

Melbourne School of Psychological Sciences

Debriefing Statement



PROJECT TITLE: Minimal models of sensory prediction

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Thank you for participating in our study!

As we mentioned at the beginning of this experiment, we are interested in understanding the limits of human prediction. The sequences we used were constructed using a nice mathematical model, called the epsilon machine. This machine lets us construct sequences with very specific structures and different levels of complexity, for which the optimal prediction strategy can be calculated. You may have viewed a simple sequence or a complex one, so don't feel bad if you didn't feel like you learned the sequence - you probably had one of the really complex ones.

We expect this data will have many uses, but our most immediate project is to explore the different types of prediction strategies that people are using, and see how close each strategy comes to the known, optimal strategy. We might discover some cool things like, people with "bad" working memory actually use smarter prediction strategies to achieve similar results as someone with "good" working memory. This research in human intelligence can also be exchanged with current research in artificial intelligence and deep learning. Our research will be able to identify types of structures that humans are close to optimal in predicting, and others that they are far from optimal – this will help artificial intelligence researchers develop technologies that target the areas where humans are bad at prediction, so that these technologies complement human intelligence, rather than re-invent or replace it in the future. Also, there is a neat new concept called the "information bottleneck", which is helping to explain *how* deep learning works (whereas before, engineers just cared *if* it worked). We are going to see whether the information bottleneck concept has any natural similarities to how humans learn to predict sequences.

If you are interested in learning more about the information bottleneck, this is a good article:
<https://www.quantamagazine.org/new-theory-cracks-open-the-black-box-of-deep-learning-20170921>

As always we are very grateful for the thoughtful data you provide, as it tells us a great deal about how humans think, reason, and predict the world around them.

This research has been cleared by the Human Research Ethics Committee (HREC 1954586.1). If you have any concerns about this project please contact the Executive Officer, Human Research Ethics, The University of Melbourne (Tel: 8344 2073; Fax: 9347 6739).