	18.36444	1.811946	0.08638	1.561754	-0.30992	3.433428
											day 5		4.851852	18.36444	1.836479	0.082529	1.5829	-0.29047	3.456273
	Middle	LMER	Seq. Number	STIM,DAY	(1 + 1|ID)	STIM	1	16.99999	2.2041	0.15595	day 1	Verum vs. Placebo	0.948148	19.20977	0.61181	0.547837	0.421402	-1.02501	1.867819
						DAY	4	543	330.4279	**6.51E-144**	day 2		1.896296	19.20977	1.22362	0.235893	0.842805	-0.62102	2.306629
						STIM:DAY	4	543	3.795345	**0.0047**	day 3		2.859259	19.20977	1.84499	0.080514	1.270791	-0.22213	2.763708
											day 4		2.553704	19.20977	1.647825	0.115649	1.134988	-0.34749	2.617463
											day 5		2.9	19.20977	1.871279	0.076617	1.288899	-0.20549	2.783291
	Older	LMER	Seq. Number	STIM,DAY	(1 + 1|ID)	STIM	1	21	0.496911	0.488606									
						DAY	4	659	264.3163	**2.17E-135**									
						STIM:DAY	4	659	0.703884	0.589453									
Accuracy	Young	LMER	Per. Correct	STIM,DAY	(1 + 1|ID)	STIM	1	17	0.155273	0.698446	day 1	Verum vs. Placebo	0.00426	22.85555	0.129455	0.89813	0.058486	-0.8766	0.993576
						DAY	4	543	6.412699	**4.78E-05**	day 2		-0.00041	22.85555	-0.01236	0.990247	-0.00558	-0.9405	0.929338
						STIM:DAY	4	543	5.873906	**0.000124**	day 3		0.001119	22.85555	0.034016	0.97316	0.015368	-0.91956	0.950299
											day 4		0.005933	22.85555	0.180319	0.858491	0.081466	-0.85378	1.016716
											day 5		-0.0711	22.85555	-2.16077	**0.041439**	-0.97621	-1.95743	0.00501
											Verum	day 1 - day 2	-0.03907	543	-2.93848	**0.028267**	-0.53649	-0.94824	-0.12474
												day 2 - day 3	-0.01654	543	-1.24411	0.725431	-0.22714	-0.61126	0.156976
												day 3 - day 4	-3.08E-05	543	-0.00232	1	-0.00042	-0.37824	0.377393
												day 4 - day 5	0.053588	543	4.030032	**0.000608**	0.73578	0.296299	1.175261
											Placebo	day 1 - day 2	-0.04374	543	-3.1206	**0.016238**	-0.60056	-1.03895	-0.16217
												day 2 - day 3	-0.01502	543	-1.07141	0.821188	-0.20619	-0.60938	0.196999
												day 3 - day 4	0.004783	543	0.341259	0.99708	0.065675	-0.33308	0.464432
												day 4 - day 5	-0.02344	543	-1.67262	0.451833	-0.3219	-0.73208	0.088289
	Middle	LMER	Per. Correct	STIM,DAY	(1 + 1|ID)	STIM	1	17	4.111138	0.058575	day 1	Verum vs. Placebo	-0.14785	21.71704	-3.39216	**0.002655**	-1.67475	-2.82044	-0.52907
						DAY	4	543	13.05669	**3.69E-10**	day 2		-0.10713	21.71704	-2.45805	**0.022432**	-1.21357	-2.30346	-0.12368
						STIM:DAY	4	543	7.065989	**1.50E-05**	day 3		-0.06873	21.71704	-1.57692	0.12927	-0.77855	-1.83055	0.273456
											day 4		-0.04822	21.71704	-1.10623	0.280733	-0.54616	-1.58437	0.492054
											day 5		-0.04364	21.71704	-1.0013	0.327711	-0.49435	-1.53013	0.541425
	Older	LMER	Per. Correct	STIM,DAY	(1 + 1|ID)	STIM	1	21	9.092071	**0.006587**	day 1	Verum vs. Placebo	0.113522	35.17942	2.841075	**0.00743**	0.927315	0.20904	1.64559
						DAY	4	659	3.554149	**0.007023**	day 2		0.171254	35.17942	4.28591	**0.000134**	1.398903	0.615213	2.182592
						STIM:DAY	4	659	4.054401	**0.002959**	day 3		0.0529	35.17942	1.323904	0.194073	0.432117	-0.24288	1.107118
											day 4		0.100713	35.17942	2.520517	**0.016405**	0.822686	0.115919	1.529453
											day 5		0.09076	35.17942	2.271434	**0.029345**	0.741386	0.042722	1.44005
FU scores	Young	LMER	Score	STIM,DAY	(1 + 1|ID)	STIM	1	16.99982	0.293404	0.595076	day	day 5 - day 10	-0.94675	148	-1.03171	0.558089	-0.19353	-0.58954	0.202492
						DAY	2	148.0001	3.47365	**0.033554**		day 5 - day 60	1.454159	148	1.584657	0.255451	0.297245	-0.10481	0.699304
						STIM:DAY	2	148.0001	0.10859	0.897169		day 10 - day 60	2.400907	148	2.616369	**0.02638**	0.490771	0.071136	0.910406
	Middle	LMER	Score	STIM,DAY	(1 + 1|ID)	STIM	1	17	0.706449	0.412291	day	day 5 - day 10	-1.54311	148	-2.12247	0.088768	-0.39813	-0.80832	0.012069
						DAY	2	148	14.3154	**2.07E-06**		day 5 - day 60	2.321085	148	3.192525	**0.004877**	0.598845	0.166169	1.03152
						STIM:DAY	2	148	2.971993	0.054266		day 10 - day 60	3.864197	148	5.314991	**1.15E-06**	0.996971	0.499612	1.49433
	Older	LMER	Score	STIM,DAY	(1 + 1|ID)	STIM	1	20.99996	5.698807	**0.026458**	stim	Verum vs. Placebo	4.916899	21	2.387217	**0.026458**	1.490656	0.113987	2.867324
						DAY	2	180	5.581149	**0.00445**	day	day 5 - day 10	-0.43619	182	-0.79852	0.70441	-0.13595	-0.48853	0.21663
						STIM:DAY	2	180	0.122867	0.884456		day 5 - day 60	1.409152	182	2.57971	**0.028644**	0.439199	0.064565	0.813833
												day 10 - day 60	1.845337	182	3.378226	**0.002558**	0.575147	0.183955	0.96634
SICI at Baseline	Young	LM	SICI ratio (SICI/Test)	STIM	NA	STIM	1		1.209097	0.287781									
	Middle	LM	SICI ratio (SICI/Test)	STIM	NA	STIM	1		1.625375	0.221739									
	Older	LM	SICI ratio (SICI/Test)	STIM	NA	STIM	1		0.076384	0.78603									
SICIrest change Tr. D1	Young	LM	ΔSICI ratio	STIM,TimePoint	NA	STIM	1		2.838527	0.101759									
						TimePoint	1		0.251919	0.619163									
						STIM:TimePoint	1		0.016824	0.897611									
	Middle	LM	ΔSICI ratio	STIM,TimePoint	NA	STIM	1		2.457586	0.127807									
						TimePoint	1		0.039016	0.844795									
						STIM:TimePoint	1		0.007487	0.931641									
	Older	LM	ΔSICI ratio	STIM,TimePoint	NA	STIM	1		0.016204	0.899556									
						TimePoint	1		0.002271	0.962305									
						STIM:TimePoint	1		0.2572	0.615758									
SICIrest change Tr. Week	Young	LM	ΔSICI ratio	STIM,TimePoint	NA	STIM	1		0.979849	0.329662									
						TimePoint	1		0.14306	0.707755									
						STIM:TimePoint	1		0.111089	0.741082									
	Middle	LM	ΔSICI ratio	STIM,TimePoint	NA	STIM	1		0.895513	0.351306									
						TimePoint	1		0.080159	0.778965									
						STIM:TimePoint	1		0.692909	0.411544									
	Older	LM	ΔSICI ratio	STIM,TimePoint	NA	STIM	1		0.027865	0.868548									
						TimePoint	1		0.45041	0.507275									
						STIM:TimePoint	1		0.018168	0.89368									

Table S7. Statistical tests run on data from the second experiment, comparing young-like and old-like older adults in the verum group. Labels are either "Young-like" or "Old-Like".

					ANOVA					PostHoc tests								
Aspect	**Model**	**Dependent**	**Independent**	**Random**	**ANOVA param.**	**DF num.**	**DF den.**	**F**	**p**	**Level**	**Contrast**	**Estimate**	**DF**	**t**	**p**	**d**	**CI**	
Baseline speed	LM	Seq. Number	LABEL	NA	LABEL	1		6.0615	**0.029928**	BL	YoungLike - OldLike	4.208333	12	2.462011	**0.029928**	1.329638	0.077816	2.581461
Block 1 speed	LM	Seq. Number	LABEL	NA	LABEL	1		6.817824	**0.022756**	B1	YoungLike - OldLike	4.25	12	2.611096	**0.022756**	1.410153	0.149271	2.671036
Block 1 accuracy	LM	Per. Correct	LABEL	NA	LABEL	1		0.097421	0.760304									
Training	LMER	Score	LABEL,DAY	(1 + 1|ID)	LABEL	1	12	23.68295	**0.000387**	day 1	YoungLike - OldLike	3.896406	16.15486	2.569147	**0.020478**	1.361515	0.16111	2.56192
					DAY	4	398	84.58827	**6.20E-52**	day 2		6.578695	16.15486	4.337749	**0.000499**	2.298783	0.966261	3.631304
					LABEL:DAY	4	398	9.701391	**1.70E-07**	day 3		7.004135	16.15486	4.618268	**0.000278**	2.447443	1.089343	3.805544
										day 4		7.411037	16.15486	4.886565	**0.00016**	2.589626	1.206045	3.973207
										day 5		9.362692	16.15486	6.173414	**1.28E-05**	3.27159	1.753634	4.789546
Online slope D1	LM	Slope	LABEL,BLOCK	NA	LABEL	1		35.0624	**7.62E-08**									
					BLOCK	1		27.45138	**1.28E-06**									
					LABEL:BLOCK	1		2.214154	0.140681									
Online slope D2-D5	LM	Slope	LABEL,BLOCK	NA	LABEL	1		289.9642	**3.54E-47**									
					BLOCK	1		13.87193	**0.00023**									
					LABEL:BLOCK	1		0.083031	0.773411									
Speed	LMER	Seq. Number	LABEL,DAY	(1 + 1|ID)	DAY	4	398	224.2692	**1.49E-100**	day 1	YoungLike - OldLike	2.777778	13.2841	1.941788	0.073675	1.719401	-0.26609	3.704889
					LABEL	1	11.99999	16.75407	**0.00149**	day 2		5.590278	13.2841	3.907848	**0.001731**	3.460294	1.257319	5.663269
					DAY:LABEL	4	398	26.0044	**3.62E-19**	day 3		6.180556	13.2841	4.320478	**0.000792**	3.825667	1.562478	6.088856
										day 4		6.270833	13.2841	4.383586	**0.000704**	3.881547	1.608767	6.154328
										day 5		7.722222	13.2841	5.39817	**0.000113**	4.779934	2.340342	7.219527
Speed slope D1	LM	Seq. Number	LABEL,BLOCK	NA	LABEL	1		44.78938	**2.75E-09**	Slope D1	YoungLike - OldLike	0.547619	80	2.850178	**0.005555**	0.290895	0.070579	0.511211
					BLOCK	1		27.93586	**1.06E-06**									
					LABEL:BLOCK	1		8.123515	**0.005555**									
Speed slope D2-D5	LM	Seq. Number	LABEL,BLOCK	NA	LABEL	1		305.058	**6.53E-49**									
					BLOCK	1		13.34315	**0.000301**									
					LABEL:BLOCK	1		1.296887	0.255604									
Accuracy	LMER	Per. Correct	LABEL,Day	(1 + 1|ID)	LABEL	1	12	0.007673	0.931642	Day	day 1 - day 2	-0.08039	398	-4.57962	**6.10E-05**	-0.71397	-1.10482	-0.32313
					DAY	4	398	11.02619	**1.72E-08**		day 1 - day 3	-0.05978	398	-3.40553	**0.0065**	-0.53093	-0.89339	-0.16847
					LABEL:DAY	4	398	0.305363	0.874357		day 1 - day 4	-0.08503	398	-4.84412	**1.80E-05**	-0.75521	-1.15326	-0.35715
											day 1 - day 5	-0.10883	398	-6.19978	**1.41E-08**	-0.96656	-1.40542	-0.5277
											day 2 - day 3	0.020609	398	1.17409	0.766217	0.183043	-0.14569	0.511781
											day 2 - day 4	-0.00464	398	-0.2645	0.998922	-0.04124	-0.3654	0.28293
											day 2 - day 5	-0.02844	398	-1.62016	0.485326	-0.25259	-0.58562	0.080446
											day 3 - day 4	-0.02525	398	-1.43859	0.603055	-0.22428	-0.55541	0.106847
											day 3 - day 5	-0.04905	398	-2.79425	**0.043143**	-0.43563	-0.78596	-0.0853
											day 4 - day 5	-0.0238	398	-1.35566	0.656414	-0.21135	-0.54168	0.118976

Table S8. Statistical tests run on scores given to rate attention and fatigue using a visual analog scale in the first experiment.

						ANOVA					Post-Hoc								
Aspect	AGE group	Model	Dependent	Independent	Random	Parameters	DF num.	DF den.	F	p	Level	Contrast	DF	Estimate	t	p	d	CI	
Attention	All	LMER	Att. Score	AGE,DAY,BLOCK	(1 + 1|ID)	AGE	2	45.68067	0.073668	0.92909									
						DAY	4	1767	3.033341	**0.016632**									
						BLOCK	1	1767	86.29617	**4.40E-20**									
						AGE:DAY	8	1767	2.666987	**0.006527**									
						AGE:BLOCK	2	1767	7.506309	**0.000567**									
						DAY:BLOCK	4	1767	0.699577	0.592234									
						AGE:DAY:BLOCK	8	1767	1.221993	0.281869									
	Young	LMER	Att. Score	DAY,BLOCK	(1 + 1|ID)	DAY	4	849	6.482129	**3.86E-05**	DAY	D1-D2	849	1.060739	8.743712	**0**	0.932083	0.573233	1.290933
						BLOCK	1	849	14.14725	**0.000181**		D2-D3	849	0.044119	0.363677	0.996265	0.038768	-0.18149	0.259026
						DAY:BLOCK	4	849	0.290771	0.884045		D3-D4	849	-0.2894	-2.38556	0.120209	-0.2543	-0.48745	-0.02115
												D4-D5	849	0.067699	0.558045	0.980936	0.059488	-0.1612	0.280173
	Middle	LMER	Att. Score	DAY,BLOCK	(1 + 1|ID)	DAY	4	381	2.293873	0.058878									
						BLOCK	1	381	17.26319	**4.02E-05**									
						DAY:BLOCK	4	381	0.487373	0.745025									
	Older	LMER	Att. Score	DAY,BLOCK	(1 + 1|ID)	DAY	4	537	0.40211	0.807169	DAY:BLOCK	D1 slope over BLOCKs	97	0.227049	6.395316	**5.64E-09**	1.430036	0.156587	0.297512
						BLOCK	1	537	84.79408	**7.39E-19**		D2 slope over BLOCKs	97	0.234001	7.023921	**2.98E-10**	1.570596	0.16788	0.300122
						DAY:BLOCK	4	537	2.954083	**0.019644**		D3 slope over BLOCKs	97	0.132602	3.776207	**0.000275**	0.844386	0.062908	0.202296
												D4 slope over BLOCKs	97	0.091858	4.088568	**8.96E-05**	0.914232	0.047267	0.136449
												D5 slope over BLOCKs	97	0.111586	5.220472	**1.02E-06**	1.167333	0.069163	0.154009
Corr. Attention and offline learning	All	LMER	Offline learning	Att.Diff.,AGE,NIGHT	(1 + 1|ID)	Att.Diff.	1	131.6857	0.50656	0.477891									
						AGE	2	49.97175	4.049703	**0.023444**									
						NIGHT	3	125.9367	0.639795	0.590779									
						Att.Diff.:AGE	2	128.0689	0.643882	0.526941									
						Att.Diff.:NIGHT	3	148.6348	0.641049	0.589766									
						AGE:NIGHT	6	125.8198	1.922057	0.082178									
						Att.Diff.:AGE:NIGHT	6	147.862	1.183845	0.318009									
Fatigue	All	LMER	Fatigue score	AGE,DAY,BLOCK	(1 + 1|ID)	AGE	2	45.71778	0.073813	0.928956									
						DAY	4	1767	2.244268	0.062122									
						BLOCK	1	1767	27.6279	**1.65E-07**									
						AGE:DAY	8	1767	6.368921	**3.55E-08**									
						AGE:BLOCK	2	1767	9.813098	**5.78E-05**									
						DAY:BLOCK	4	1767	1.219599	0.300426									
						AGE:DAY:BLOCK	8	1767	1.344472	0.216789									
	Young	LMER	Fatigue score	DAY,BLOCK	(1 + 1|ID)	DAY	4	849	12.24022	**1.11E-09**	DAY	D1-D2	849	1.384631	10.02207	**0.00E+00**	1.068356	0.676615	1.460097
						BLOCK	1	849	0.358259	5.50E-01		D2-D3	849	-0.02548	-0.18445	1.00E+00	-0.01966	-0.2393	0.199975
						DAY:BLOCK	4	849	0.171086	9.53E-01		D3-D4	849	0.067557	0.488982	9.88E-01	0.052126	-0.168	0.272251
												D4-D5	849	-0.34795	-2.51852	8.75E-02	-0.26848	-0.50268	-0.03427
	Middle	LMER	Fatigue score	DAY,BLOCK	(1 + 1|ID)	DAY	4	381	0.576733	0.679676									
						BLOCK	1	381	7.047336	**0.008271**									
						DAY:BLOCK	4	381	0.552292	0.697463									
	Older	LMER	Fatigue score	DAY,BLOCK	(1 + 1|ID)	DAY	4	537	2.094641	0.080233	DAY:BLOCK	D1 slope over BLOCKs	97	0.236446	7.241042	**1.06E-10**	1.619146	0.171637	0.301254
						BLOCK	1	537	54.27314	**6.62E-13**		D2 slope over BLOCKs	97	0.171471	5.743798	**1.06E-07**	1.284352	0.112221	0.230722
						DAY:BLOCK	4	537	4.144151	**0.002577**		D3 slope over BLOCKs	97	0.096373	2.979695	**0.003646**	0.66628	0.032181	0.160566
												D4 slope over BLOCKs	97	0.033703	1.433857	0.154829	0.32062	-0.01295	0.080355
												D5 slope over BLOCKs	97	0.096042	4.833883	**5.02E-06**	1.080889	0.056608	0.135475
Corr. Fatigue and offline learning	All	LMER	Offline learning	FatigueDiff,AGE,NIGHT	(1 + 1|ID)	Fatg.Diff.	1	147.2008	0.722465	0.396717									
						AGE	2	45.16342	4.983619	**0.011073**									
						NIGHT	3	123.0322	0.569456	0.63616									
						Fatg.Diff.:AGE	2	133.9185	0.519881	0.595786									
						Fatg.Diff.:NIGHT	3	151.4781	0.916891	0.434319									
						AGE:NIGHT	6	123.0875	2.222761	**0.045227**									
						Fatg.Diff.:AGE:NIGHT	6	149.2243	0.252344	0.957714									

Table S9. Statistical tests run on scores given to rate attention and fatigue using a visual analog scale in the second experiment.

						ANOVA					Post-Hoc								
Aspect	**AGE group**	**Model**	**Dependent**	**Independent**	**Random**	**Parameters**	**DF num.**	**DF den.**	**F**	**p**	**Level**	**Contrast**	**DF**	**Estimate**	**t**	**p**	**d**	**CI**	
Attention	All	LMER	Att. Score	AGE,STIM,DAY,BLOCK	(1 + 1|ID)	AGE	2	59.79038	0.083294	0.920187	**DAY**	D1-D2	2325	0.612498	10.64041	**8.99E-12**	0.689556	0.448646	0.930465
						STIM	1	59.79038	0.151111	0.698856		D2-D3	2325	-0.09956	-1.7295	0.41591	-0.11208	-0.24571	0.021553
						DAY	4	2325	7.966487	**2.24E-06**		D3-D4	2325	-0.05619	-0.97609	0.866064	-0.06326	-0.19408	0.067568
						BLOCK	1	2325	39.97953	**3.07E-10**		D4-D5	2325	0.027367	0.475425	0.989568	0.03081	-0.099	0.160618
						AGE:STIM	2	59.79038	1.856584	0.165098									
						AGE:DAY	8	2325	1.021196	0.417448									
						STIM:DAY	4	2325	1.41702	0.225717									
						AGE:BLOCK	2	2325	13.34761	**1.72E-06**									
						STIM:BLOCK	1	2325	0.000346	0.985168									
						DAY:BLOCK	4	2325	0.910253	0.456953									
						AGE:STIM:DAY	8	2325	0.445183	0.894219									
						AGE:STIM:BLOCK	2	2325	0.001665	0.998336									
						AGE:DAY:BLOCK	8	2325	1.389249	0.195997									
						STIM:DAY:BLOCK	4	2325	0.666886	0.614973									
						AGE:STIM:DAY:BLOCK	8	2325	0.362382	0.940416									
Corr. Attention and offline learning	All	LMER	Offline learning	Att.Diff.,AGE,STIM,NIGHT	(1 + 1|ID)	Att.Diff.	1	183.0026	0.181275	0.67078									
						AGE	2	58.89909	6.573071	**0.00265**									
						STIM	1	59.1089	0.013262	0.908708									
						NIGHT	3	146.8905	0.210935	0.888702									
						Att.Diff.:AGE	2	187.1501	0.013211	0.986877									
						AttChange:STIM	1	183.0026	0.021227	0.884323									
						AGE:STIM	2	58.89909	0.775012	0.465339									
						Att.Diff.:NIGHT	3	169.9148	3.04928	**0.030152**									
						AGE:NIGHT	6	146.8187	0.713472	0.639287									
						STIM:NIGHT	3	146.8905	0.179958	0.90986									
						Att.Diff.:AGE:STIM	2	187.1501	0.124199	0.883277									
						Att.Diff.:AGE:NIGHT	6	168.1358	0.525433	0.788468									
						Att.Diff.:STIM:NIGHT	3	169.9148	0.151235	0.928783									
						AGE:STIM:NIGHT	6	146.8187	4.529984	**0.000304**									
						Att.Diff.:AGE:STIM:NIGHT	6	168.1358	1.983098	0.070704									
	Young	LMER	Offline learning	Att.Diff.,STIM,NIGHT	(1 + 1|ID)	Att.Diff.	1	55.01355	0.007572	0.930972									
						STIM	1	16.5574	0.259698	0.617053									
						NIGHT	3	44.00605	0.091742	0.964211									
						Att.Diff.:STIM	1	55.01355	0.016417	0.898515									
						Att.Diff.:NIGHT	3	48.53039	1.435353	0.24394									
						STIM:NIGHT	3	44.00605	5.819877	**0.001935**									
						Att.Diff.:STIM:NIGHT	3	48.53039	2.030266	0.121976									
	Middle	LMER	Offline learning	Att.Diff.,STIM,NIGHT	(1 + 1|ID)	Att.Diff.	1	43.88773	0.064588	0.800574									
						STIM	1	19.71731	2.20887	0.153035									
						NIGHT	3	47.7768	1.115186	0.352265									
						Att.Diff.:STIM	1	43.88773	0.017546	0.895226									
						Att.Diff.:NIGHT	3	55.60296	1.964199	0.129916									
						STIM:NIGHT	3	47.7768	0.466135	0.707271									
						Att.Diff.:STIM:NIGHT	3	55.60296	0.170898	0.915606									
	Older	LMER	Offline learning	Att.Diff.,STIM,NIGHT	(1 + 1|ID)	Att.Diff.	1	63.71946	0.054561	0.816057									
						STIM	1	21.65852	0.099122	0.755899									
						NIGHT	3	55.96544	0.522384	0.668656									
						Att.Diff.:STIM	1	63.71946	0.205449	0.651898									
						Att.Diff.:NIGHT	3	65.05374	1.404731	0.24938									
						STIM:NIGHT	3	55.96544	2.894376	**0.043153**									
						Att.Diff.:STIM:NIGHT	3	65.05374	2.104272	0.108223									
Fatigue	All	LMER	Fatigue score	AGE,STIM,DAY,BLOCK	(1 + 1|ID)	AGE	2	59.51159	1.427205	0.248072									
						STIM	1	59.51159	0.145404	0.704325									
						DAY	4	2325	12.06511	**1.05E-09**									
						BLOCK	1	2325	10.88526	**0.000984**									
						AGE:STIM	2	59.51159	1.248396	0.29437									
						AGE:DAY	8	2325	3.242799	**0.001122**									
						STIM:DAY	4	2325	2.83953	**0.023043**									
						AGE:BLOCK	2	2325	9.158439	**0.000109**									
						STIM:BLOCK	1	2325	0.258093	0.611481									
						DAY:BLOCK	4	2325	1.783872	0.129296									
						AGE:STIM:DAY	8	2325	0.536278	0.829884									
						AGE:STIM:BLOCK	2	2325	0.67222	0.510673									
						AGE:DAY:BLOCK	8	2325	1.279287	0.249587									
						STIM:DAY:BLOCK	4	2325	1.149562	0.331352									
						AGE:STIM:DAY:BLOCK	8	2325	0.49494	0.860602									
	Young	LMER	Fatigue score	STIM,DAY,BLOCK	(1 + 1|ID)	STIM	1	18.32312	0.81955	0.377062	DAY	D1-D2	723	0.840906	7.565769	**0**	0.869058	0.509256	1.22886
						DAY	4	723	8.28597	**1.55E-06**		D2-D3	723	-0.02261	-0.20347	0.999618	-0.02337	-0.26365	0.216905
						BLOCK	1	723	2.029106	0.154743		D3-D4	723	-0.23288	-2.09525	0.22317	-0.24067	-0.49204	0.010693
						STIM:DAY	4	723	1.358473	0.246757		D4-D5	723	-0.20009	-1.80028	0.374148	-0.20679	-0.45528	0.041693
						STIM:BLOCK	1	723	0.045009	0.832047									
						DAY:BLOCK	4	723	0.362326	0.835485									
						STIM:DAY:BLOCK	4	723	0.207573	0.934249									
	Middle	LMER	Fatigue score	STIM,DAY,BLOCK	(1 + 1|ID)	STIM	1	18.47923	0.439077	0.515749	DAY	D1-D2	723	0.988806	8.778537	**0**	1.008365	0.615905	1.400825
						DAY	4	723	7.455515	**6.91E-06**		D2-D3	723	-0.25934	-2.30243	0.145215	-0.26447	-0.51787	-0.01108
						BLOCK	1	723	17.0646	**4.04E-05**		D3-D4	723	0.073767	0.654901	0.965716	0.075227	-0.16583	0.316287
						STIM:DAY	4	723	0.57978	0.677383		D4-D5	723	0.313149	2.780115	**0.044127**	0.319344	0.060023	0.578664
						STIM:BLOCK	1	723	1.335341	0.248239									
						DAY:BLOCK	4	723	1.697226	0.148751									
						STIM:DAY:BLOCK	4	723	1.077718	0.366423									
	Older	LMER	Fatigue score	STIM,DAY,BLOCK	(1 + 1|ID)	STIM	1	22.70795	1.400237	0.248925	DAY:BLOCK	D1 slope over BLOCKs	160	0.113535	4.813551	**3.41E-06**	1.076343	0.066954	0.160116
						DAY	4	879	0.282416	0.889448		D2 slope over BLOCKs	160	0.056545	3.500963	**0.000601**	0.782839	0.024648	0.088442
						BLOCK	1	879	10.18879	**0.001463**		D3 slope over BLOCKs	160	0.001025	0.058466	0.95345	0.013073	-0.03359	0.035643
						STIM:DAY	4	879	2.225241	0.064531		D4 slope over BLOCKs	160	0.014943	1.063371	0.289216	0.237777	-0.01281	0.042695
						STIM:BLOCK	1	879	0.027861	0.867475		D5 slope over BLOCKs	160	0.014633	0.713951	0.476298	0.159644	-0.02584	0.055108
						DAY:BLOCK	4	879	2.51227	**0.04037**									
						STIM:DAY:BLOCK	4	879	0.827751	0.50758									
Corr. Fatigue and offline learning	All	LMER	Offline learning	FatigueDiff,AGE,STIM,NIGHT	(1 + 1|ID)	Fatg.Diff.	1	187.9116	0.144108	0.704659									
						AGE	2	57.59129	6.148782	**0.003799**									
						STIM	1	57.5733	0.128463	0.721342									
						NIGHT	3	148.726	0.408184	0.747344									
						Fatg.Diff.:AGE	2	190.6759	0.206127	0.813911									
						Fatg.Diff.:STIM	1	187.9116	4.48E-06	0.998314									
						AGE:STIM	2	57.59129	0.678663	0.511305									
						Fatg.Diff.:NIGHT	3	176.077	1.792867	0.150257									
						AGE:NIGHT	6	148.6078	1.294804	0.263005									
						STIM:NIGHT	3	148.726	0.217004	0.884486									
						Fatg.Diff.:AGE:STIM	2	190.6759	0.047532	0.953591									
						Fatg.Diff.:AGE:NIGHT	6	173.1769	0.752842	0.607961									
						Fatg.Diff.:STIM:NIGHT	3	176.077	0.665712	0.574169									
						AGE:STIM:NIGHT	6	148.6078	3.915453	**0.001162**									
						Fatg.Diff.:AGE:STIM:NIGHT	6	173.1769	1.325355	0.248232									

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