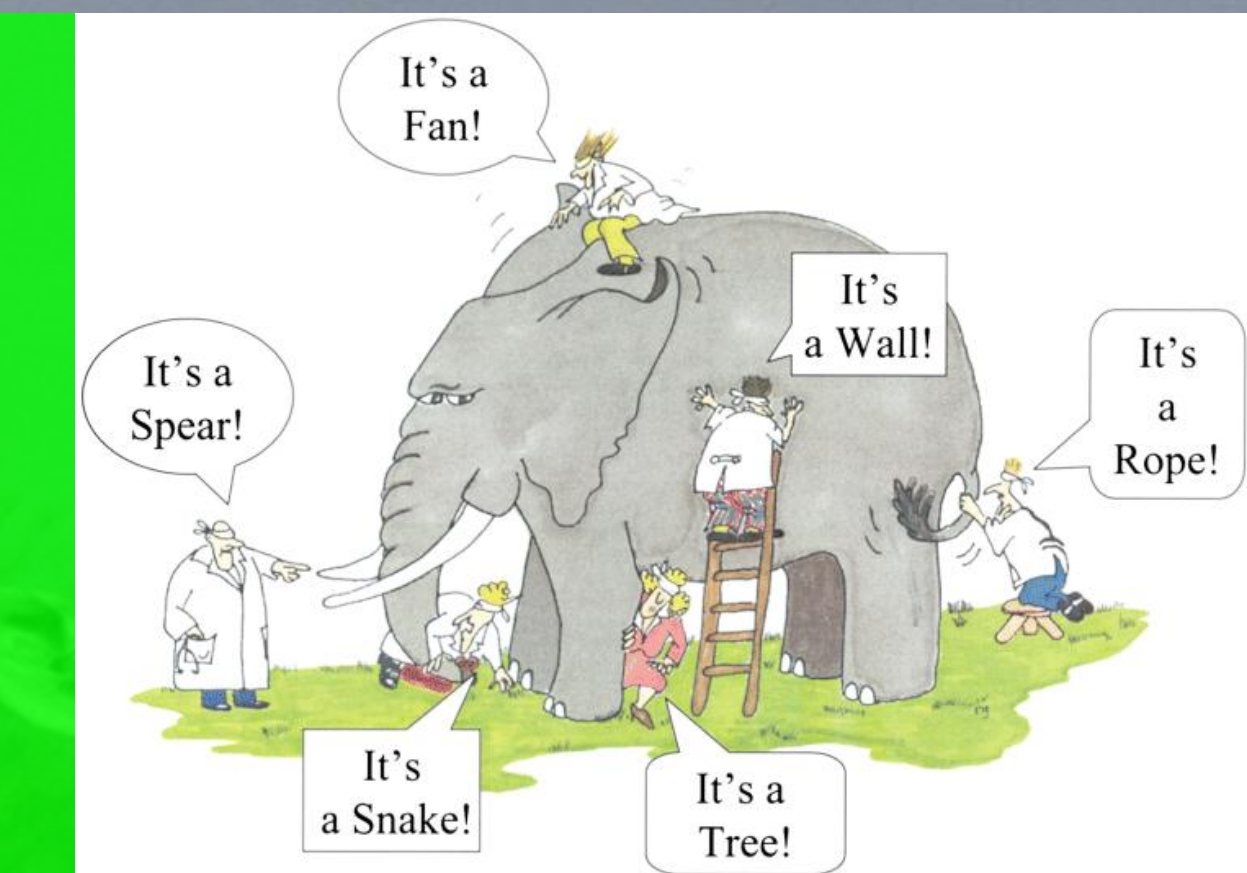


2011

Local Measure Reliability vs. Global Concept Validity. Has Cognitive Science Moved Beyond Behaviourism? (Insignificant Progress in Validating Cognitive Constructs $p < .05$)



<u>Spring Conference</u>		<u>David Pierre Leibovitz</u> <u>Institute of Cognitive Science</u>	
Thesis	<p>Every cognitive experiment contributes to the factual accumulation of raw, stimulus-response behavioural data. The raw data are factual/indisputable in that 95+% scientists understand and can reproduce the operationalized procedure and measures despite validity and interpretation concerns. Nevertheless, there has been zero factual accumulation of cognitive constructs and interpretations as there is no 95+% agreement nor comprehension in the sea of hypotheticals. Indeed, the signal to noise ratio worsens (entropy increases) with every experiment as new micro-theories are created, rather than a scientific reduction (convergence) to unity.</p>		
<u>Divisions</u>	<u>Brain/Body</u>	<u>Cognitive Structures/Processes</u>	<u>Behaviour</u> (Not Just <u>Behaviourism</u>)
<u>Stimuli</u>	<u>Behaviour</u> + <u>Physiological</u> <u>Lesions</u> , <u>Genetics</u> , Chemical, Electrical, <u>TMS</u> <u>Comparative Cognition</u> 	Construct Simulation (or other analytic) <ul style="list-style-type: none"> Construct equivalent to <u>Behavioural</u> stimuli Internal construct manipulations 	<u>Time</u> + <u>Multi-Modal (Sensory)</u> <u>Psychological</u> (<u>Semantic/Linguistic</u>)
(Response) Microscopes	<u>Behaviour</u> + <u>Histology: staining/microscopes</u> <u>Patch Clamps</u> , <u>Multielectrode array</u> <u>MEG</u> , <u>EEG</u> <u>PET</u> , <u>fMRI</u>   	<u>Behaviour</u> + <u>Construct Chronometry & Accuracy</u> Simulate over any time period 	<u>Surveys</u> ; <u>Response Time & Accuracy</u> <u>Comparative</u> (context, age & <u>species</u>) Times: <u>Pedagogical</u> & <u>Developmental</u> , <u>Longitudinal</u> , <u>Historical</u> , <u>Archaeological</u> , <u>Evolutionary</u>   
Clinical Progress (Applied)	<u>Medicine</u> , <u>Neurosurgery</u> , <u>Microsurgery</u> , <u>Nerve Reconstruction</u> , <u>Smile</u> , <u>Hands</u> ; <u>Neuroprosthetics: Pacemaker</u> , <u>Cochlear Implants</u> , <u>Sensory Substitution</u> , <u>Brain Pacemaker</u> , <u>Psychophysiological</u> , <u>Psychiatry</u>	None. See Forsyth, J. P., & Kelly, M. M. (2001). A tale of three blind men on the proper subject matter of clinical science and practice. Journal of clinical psychology, 57(9), 1133-48. doi: 10.1002/jclp.1080; pubmed:11494246 .	<u>Animal Training</u> ; <u>Rote Learning</u> <u>Normative assessment</u> , <u>Psychometrics</u> (<u>IQ</u> , <u>Personality</u>) <u>Pluralism: Cognitive Behavioural Therapies</u> <u>DSM</u>
Theoretical Progress	Plenty throughout brain V1 at 15% [1]	Not a single theory, structure or process generally understood and agreed upon (by 95%). <ul style="list-style-type: none"> Exploration: Explosion of methodologies; hypothetic constructs, theories, architectures & models 	Exploring the animal kingdom <u>Psychophysics</u> (<u>Perception</u>) <u>Classical Conditioning</u> (1927); <u>Cybernetics</u>
Issues	<u>Behaviour</u> + NCC and everything cognitive Network Function (link to Cognition) Bottom-up feedforward analysis; attention modulates Reusable/distributed regions Resting state brain activity <u>Electroconvulsive therapy</u> Historical: <u>Lobotomy</u> , (still forms for <u>epilepsy</u>)	<u>Behaviour</u> + <u>Mind/Body Problem</u> , <u>Consciousness</u> , <u>Qualia</u> , <u>Intentionality</u> Emergence, Levels of Analysis; Construct Validity; Pluralism; Signal to Noise Ratio of Fact to Fiction What is information and representation? What is attention, memory, control? (structural or functional)	Global <u>Linearity</u> & <u>Separability</u> ; Interaction Micro Theories: <u>Pluralism</u> , <u>Incommensurability</u> , <u>Incoherence</u> , <u>Intervening Variables</u> <u>Construct (Measure) Validity</u> ; <u>Operationalism</u> Complex Behaviour, Language <u>Individual Variability</u> (& <u>Statistical</u>); Averaging over Individuals <u>DSM Criticism</u> (<u>validity/reliability</u> , <u>medicalization</u>) <u>Confirmation bias</u> (need breadth)
Solutions	Network success requires cognitive solutions	Unified Theories; Bottom-up Re-engineering	Complex behaviour requires cognitive solutions
Sources	<u>Reference:</u> [1] Olshausen, B. A., & Field, D. J. (2005). How Close Are We to Understanding V1? <i>Neural computation</i> , 17(8), 1665-99. doi: 10.1162/0899766054026639.	<u>Suggest a Cognitive Fact</u> (not behaviour) that is generally understood and agreed upon (95+% scientists):	<u>Image Attribution:</u> Wikipedia, Institute for Research in Child Development, blog.searchenginewatch.com/110220-080701