

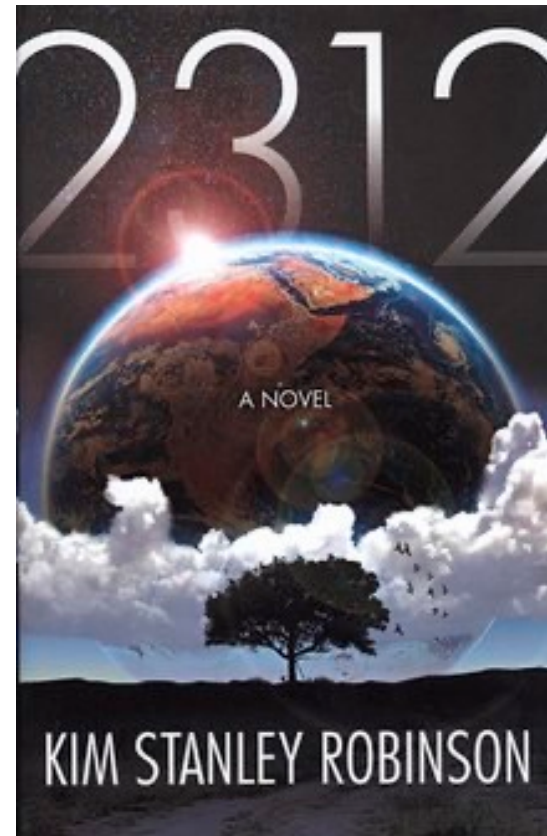
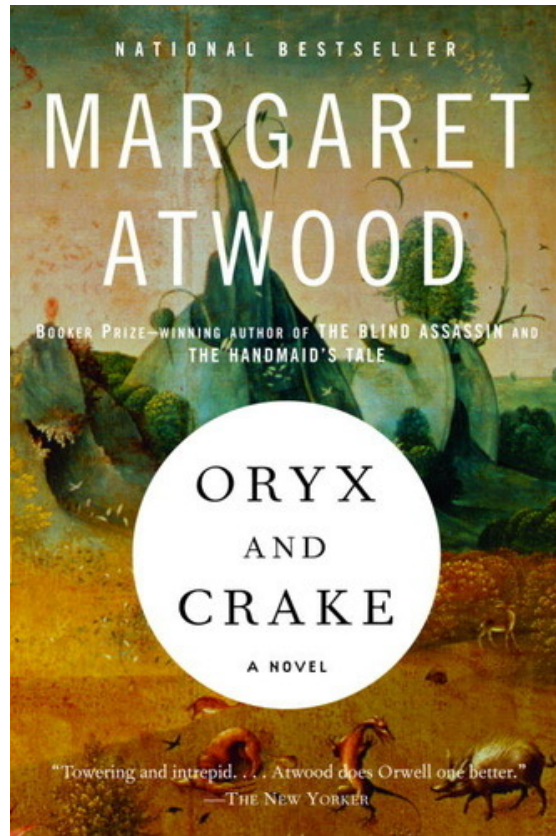
Kognitionspsychologie II: Session 11

What's next?

Rui Mata, FS 2024

Version: February 26, 2024

The future...



“People sometimes think that science fiction is about predicting the future, but that isn’t true. (...) science fiction is more of a modeling exercise, or a way of thinking.”

Kim Stanley Robinson

Session 11: What's next?

Will we still need cognitive psychology in 2050?



Photo by [Andy Kelly](#) on [Unsplash](#)

A few questions about 2050...

1. Will we still need pluralistic explanations?
2. Will our models of intelligence involve g ? And, if so, as a reflective or a formative factor?
3. Will we think of the mind as a collection of modules?
4. Will we make a distinction between cognition and emotion?
5. Will machines have consciousness?
6. Will behavioral research still be needed?

<https://matarui.github.io/kogpsy/session11.html>

Will we still need pluralistic explanations?

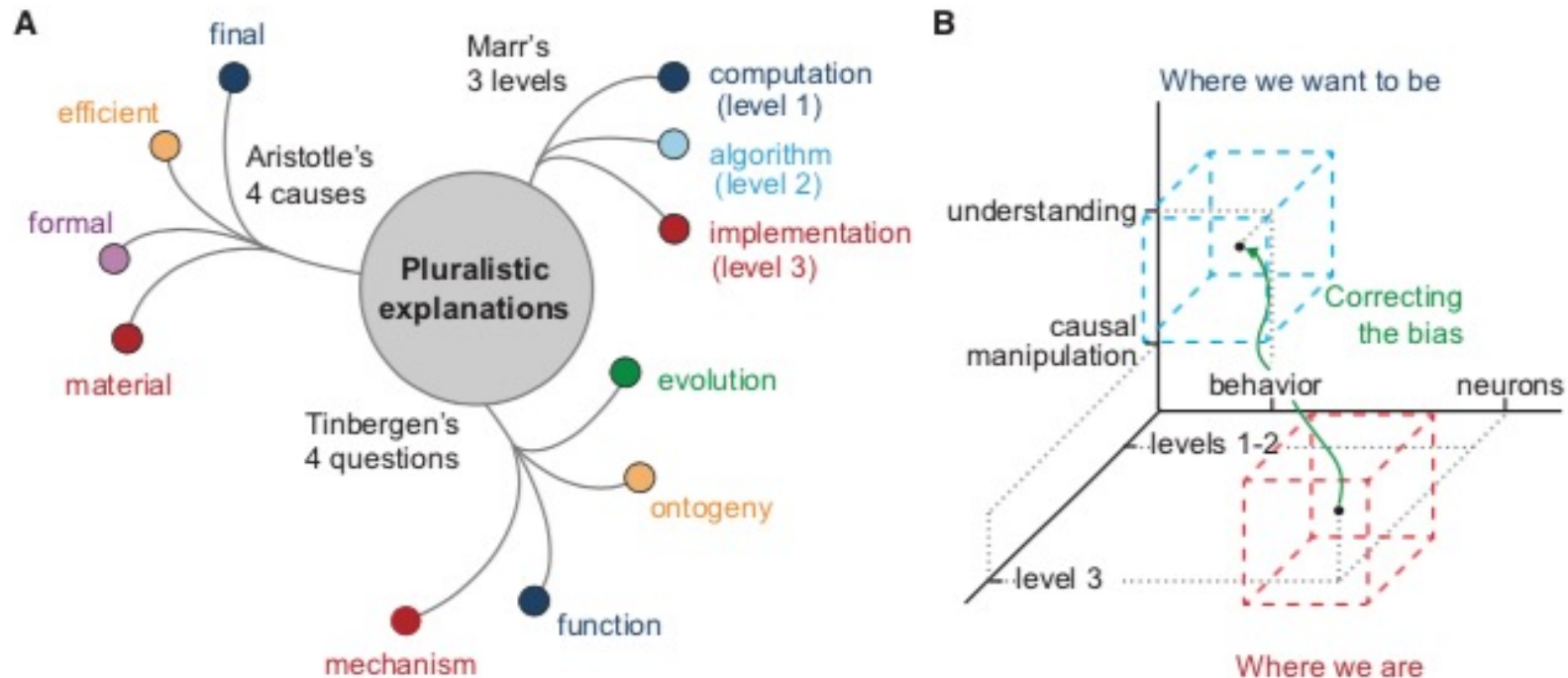


Figure 4. The Future History of Pluralistic Explanation

(A) That understanding of a phenomenon is multidimensional has long been appreciated. Aristotle posited four kinds of explanation: to explain "why" something changes, a polyhedric notion of causality is necessary; one that includes not only the material cause (what it is made out of), but also the other three "whys": formal (what it is to be), efficient (what produces it), and final (what it is for). Tinbergen also devised four questions about behavior: to go beyond its proximate causation (mechanism) to also considering its evolution, development, and real-world function. Marr's three levels are also shown.

(B) Three-dimensional space with axes of understanding-manipulation, behavior-neurons, and Marr's levels. The red box is where we are and the blue is where we should be.

Will our models of intelligence involve g ? And, if so, as a reflective or a formative factor?

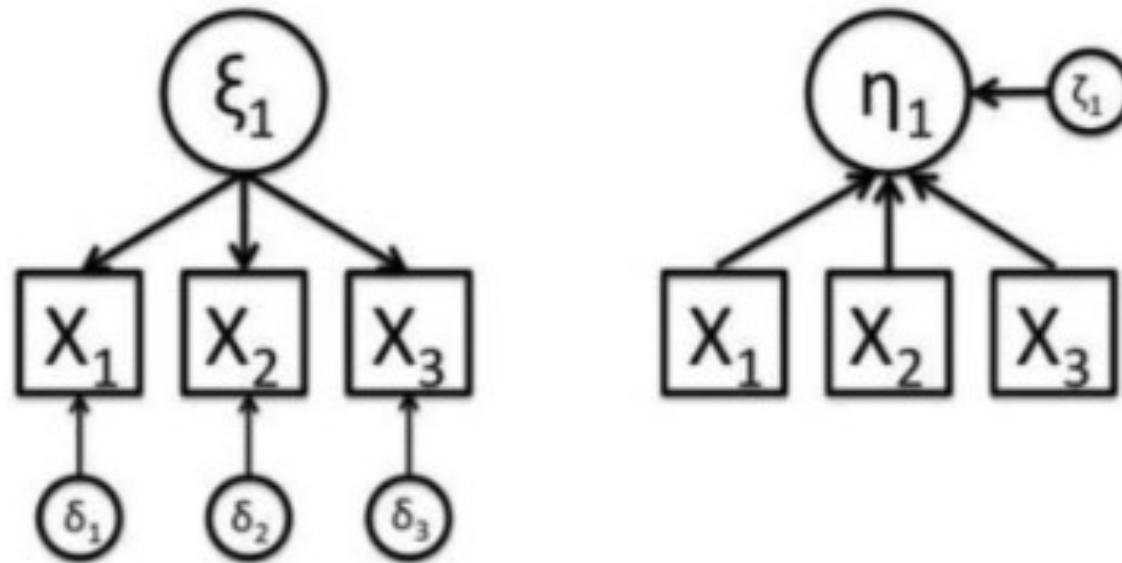
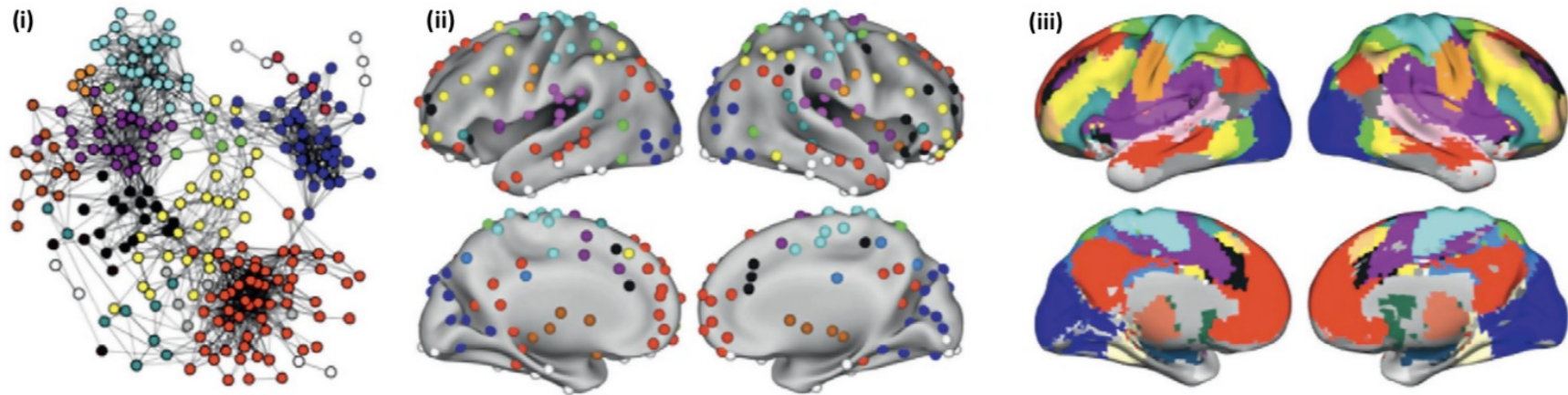
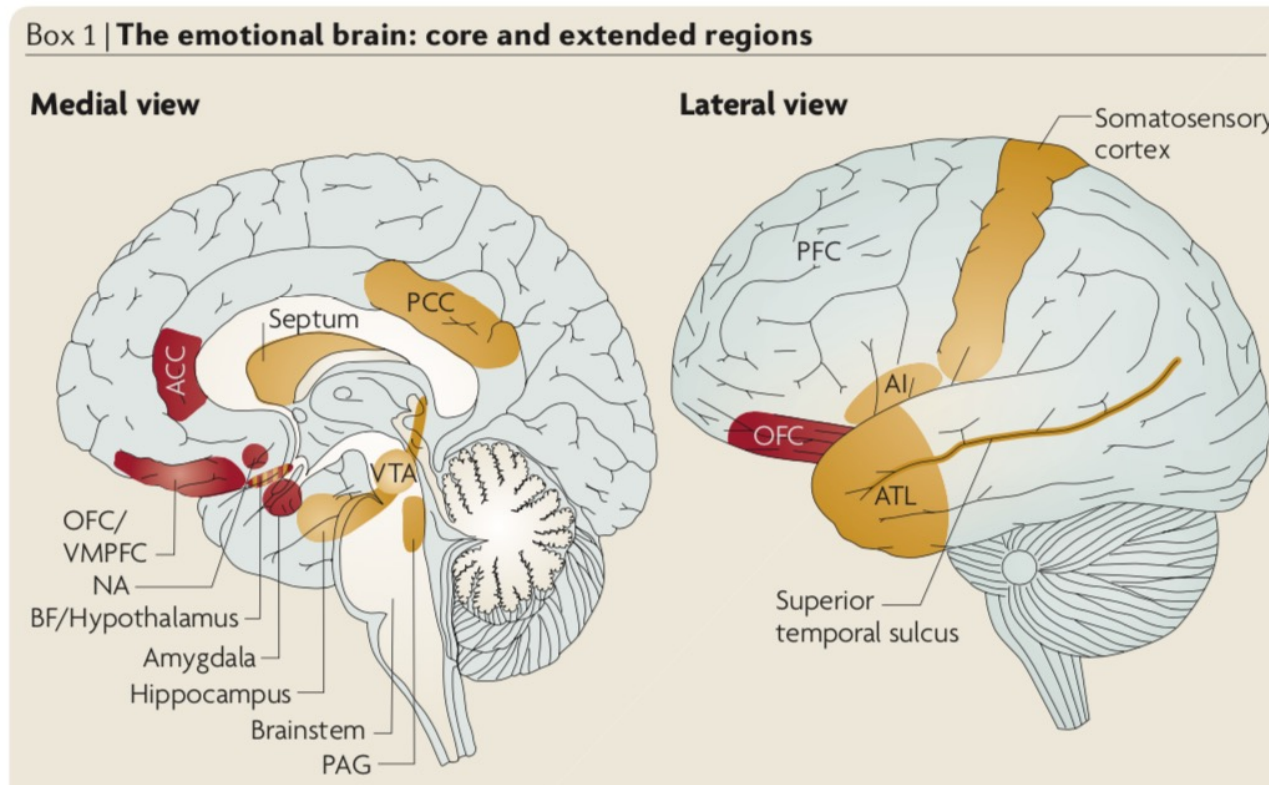


Figure 7. A reflective (left) and a formative (right) model.

Will we think of the mind as a collection of modules?




Will we make a distinction between cognition and emotion?



Will machines have consciousness?

Can machines have consciousness?

Type	Description	Example(s)	
C0: Unconscious processing	Information processing can be realized by (mindless) automatons	face or speech recognition, priming, debating(!)	 
C1: Global availability	Selection of information for global broadcasting, making it robust, and available for computation and report	reportable aspects of sensory experience	
C2: Self-monitoring	Self-monitoring of computations, leading to a subjective sense of certainty or error.	confidence, error-monitoring, knowledge of strategy efficacy	

Dehaene, S., Lau, H., & Kouider, S. (2017). What is consciousness, and could machines have it? *Science*, 358(6362), 486–492. <http://doi.org/10.1126/science.aan8871>

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Will behavioral research still be needed?

The Primacy of Behavioral Research for Understanding the Brain

Yael Niv

Department of Psychology and Neuroscience Institute, Princeton University

Understanding the brain requires us to answer both *what* the brain does, and *how* it does it. Using a series of examples, I make the case that behavior is often more useful than neuroscientific measurements for answering the first question.¹ Moreover, I show that even for “how” questions that pertain to neural mechanism, a well-crafted behavioral paradigm can offer deeper insight and stronger constraints on computational and mechanistic models than do many highly challenging (and very expensive) neural studies. I conclude that purely behavioral research is essential for understanding the brain—especially its cognitive functions—contrary to the opinion of prominent funding bodies and some scientific journals, who erroneously place neural data on a pedestal and consider behavior to be subsidiary.

Keywords: behavioral experiments, cognition, neuroscience, priorities

Niv, Y. (2021). The primacy of behavioral research for understanding the brain. *Behavioral Neuroscience*, 135(5), 601–609. <https://doi.org/10.1037/bne0000471>

What's next?

YOU CAN'T PLAY 20 QUESTIONS WITH NATURE
AND WIN:
PROJECTIVE COMMENTS ON THE PAPERS OF THIS
SYMPOSIUM

Allen Newell
May, 1973

I am a man who is half and half. Half of me is half distressed and half confused. Half of me is quite content and clear on where we are going.

My confused and distressed half has been roused by my assignment to comment on the papers of this symposium. It is curious that it should be so. We have just listened to a sample of the best work in current experimental psychology. For instance, the beautifully symmetric RT data of Cooper and Shepard (Chapter 3) make me positively envious. It is a pleasure to watch Dave Klahr (Chapter 1) clean up the subitizing data. The demonstrations of Bransford and Johnson (Chapter 8) produce a special sort of impact. And so it goes. Furthermore, independent of the particular papers presented here, the speakers constitute a large proportion of my all-time favorite experimenters--Chase, Clark, Posner, Shepard. Not only this, but almost all of the material shown here serves to further a view of man as a processor of information, agreeing with my current theoretical disposition. Half of me is ecstatic.

Still, I am distressed. I can illustrate it by the way I was going to start my comments, though I could not in fact bring myself to do so. I was going to draw a line on the blackboard and, picking one of the speakers of the day at random, note on the line the time at which he got his PhD and the current time (in mid-career). Then, taking his total production of papers like those in the present symposium, I was going to compute a rate of productivity of such excellent work. Moving, finally, to the date of my chosen target's retirement, I was going to compute the total future addition of such papers to the (putative) end of this man's scientific career. Then I was going to pose, in my role as discussant, a question: Suppose you had all those additional papers, just like those of today (except being on new aspects of the problem), *where will psychology then be?* Will we have achieved a science of man adequate in power and commensurate with his complexity? And if so, how will this have happened via these papers that I have just granted you? Or will we be asking for yet another quota of papers in the next dollop of time?

Newell's solutions:

- Complete Processing Models
- Analyze a Complex Task
- One Program for Many Tasks

Next week

- You can submit questions by May 19th (but earlier is better)
- I will go over the questions on May 21st and prepare a summary of the semester – focusing on your questions
- I will give more details about the exam and provide a couple of example questions

Course evaluation