

vitamin N & cognitive growth



@cjlorcie

debate about (N)atural













less native, somewhat natural



different species & different complexity



11 million bits of information per second in cities

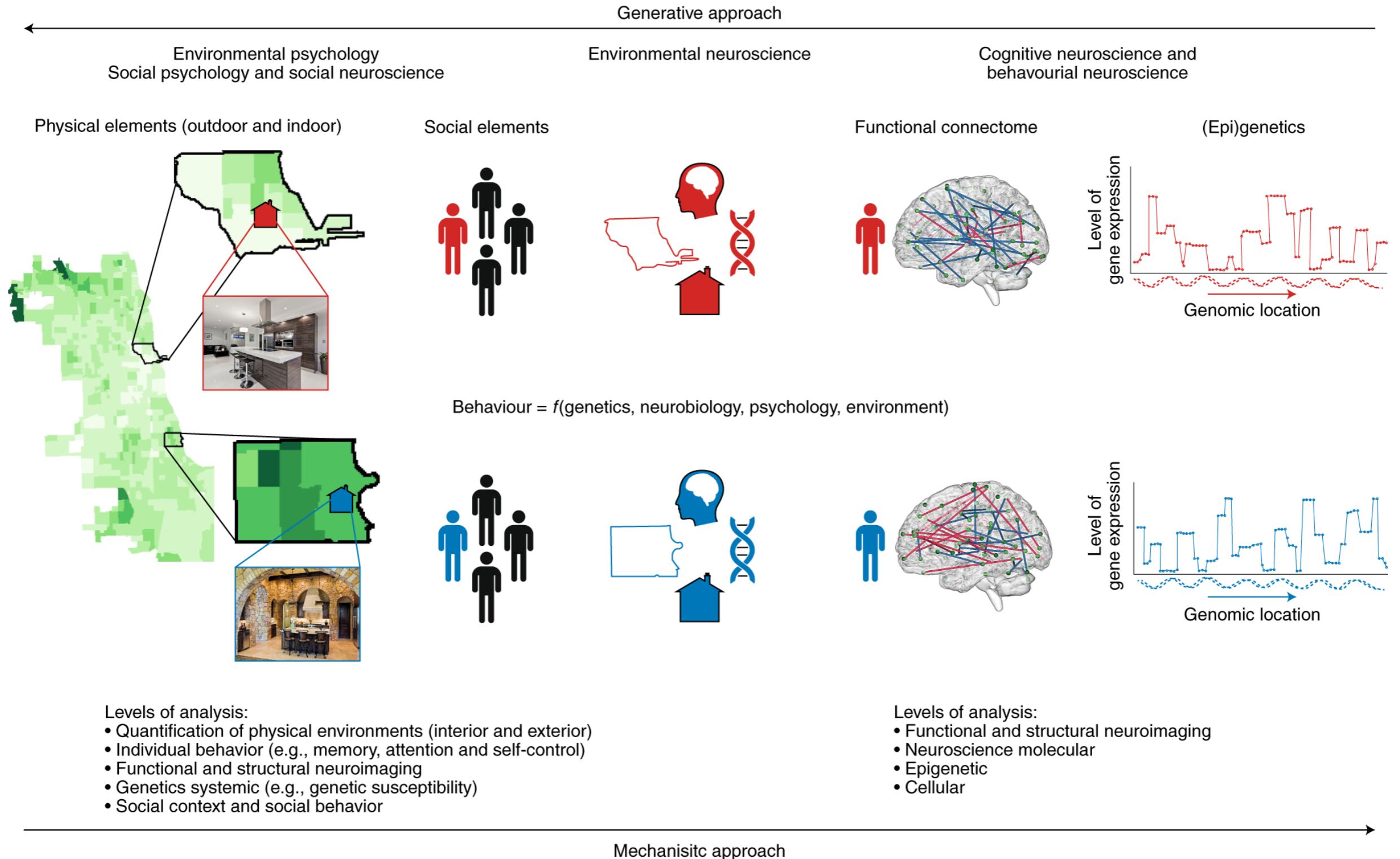
Plambech et al. 2015

people are animals too



ecology is always about interactions
(with one another, other species, and the environment)

the promise of environmental neuroscience



Berman et al. 2019

explore this interaction set



as an antidote to this interaction set



screen time

ART

attention restoration theory



Berman et al. 2008 & Bratman et al. 2015

BET

biophilia effect

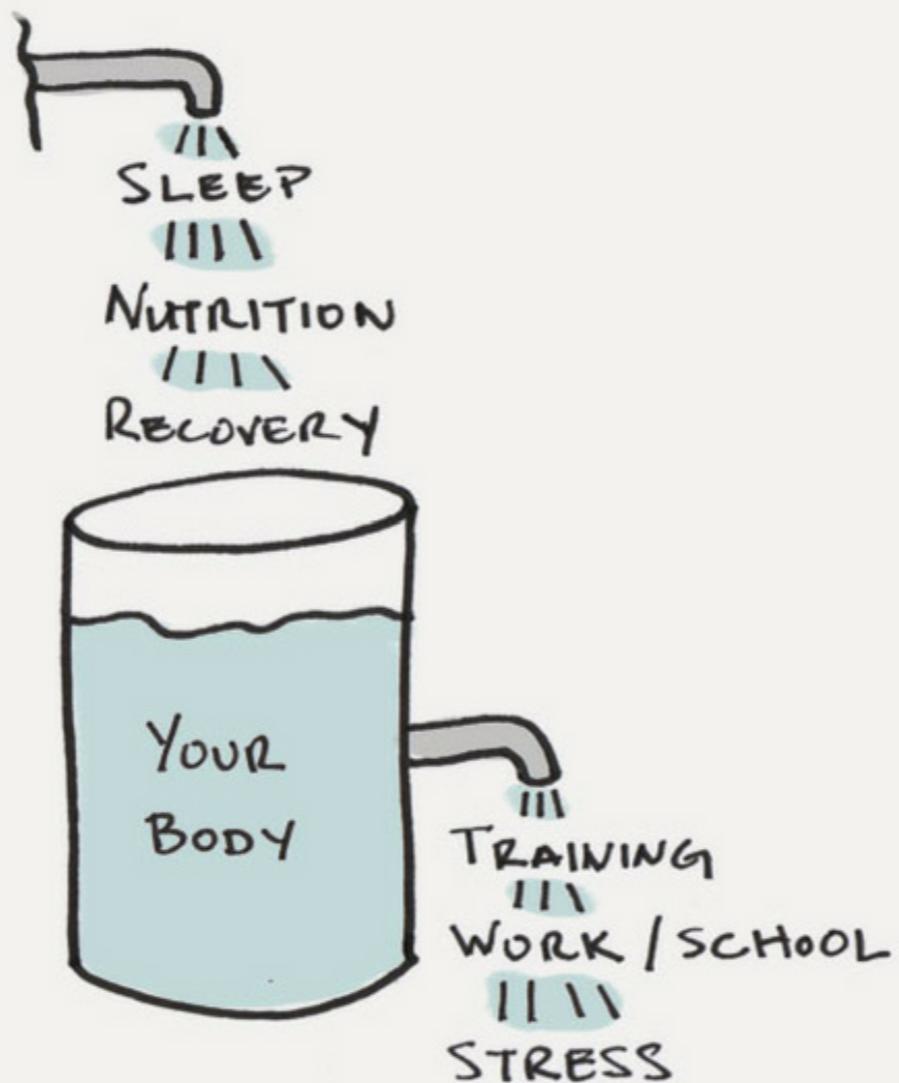


evolutionary history & connectedness

Kellert & Wilson 1993

SRT

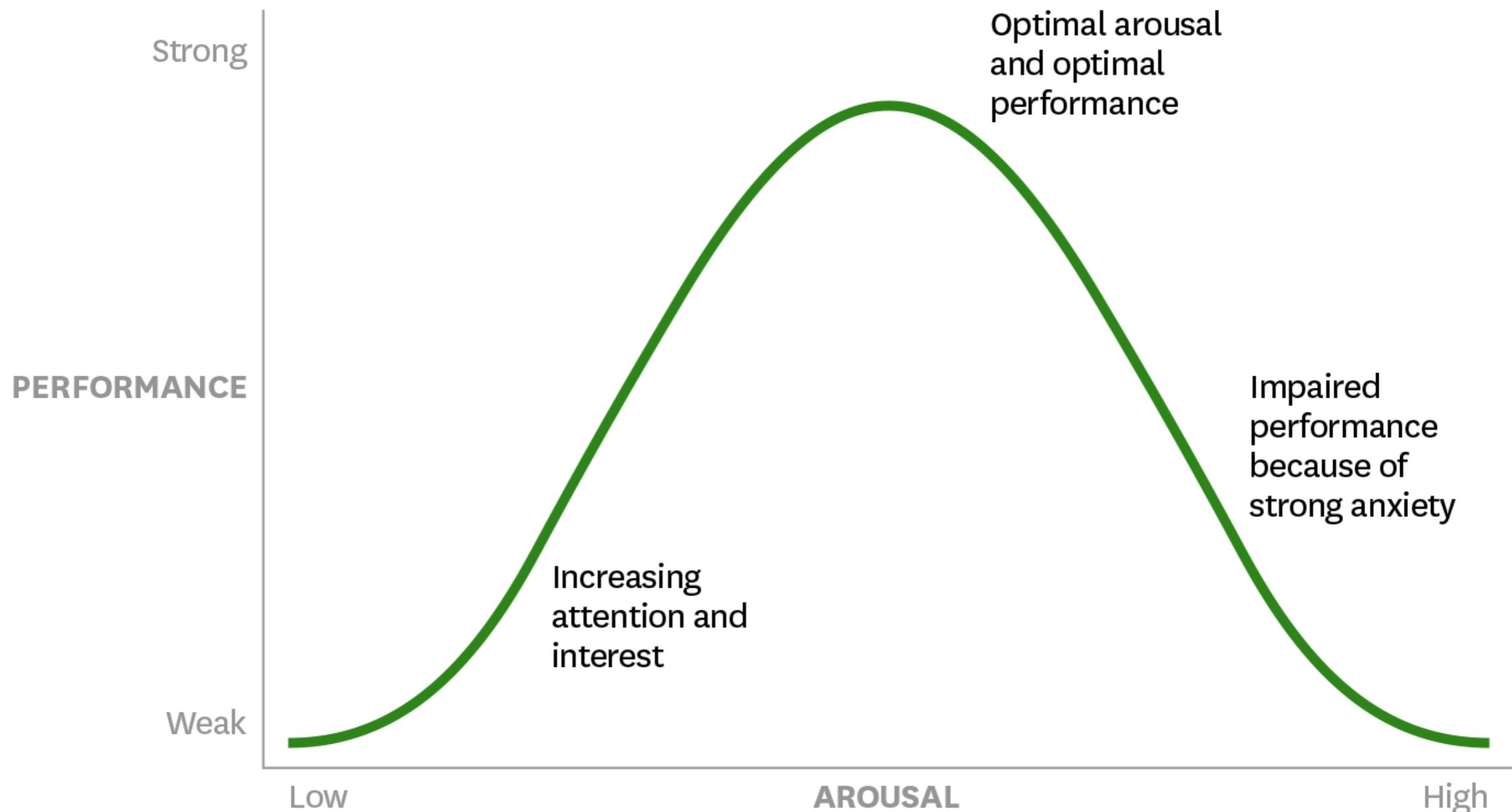
stress-reduction theory



Ulrich et al. 1991

The Yerkes-Dodson Law

How anxiety affects performance.



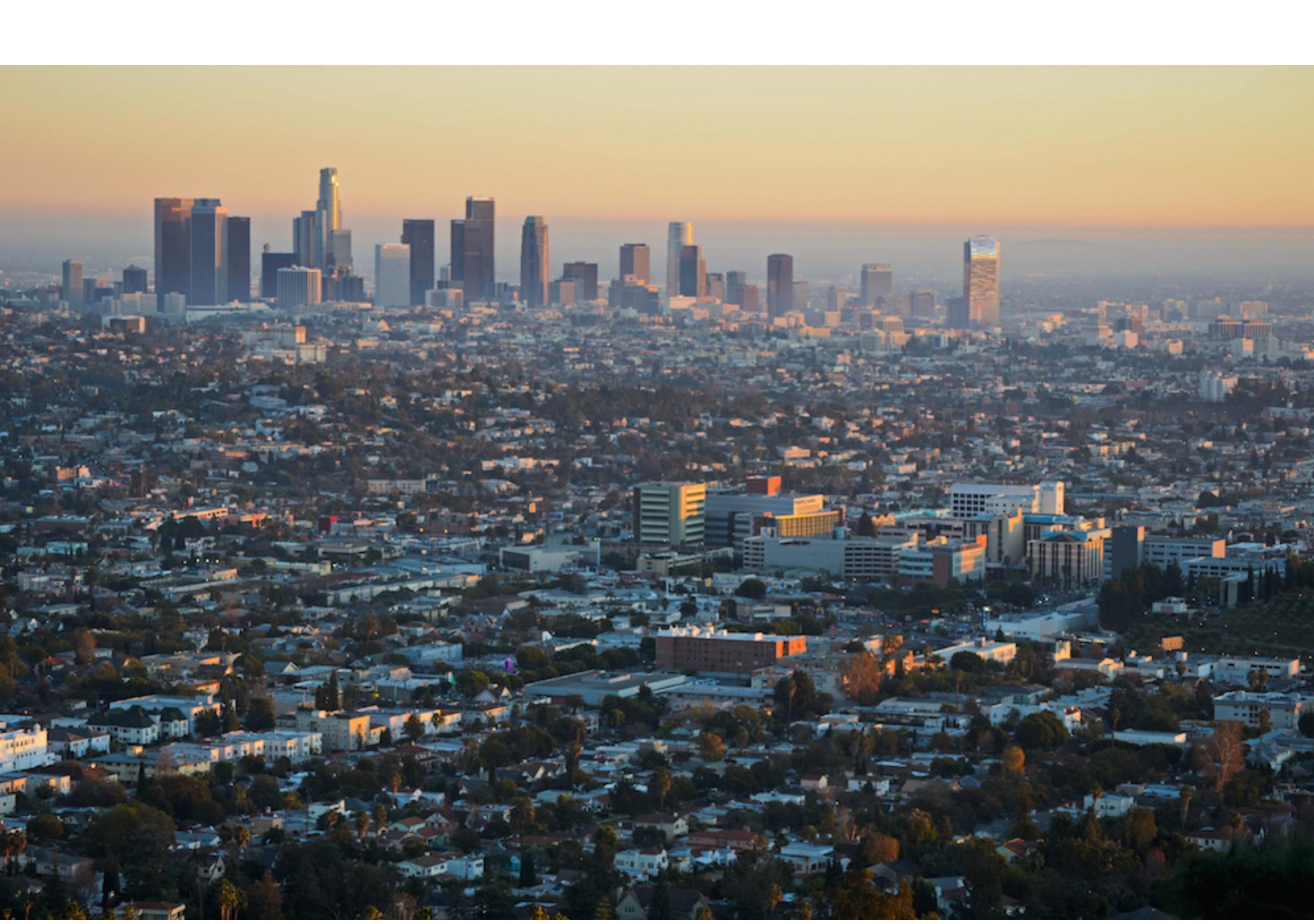
SOURCE ROBERT M. YERKES AND JOHN D. DODSON

© HBR.ORG



cognition

knowledge, processing, experience, perception, learning, reasoning



0, 5, 3, 2, 7



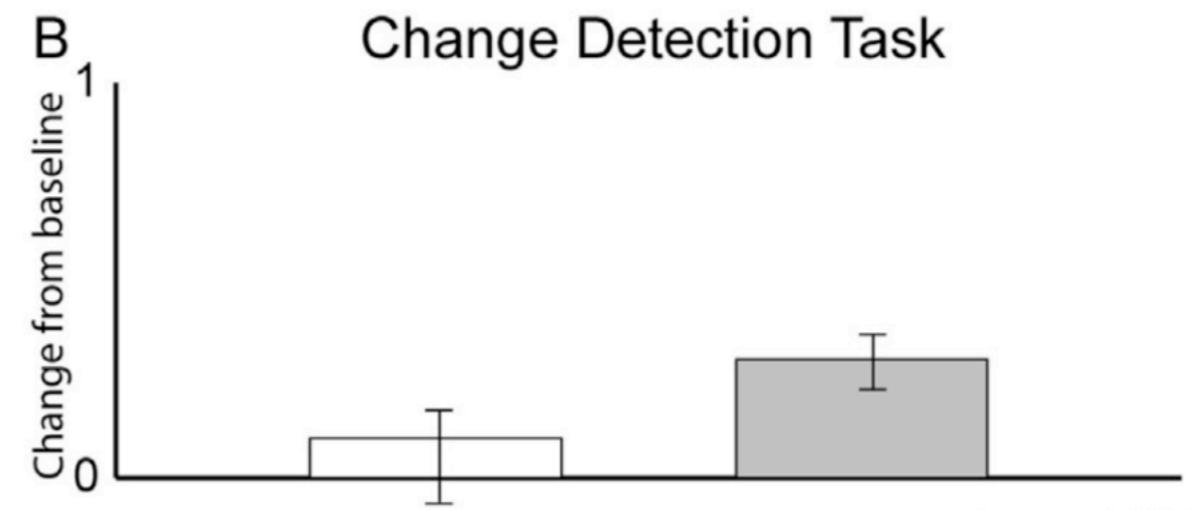
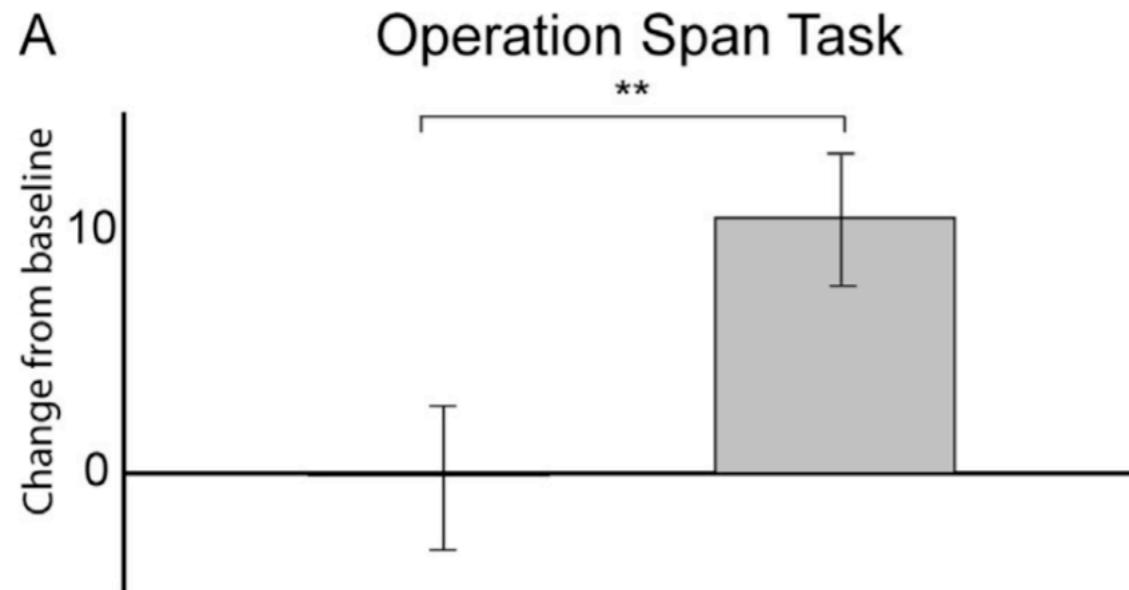
10, 9, 8, 7, 6, 5

50 individuals tested all typically showed modest increases from a walk outside or imagery

TABLE 1
Behavioral Results From Experiments 1 and 2

Measure	Natural setting		Urban setting	
	Before interaction	After interaction	Before interaction	After interaction
Backward span				
Experiment 1	7.90 (0.37)	9.40 (0.41)	7.90 (0.30)	8.40 (0.33)
Experiment 2	7.92 (0.96)	9.33 (0.86)	7.83 (1.04)	8.83 (0.90)
ANT effects (ms)				
Executive	86 (11.30)	67 (8.45)	81 (15.50)	93 (17.96)
Orienting	47 (6.46)	55 (7.33)	46 (10.01)	43 (4.73)
Alerting	32 (6.86)	31 (5.23)	36 (6.52)	46 (5.63)

Berman et al. 2008



~**250** people test to date show mean change at
+**20%** with a short walk (15-50mins)



stress

2356 people tested
20-40% of variation explained by experiencing nature
(viewing or outside)

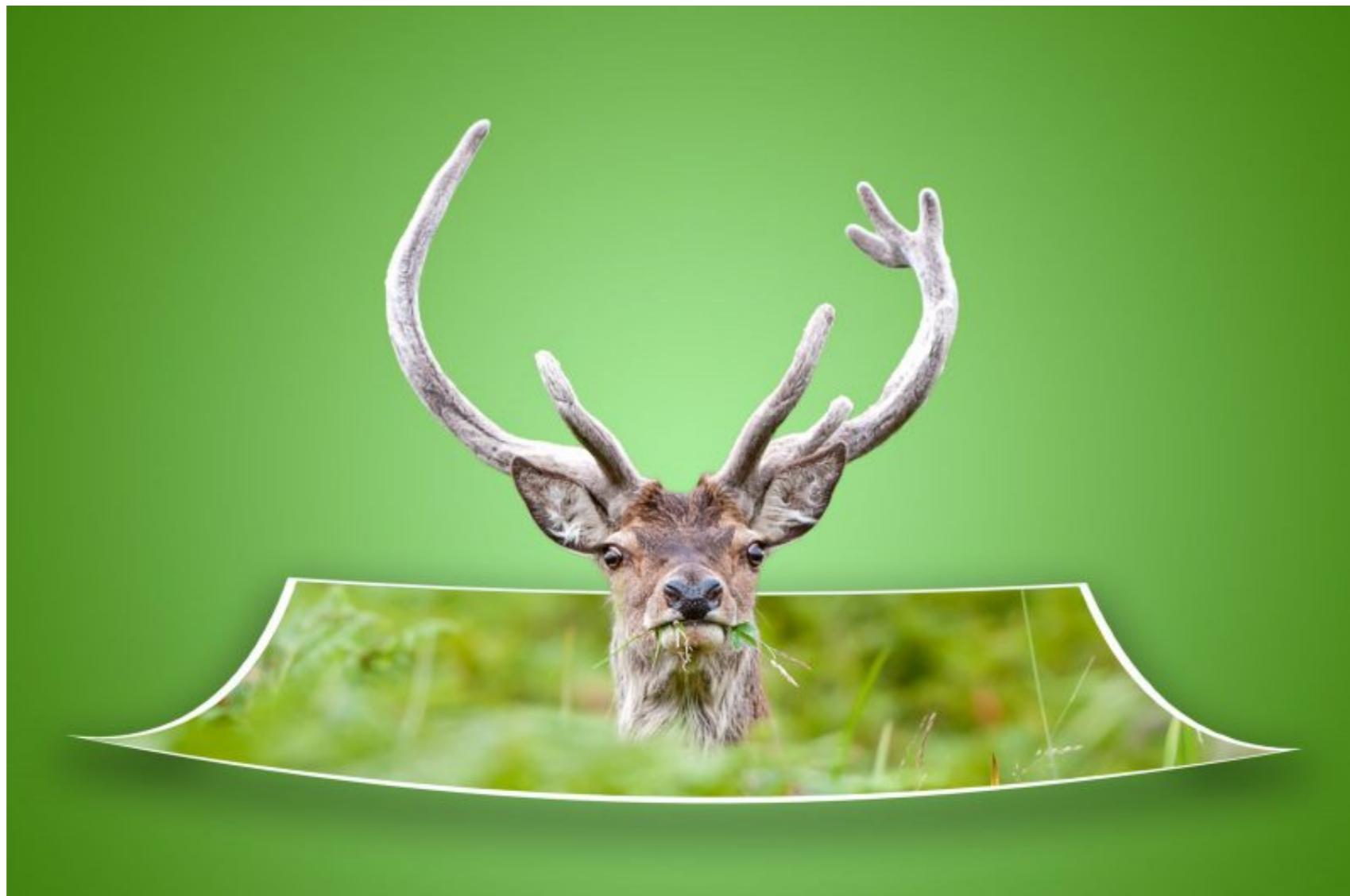
Table 3. Overall effect size estimates for the effect of brief exposure to natural environments on positive and negative affect.

Outcome	N	k	r	95% CI for r (lower, upper)	T^2	I^2
Positive affect	2284	31	0.31	0.24, 0.37	0.02	56.95
Negative affect	1630	20	-0.12	-0.17, -0.07	0.00	13.08
Overall	2356	32				

Note: N = number of participants included in analysis; k = number of studies; r = effect size estimate; CI = confidence interval; T^2 = estimate of between-study variability; I^2 = estimate of total variability due to between-study variability.

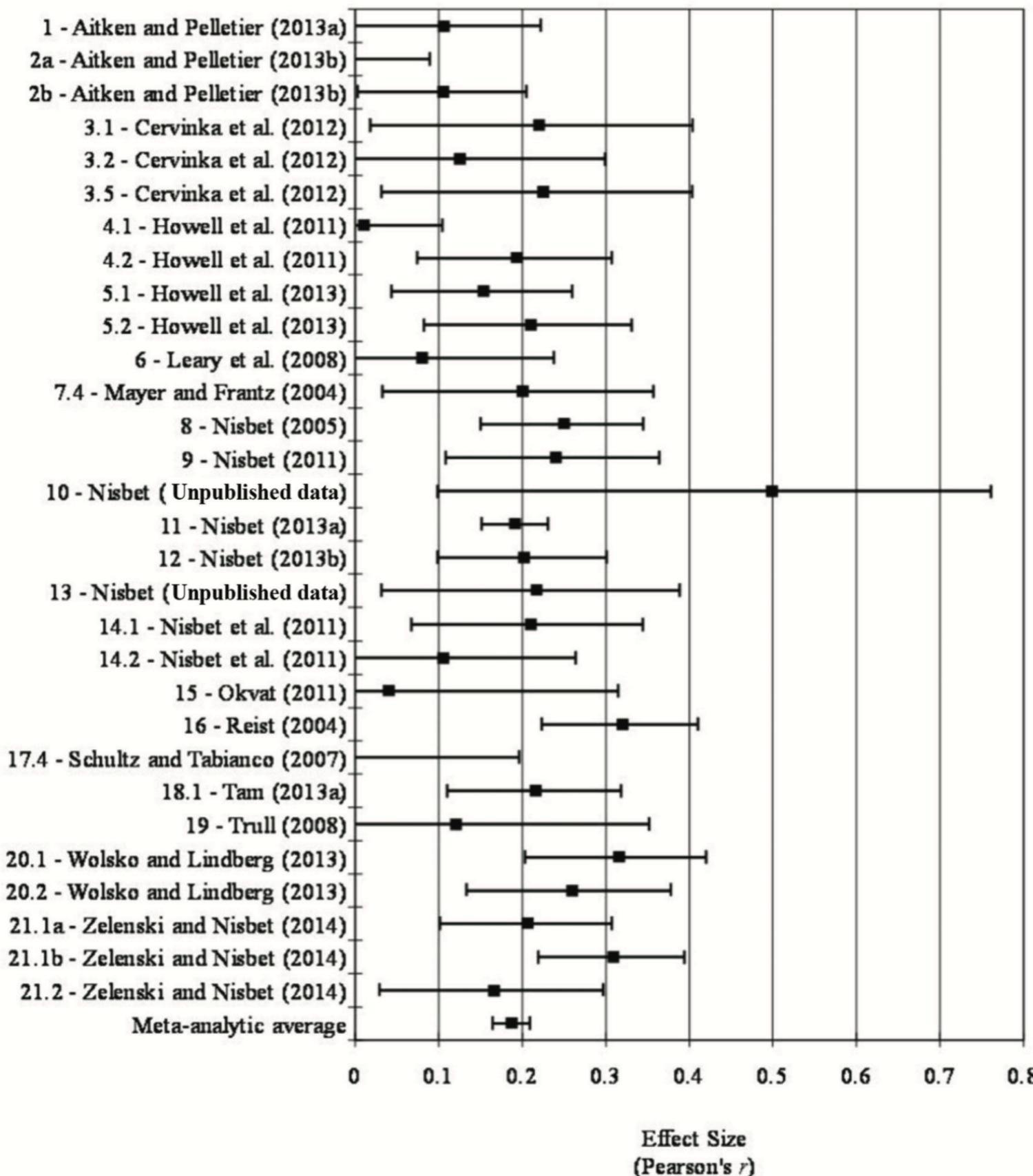


lab < outside
manicured nature = wild nature
Sweden < Canada < USA < Japan



McMahan & Estes 2015

8523 people
happier with
nature



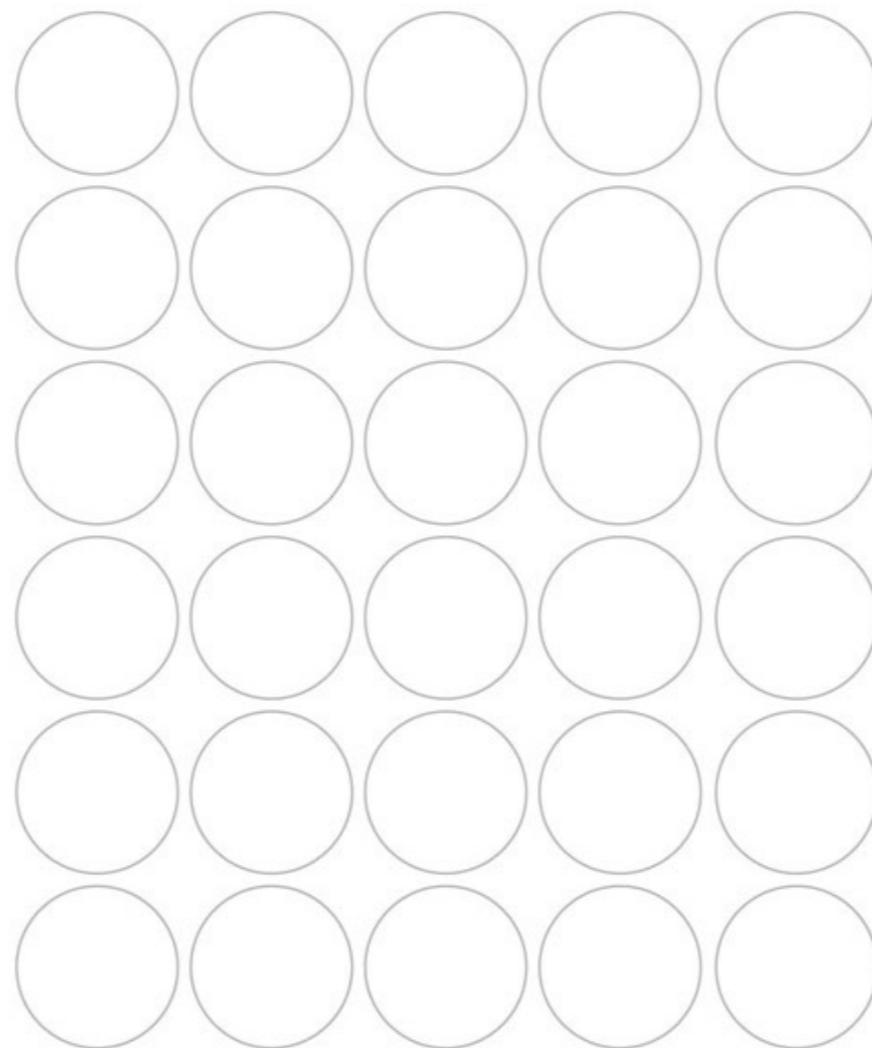
Capaldi et al. 2014



creativity

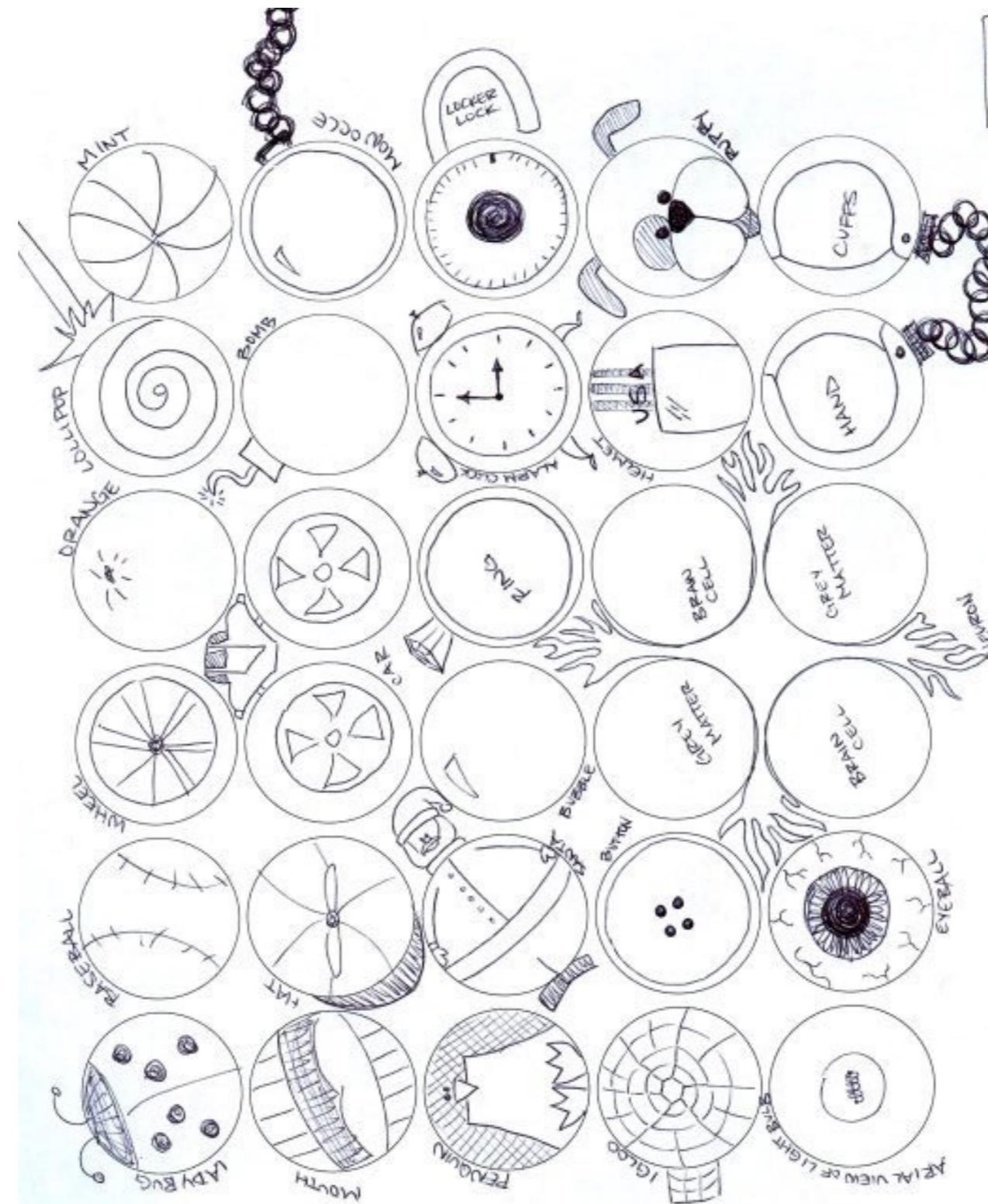
104 people tested for verbal & visual creativity
with & without natural views/plants

30 CIRCLES TEST



Studente et al. 2016

8.3.10



visual creativity (judged by others) increased by **nearly 20%**
but not all measures universally increased



problem solving

RWPS

real world problem-solving

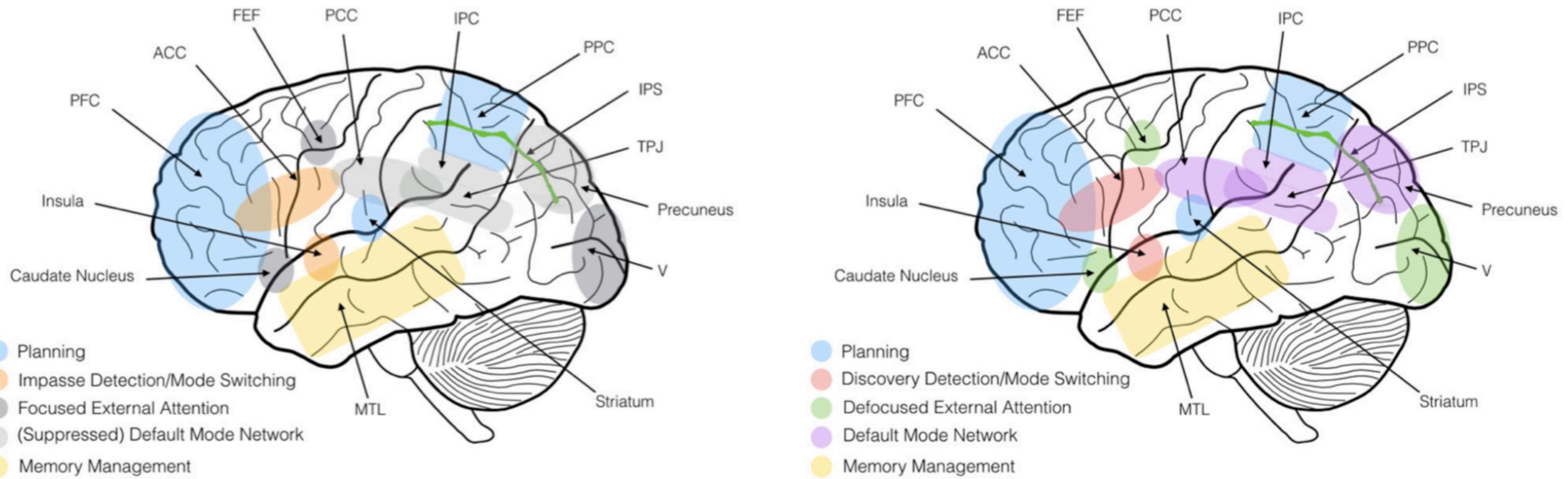
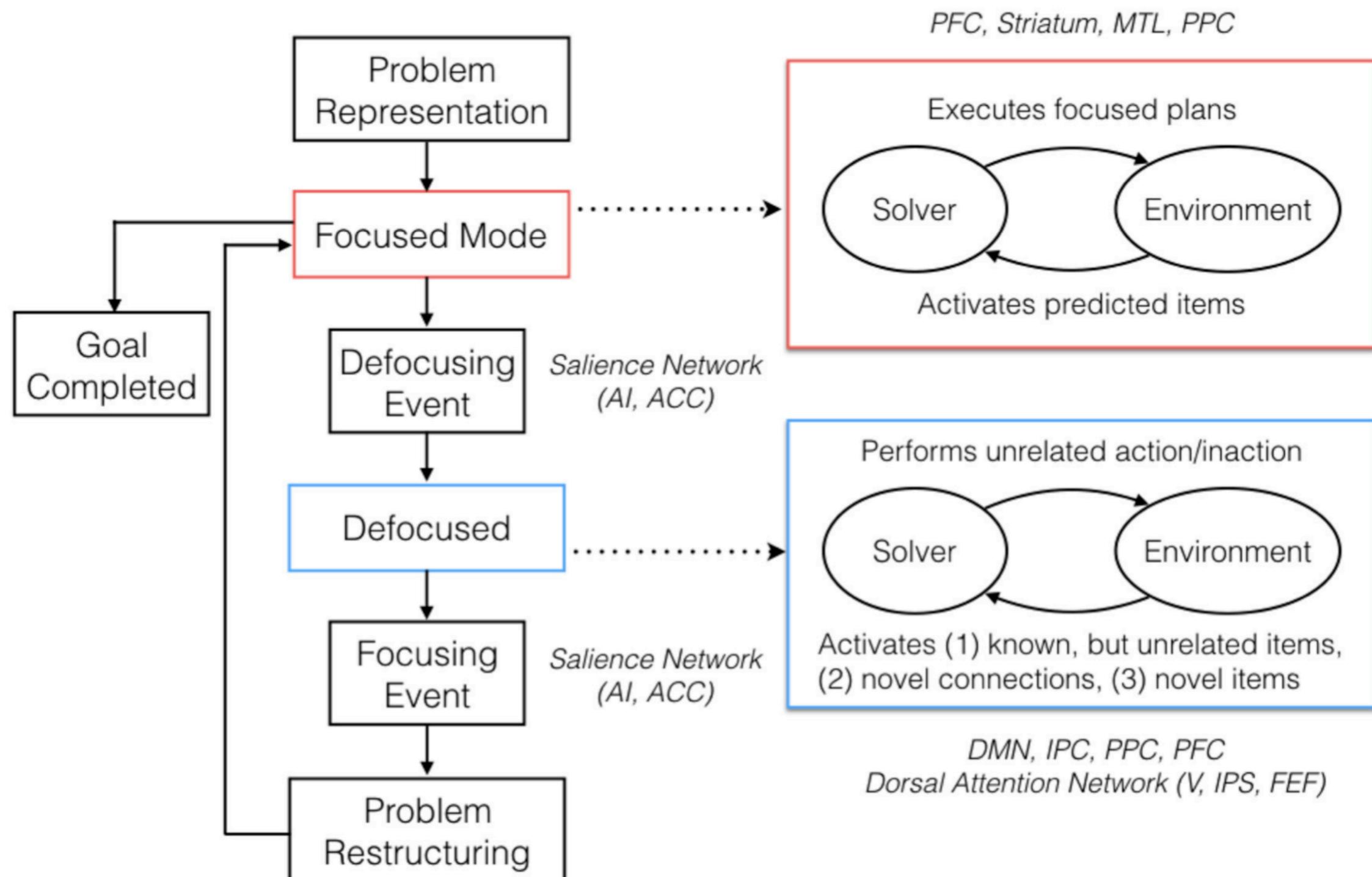
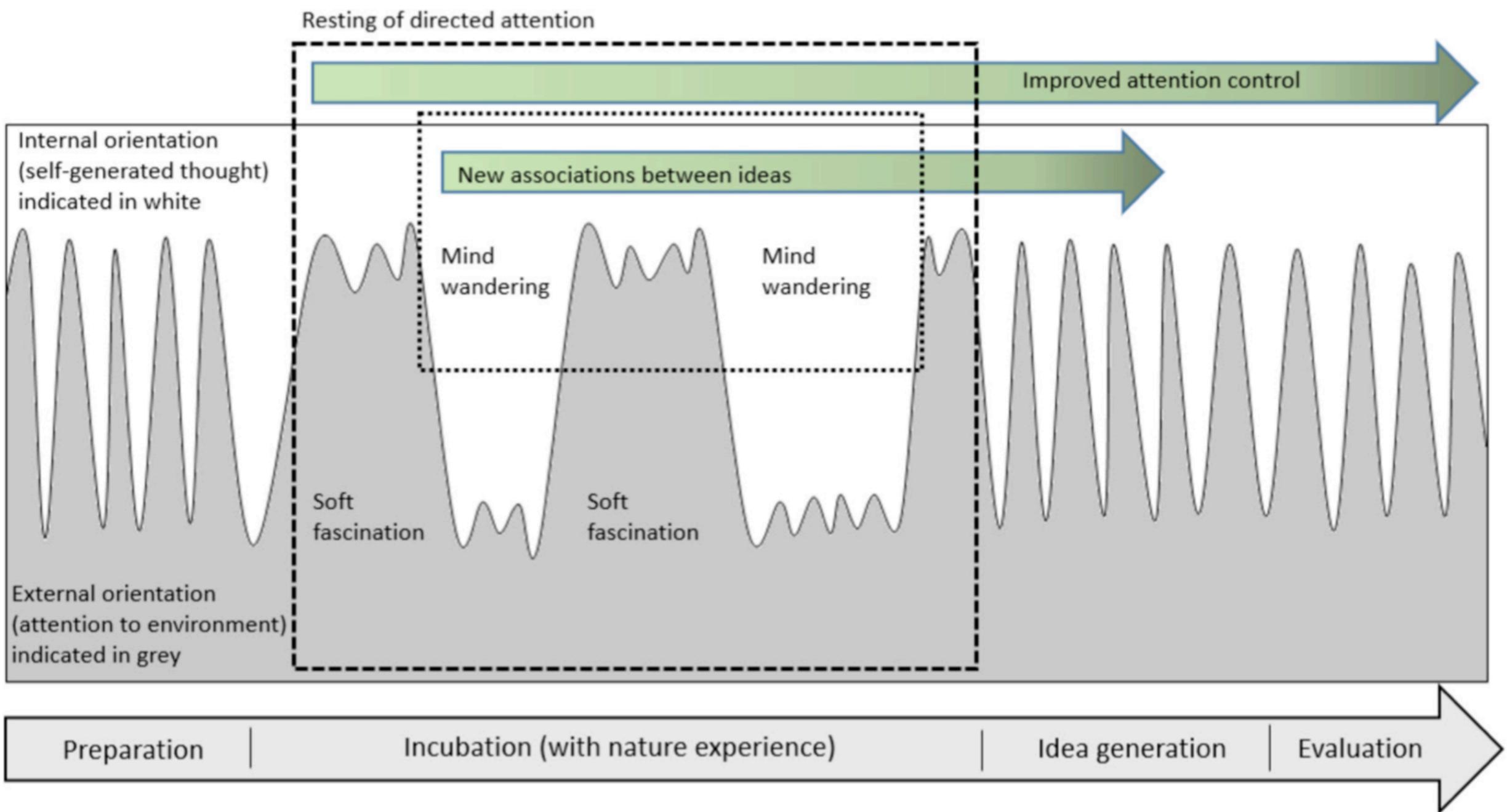


FIGURE 1 | Summary of neural activations during focused problem-solving (**Left**) and defocused problem-solving (**Right**). During defocused problem-solving, the salience network (insula and ACC) coordinates the switching of several networks into a defocused attention mode that permits the reception of a more varied set of stimuli and interpretations via both the internally-guided networks (default mode network DMN) and externally guided networks (Attention). PFC, prefrontal cortex; ACC, anterior cingulate cortex; PCC, posterior cingulate cortex; IPC, inferior parietal cortex; PPC, posterior parietal cortex; IPS, intra-parietal sulcus; TPJ, temporoparietal junction; MTL, medial temporal lobe; FEF, frontal eye field.

Sarathy 2018





Williams et al. 2018

implications

less-demanding **complexity** on cognition
reductions in top-down attentional **control**
evolutionary history & **refuge** effects
autonomic nervous system **tuning**



bonus items

mitigate onset of short-sightedness
increased fertility

how low can you go?



Fig. 1. Subjects filling in the questionnaires in Alppipuisto (urban park).



Fig. 3. Viewing session in Helsinki city centre.

vegging out sufficiency

tools

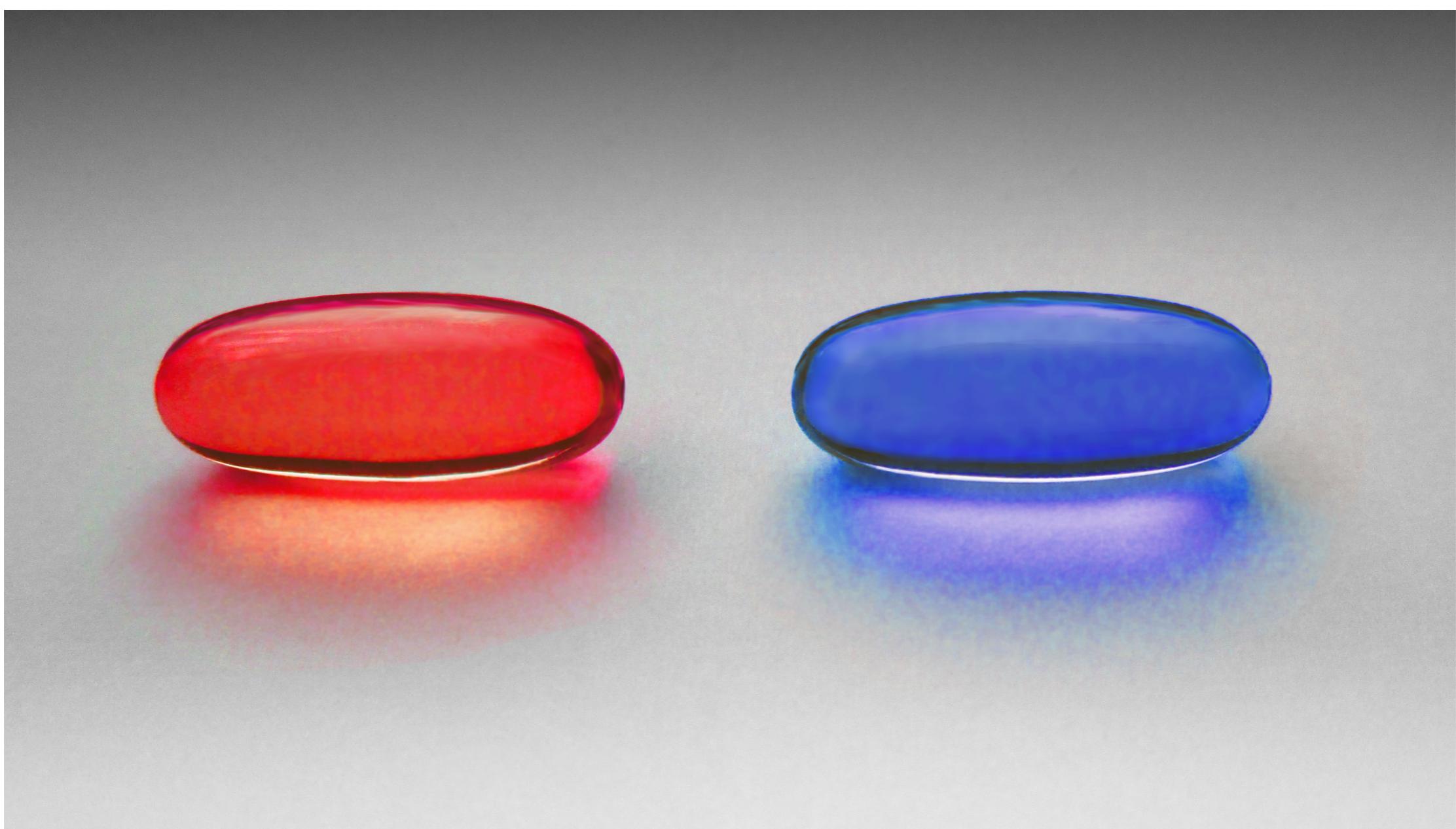


get outside
develop an environmental identity
photos, windows, views
use active interactions with nature
explore whatever natural elements are immediately present
walk and walking meetings
change your 'learning' environment
challenge or **risk** or **play outside**

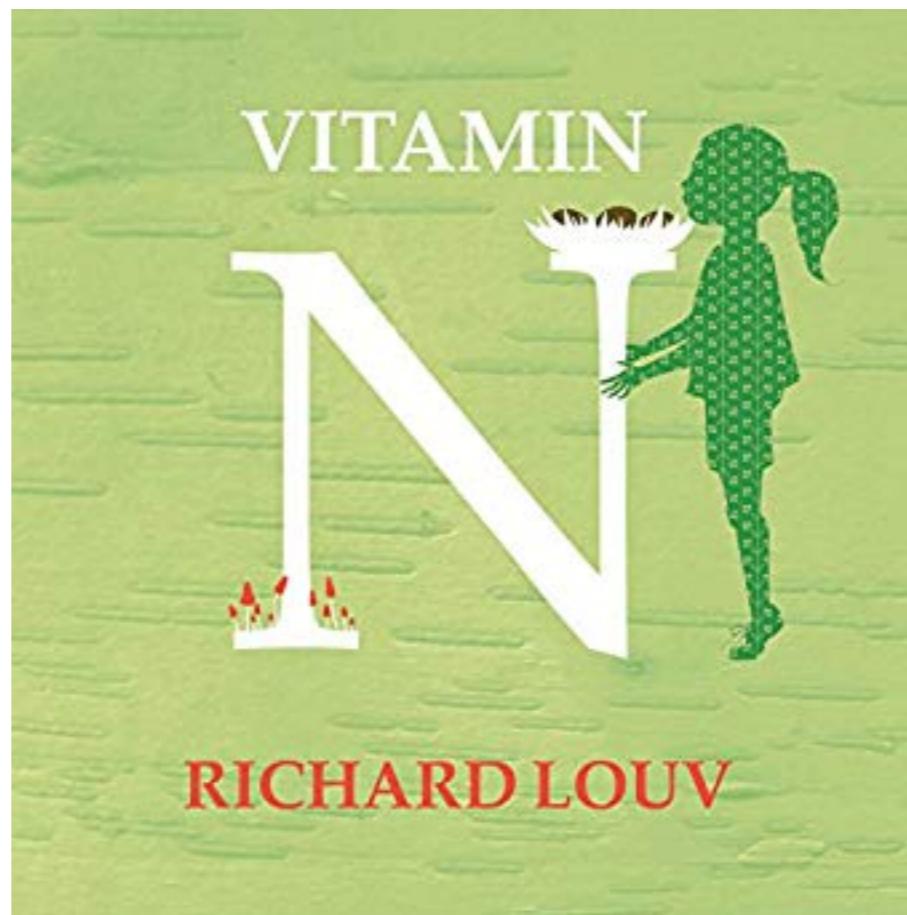
25,782 participants benefitted from risky outdoor play

Table 1. Definitions used to guide the systematic review (risky play behaviours).

Risky Play		
Thrilling and exciting forms of play that involve a risk of physical injury. The risk can be real or perceived [7,14]		
Risky Play Categories [5,6]	Definition	Examples
<i>Great heights</i>	Danger of injury from falling	Climbing/jumping from surfaces, balancing/playing on high objects (e.g., playground equipment), hanging/swinging at great heights
<i>High speed</i>	Uncontrolled speed and pace that can lead to collision with something (or someone)	Swinging at high speed
<i>Dangerous tools</i>	Can lead to injuries and wounds	Cutting tools (e.g., knives, saws, or axes), strangling tools (e.g., ropes)
<i>Dangerous elements</i>	Where children can fall into or from something	Cliffs, water, fire pits, trees
<i>Rough and Tumble Play</i>	Where children can be harmed	Wrestling or play fighting with other children or parents
<i>Disappear/get lost</i>	Where children can disappear from the supervision of adults or get lost alone	Exploring alone, playing alone in unfamiliar environments, general independent mobility, or unsupervised play



take the green pill



side effects

None



additional info

