A large-scale analysis of test-retest reliabilities of self-regulation measures

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Abstract

• Both cognitive and personality psychology literatures are rich with measures of impulsivity, self-control, inhibition, delay discounting etc.
• Test-retest reliability is crucial for individual difference variables yet not clearly presented for at least half of the available measures
• We present a comprehensive literature review as well as novel analyses on a new large dataset containing both types of measures

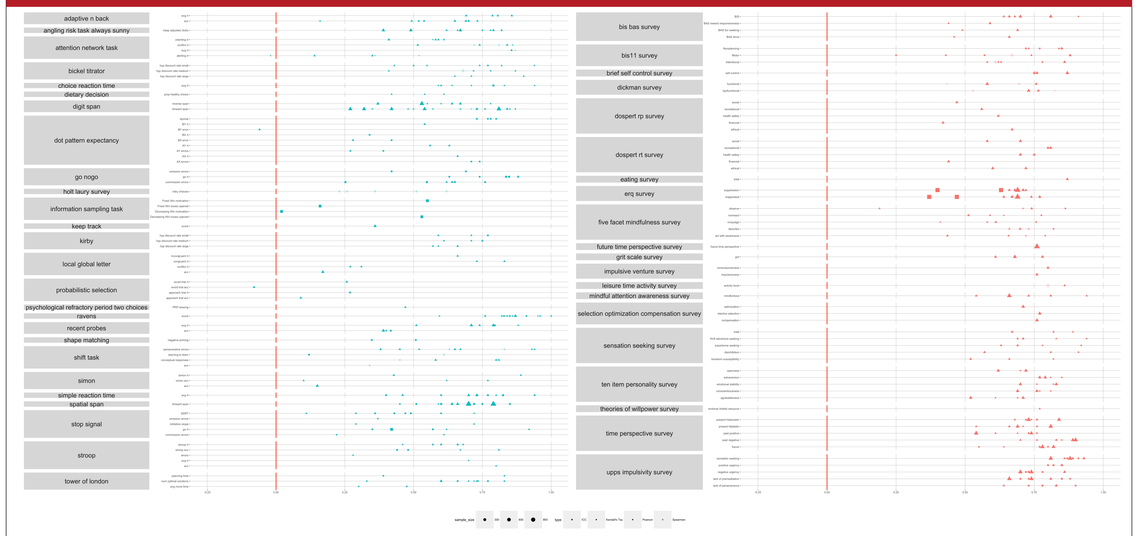
Introduction

• Self-regulation measures are often used as trait variables as they relate to suboptimal real-world behaviors
• Such individual difference measures should remain stable across time for validity
• Data on this stability is sparse and unorganized in the literature

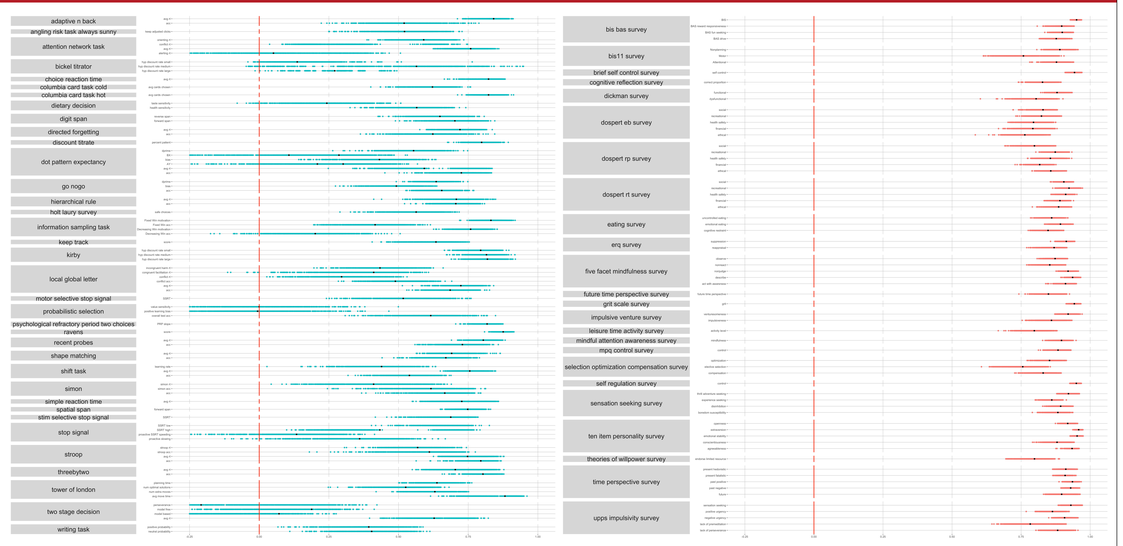
Methods

• Battery consisted of 37 cognitive tasks and 23 questionnaires putatively related to self-regulation https://expfactory.github.io/table.html
• 242 of 522 participants were invited to complete the battery twice
• 175 started the second time, 157 completed and 150 passed QC
• Average retest delay = 115 days (range = 60 - 228 days)
• ICC's were used as the main retest reliability metric (no changes with Spearman or Pearson correlations)
• Point estimates of reliabilities were bootstrapped 1000 times

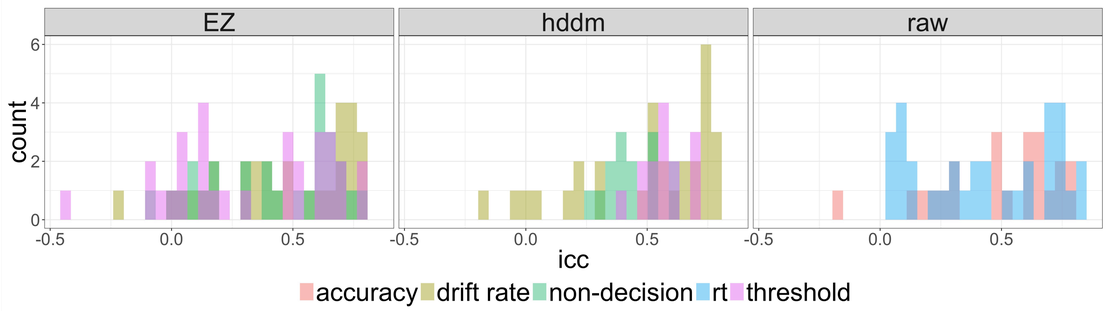
Literature review



Our results

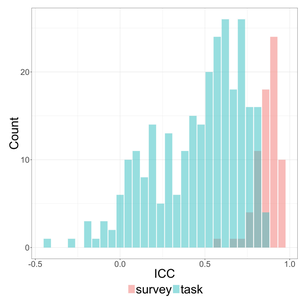


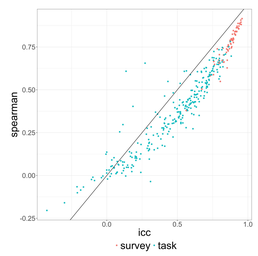
• Task measures have significantly lower reliability than survey measures (b = -0.401, t(342) = -12.6, p < 0.001)
• Reliabilities do not depend on number of items (tasks b = -0.0001, t(272) = -1.17, p = 0.24, surveys b = -0.001, t(58) = -1.2, p = 0.24)
• HDDM parameters were more reliable than EZ DDM parameters (b = 0.098, t(143) = 2.17, p = 0.032) and no less reliable compared to raw measures of rt and accuracy (b = -0.045, t(11) = -1, p = 0.32)



Task	Min ICC	Mean ICC	Max ICC
ravens	0.81	0.87	0.91
kirby	0.66	0.81	0.92
discount titrate	0.68	0.80	0.89
cognitive reflection survey	0.63	0.78	0.89
psychological refractory period	0.38	0.73	0.87
simple reaction time	0.55	0.73	0.86
hierarchical rule	0.41	0.70	0.85
adaptive n back	0.11	0.68	0.93
digit span	0.43	0.67	0.85
tower of london	0.25	0.66	0.96
choice reaction time	0.07	0.65	0.88
spatial span	0.28	0.63	0.83
keep track	0.41	0.63	0.75
columbia card task hot	0.14	0.62	0.91
stroop	-0.13	0.62	0.88
go nogo	0.27	0.59	0.77
information sampling task	-0.17	0.58	0.92
shift task	0.03	0.57	0.85
holt laury survey	0.29	0.56	0.72
simon	-0.28	0.56	0.84
shape matching	-0.52	0.54	0.87
stop signal	-0.49	0.52	0.85
stim selective stop signal	0.01	0.51	0.79
columbia card task cold	0.04	0.51	0.76
motor selective stop signal	-0.45	0.47	0.86
directed forgetting	-0.59	0.42	0.85
local global letter	-0.77	0.42	0.84
dietary decision	-0.08	0.40	0.74
writing task	-0.29	0.39	0.61
angling risk task always sunny	-0.54	0.38	0.73
recent probes	-0.95	0.36	0.88
dot pattern expectancy	-0.84	0.35	0.88
attention network task	-1.19	0.33	0.86
bickel titrator	-0.05	0.31	0.95
threebytwo	-0.72	0.28	0.88
probabilistic selection	-0.61	0.20	0.85
two stage decision	-0.98	0.14	0.82

Survey	Min ICC	Mean ICC	Max ICC
self regulation survey	0.93	0.95	0.97
brief self control survey	0.91	0.94	0.97
grit scale survey	0.91	0.94	0.97
ten item personality survey	0.79	0.93	0.97
time perspective survey	0.83	0.92	0.97
bis bas survey	0.81	0.90	0.97
dospert rt survey	0.79	0.90	0.97
five facet mindfulness survey	0.77	0.90	0.97
mindful attention awareness survey	0.83	0.90	0.95
erq survey	0.77	0.89	0.94
impulsive venture survey	0.75	0.89	0.97
sensation seeking survey	0.79	0.89	0.96
mpq control survey	0.81	0.88	0.93
upps impulsivity survey	0.64	0.87	0.97
eating survey	0.78	0.87	0.94
future time perspective survey	0.74	0.85	0.93
bis11 survey	0.61	0.84	0.96
dickman survey	0.60	0.84	0.93
dospert rp survey	0.69	0.84	0.93
dospert eb survey	0.58	0.80	0.90
theories of willpower survey	0.69	0.80	0.89
leisure time activity survey	0.67	0.80	0.88
selection optimization compensation survey	0.50	0.78	0.91





•Results do not depend on selection of reliability metric

Discussion

• Dependent variables from cognitive tasks show larger variability and lower reliability in their stability compared to measures from surveys
• Higher reliabilities of survey measures reflect the psychometric rigor in their creation, which cognitive tasks can benefit from as well
• Alternative modeling approaches to raw measures from cognitive task measures can provide equally reliable measures of interest

References

An interactive version of the literature review as well as a list of all there references can be found at goo.gl/gM7Pgr

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