Philosophy of Cognitive Science (125)

Hilary Term, 2022

Matthew Parrott

matthew.parrott@st-hildas.ox.ac.uk

Course Description

This paper covers some of key questions about the nature of the mind dealt with by a variety of cognitive scientific disciplines: experimental psychology, cognitive neuroscience, linguistics and computational modelling of the mind. Studying this paper will provide insight into the ways that contemporary scientific advances have improved our understanding of aspects of the mind that have long been the focus of philosophical reflection. It will also introduce you to a range of theoretical issues generated by current research in the behavioural and brain sciences.

The core topics are:

* Levels of description and explanation (e.g. personal vs. subpersonal, functional vs. mechanistic, mind vs. brain)
* Cognitive architecture, modularity, homuncular functionalism
* Conceptual foundations of information processing: rules and algorithms, tacit knowledge (e.g. of grammar), competence vs. performance
* Nature and format of representations: representationalism vs. behaviourism, the computational theory of mind and language of thought, connectionist alternatives
* The scientific study of consciousness, including the role of subjects’ reports, non-verbal and direct measures; neural and computational correlates of consciousness; and the problem of distinguishing phenomenal and access consciousness empirically

The lectures will also cover philosophical issues raised by some areas of cutting-edge research, such as: agency and its phenomenology; attention and neglect; cognitive neuropsychology; concepts; delusions; dual-process theories; dynamical systems, embodied and embedded cognition; evolutionary psychology and massive modularity; forward models and predictive coding; imagery; implicit processing (e.g. blindsight, prosopagnosia); innateness (e.g. concept nativism); language processing and knowledge of language; perception and action (e.g. dorsal vs. ventral visual systems); spatial representation; theory of mind / mindreading; unity of consciousness. Lectures may also cover some historical background (e.g. the cognitive revolution).

For those studying psychology, neuroscience, linguistics or computation, the paper is a crucial bridge to philosophy. But you do not need to be studying a scientific subject to take this paper, as long as you enjoy reading about scientific discoveries about the mind and brain. The paper will be of great interest to philosophers without a scientific background who want to understand the benefits and limitations of bringing scientific data to bear on deep issues in the philosophy of mind. (From *Course Handbook*)

**Introductions and Useful Collections**

1. Bermúdez. J. L. 2019: *Cognitive science: an introduction to the science of the mind* Cambridge: CUP. 3rd Edition.
2. Bermúdez, J. L. 2006: *Philosophy of Psychology: Contemporary Readings*. London: Routledge.
3. Clark, A 2014: *Mindware*. Oxford: OUP. 2nd Edition.
4. Crane, T. 2003: *The Mechanical Mind: A Philosophical Introduction to Minds, Machines and Mental Representations*. London: Routledge. 2nd Edition.
5. Margolis, E., Samuels, R. and Stich, S. (eds) 2011: *The Oxford Handbook of Philosophy of Cognitive Science*. Oxford: OUP.
6. Sterelny, K. 1990: *The Representational Theory of Mind: An Introduction*. Oxford: Basil Blackwell.

The following entries from the Stanford Encyclopedia of Philosophy are also useful background:

1. Levin, J. 2013. ‘Functionalism’. <https://plato.stanford.edu/entries/functionalism/>
2. Pitt, D. 2012. ‘Mental Representation’. <https://plato.stanford.edu/entries/mental-representation/>
3. Rescorla, M. 2015. “The Computational Theory of Mind’. <https://plato.stanford.edu/entries/computational-mind/>
4. Smart, J. J. C. 2007. ‘Mind/Brain Identity Theory’. <https://plato.stanford.edu/entries/mind-identity/>
5. Thagard, P. 2014. ‘Cognitive Science’. <https://plato.stanford.edu/entries/cognitive-science/>

Tutorial Readings Lists

**Tutorial Structure**

1. Each week you will be asked to write a brief essay on a specified question.
2. You must **email** the completed essay to me by **10 AM** they day before your tutorial.
3. I will provide written marks and feedback on your essay.
4. If you are unable to complete your essay on time or unable to attend tutorial, please me as soon as possible. Please arrive to tutorials on time.
5. You do NOT need to do all of the primary reading for each week

Week 1: The Computational Theory of Mind

*Question*: In what sense, if any, is the mind a computer?

***Primary Reading***

1. Block, N., ‘ The Mind is the Software of the Brain’ In Daniel N. Osherson, Lila Gleitman, Stephen M. Kosslyn, S. Smith & Saadya Sternberg (eds.), [*An Invitation to Cognitive Science, Second Edition, Volume 3*](https://philpapers.org/rec/OSHAIT). Cambridge MA: MIT Press. pp. 377-425 (1995)
2. Putnam, H., 1967/1975. “The Nature of Mental States”, in *Mind, Language, and Reality: Philosophical Papers, vol. 2*, Cambridge: Cambridge University Press, pp. 429-440.
3. Marr, D. 1982: Vision. Reprinted in Bermudez (ed.) *Philosophy of Psychology: Contemporary Readings*.

***Additional Reading***

1. Block, N. and Fodor, J. 1972. “What Psychological States Are Not”, *The Philosophical Review*, 81: 159–181.
2. Chalmers, D. 1996. “Does a rock implement every finite-state automaton?”, *Synthese*, Vol.108, Issue 3, pp 309–333
3. Churchland, P.S. 1981: Language, thought and information processing. *Nous* 14, 147–70
4. Clark, A. 2001. *Mindware*, Chapters 2-3.
5. Crane, T. 1995. *The Mechanical Mind*, Chapter 3, Chapters 7-8.
6. Field, H. 1978: Mental representation. *Erkenntnis*, 13, 34–77.
7. Polger, T. 2009. ‘Computational Functionalism’, in Symons & Calvo (eds.) *The Routledge Companion to Philosophy of Psychology*, pp148-163.
8. Rescorla, M. 2015. “The Computational Theory of Mind”, especially Sections 1-3, in the *Stanford Encyclopaedia of Philosophy*, <https://plato.stanford.edu/entries/computational-mind/>
9. Shagrir, O. 2005. “The Rise and Fall of Computational Functionalism”, in Y. Ben-Menahem (ed.), *Hilary Putnam*, Cambridge: Cambridge University Press, pp220–250.

Week 2: The Representational Theory of Mind: The Language of Thought

*Question*: What are the best reasons to believe Fodor’s Language of Thought hypothesis?

***Primary Reading***

1. Fodor, J. 2006: ‘The Language of Thought: First Approximations’, Reprinted in

J.L. Bermúdez (ed.), *Philosophy of Psychology: Contemporary Readings*.

2) Sterelny, K. 1990: *The Representational Theory of Mind: An Introduction*. Oxford: Blackwell

Publishers, Chapter 2, ‘Representation and computation’.

***Additional Reading***

1. Barwise, J. 1987: ‘Unburdening the Language of Thought’, *Mind & Language*, 2: 82–96.
2. Block, N. 1981: ‘Psychologism and Behaviorism’, *Philosophical Review*, 90, 5–43. Carruthers, P. 1996: *Language, Thought and Consciousness*. Cambridge: Cambridge University Press.
3. Carruthers, P. 1998: ‘Conscious thinking: Language or elimination’? *Mind & Language*, 13: 457–76.
4. Churchland, P.S. 1981: ‘Language, Thought and Information Processing’, *Noûs*, 14: 147–70.
5. Clark, A. 2001: *Mindware: an introduction to Philosophy of Cognitive Science*. Oxford University Press. Chapters 1-2.
6. Crane, T. 1990: ‘The Language of Thought: No Syntax without Semantics’, *Mind & Language*, 5: 187–212.
7. Davies, M. 1998: ‘Language, Thought, and the Language of Thought (Aunty’s own argument revisited)’, In P. Carruthers and J. Boucher (eds), *Language and Thought*. Cambridge: Cambridge University Press: 226–47.
8. Dennett, D. 1977. ‘A cure for the common code’. Reprinted in *Brainstorms*, ch.6, 1978, MIT Press, pp90-108.
9. Field, H. 1978: ‘Mental Representation’, *Erkenntnis*, 13: 34–77.
10. Fodor, J. 2010: *LOT 2*. Oxford: Oxford University Press.
11. Fodor, J. 1975: *The Language of Thought*. New York: Crowell
12. Fodor, J.A. 1998: *In Critical Condition*. Cambridge, MA: MIT Press
13. Fodor, J.A. 2001: ‘Language, Thought and Compositionality’, *Mind & Language*: 16, 1–15.
14. Fodor, J. 1987. ‘Why There Still Has to Be a Language of Thought’, In his *Psychosemantics*. Cambridge, MA: MIT Press (pp. 135-54).
15. Laurence, S. and Margolis, E. 1997: Regress Arguments Against the Language of Thought’, *Analysis*, 57: 60–6.
16. Rey, G. 1995: ‘A not ‘Merely Empirical’ Argument for the Language of Thought’, *Philosophical Perspectives* 9.

Week 3: Modularity

*Question*: Is information encapsulation necessary for a cognitive process to be modular? Why?

***Primary Reading***

1. Fodor. J. 1985: ‘Precis of Modularity of Mind’, *Behavioral and Brain Sciences*, 8. Reprinted in *A Theory of Content and Other Essays*, Cambridge, MA: MIT.
2. Machery, E. 2008: ‘Modularity and the Flexibility of Human Cognition’, *Mind and Language*, 23: 263-272.
3. Prinz, J. 2006: ‘Is the Mind Really Modular’? In R. Stainton, ed., *Contemporary Debates in Cognitive Science*, Oxford: Blackwell: pp. 22-36.

***Additional Reading***

1. Carruthers, P. 2006: ‘The Case for Massively Modular Models of Mind’, In Stainton, ed., *Contemporary Debates in Cognitive Science*.
2. Coltheart, M. 1999: ‘Modularity and Cognition’, *Trends in Cognitive Sciences*, 3: 115–20.
3. Fodor, J. 1983: *The Modularity of Mind*. Cambridge, MA: MIT Press.
4. Fodor. J. 2000: *The Mind Doesn't Work That Way*: *The Scope and Limits of Computational Psychology*. Cambridge, MA: MIT Press, chs. 3 and 5.
5. Fodor, J. 1989: ‘Why Should the Mind be Modular’? In A. George (ed.) *Reflections on Chomsky*, Oxford: Blackwell: 1-22.
6. Ludwig, K. & Schneider, S. 2008: ‘Fodor's Challenge to the Classical Computational Theory of Mind’, *Mind and Language*, 23: 123-143.
7. Pylyshyn, Z. 1999. '[Is Vision Continuous with Cognition? The Case for Cognitive Impenetrability of Visual Perception](https://doi.org/10.1017/S0140525X15000965)' in *Behavioral and Brain Sciences* **22**(3), pp. 341–365.
8. Samuels, R. 2005: ‘The Complexity of Cognition: Tractability Arguments for Massive Modularity’, In P. Carruthers, S. Laurence, and S. Stich (eds.) *The Innate Mind: Structure and Contents*.
9. Segal, G. 1996: ‘The Modularity of Theory of Mind’, In P. Carruthers and P.K. Smith (eds). *Theories of Theories of Mind*. Cambridge: Cambridge University Press.
10. Shea, N. 2014. '[Distinguishing Top-Down from Bottom-Up Effects](http://www.oxfordscholarship.com/view/10.1093/acprof:oso/9780199832798.001.0001/acprof-9780199832798-chapter-4)' in Dustin Stokes, Mohan Matthen, and Stephen Biggs, eds. *Perception and Its Modalities*, Oxford University Press.

Week 4: Connectionism and Neural Networks

*Question*: Can connectionism explain the systematicity of thought without appealing to syntactically structured representations?

***Primary Reading***

1. McLaughlin, B. 2004. '[Computationalism, Connectionism, and the Philosophy of Mind](https://onlinelibrary.wiley.com/doi/abs/10.1002/9780470757017.ch10)' in Luciano Floridi, ed. *The Blackwell Guide to the Philosophy of Computing and Information*, Blackwell.
2. Churchland, P.S. and Sejnowski, T.J. 1989: Neural representation and neural computation. In L. Nadel, L. Cooper, P.W. Culicover and R.N. Harnish (eds.) *Neural Connections, Mental Computation*. Cambridge, MA: MIT

***Additional Reading***

1. Bechtel, W. 1987. “Connectionism and the Philosophy of Mind: An Overview”, *The Southern Journal of Philosophy (Supplement)*, pp17-41.
2. Clark, A. 1990: Connectionism, competence, and explanation. In M. Boden (ed.) *The Philosophy of Artificial Intelligence*. Oxford: Oxford University Press.
3. Fodor, J. and McLaughlin, B. 1990: Connectionism and the Problem of Systematicity: Why Smolensky's Solution Doesn't Work. *Cognition* 35: 183–204.
4. Fodor, J. and Pylyshyn, Z. 1988: ‘Connectionism and cognitive architecture: A critical analysis." *Cognition* 28.1-2: 3-71.
5. Johnson, K. 2004. '[On the Systematicity of Language and Thought](http://www.jstor.org/stable/3655573)' in *Journal of Philosophy* **101**(3), pp. 111–139.
6. McLaughlin, B. 2009. '[Systematicity Redux](http://www.jstor.org/stable/40271333)' in *Synthese* **170**(2), pp. 251–274.
7. Matthews, R. 1997. '[Can Connectionists Explain Systematicity?](http://doi.wiley.com/10.1111/j.1468-0017.1997.tb00067.x)' in *Mind & Language* **12**(2), pp. 154–177.
8. Ramsey, W., 1997. “Do Connectionist Representations Earn their Explanatory Keep?” *Mind and Language*, 12: 34–66.
9. Sterelny, K. *The Representational Mind,* Chapter 8.
10. Smolensky, P. 1988: On the proper treatment of connectionism. *Behavioral and Brain Sciences*, 11, 1–74.
11. van Gelder, T., 1990. “Compositionality: A Connectionist Variation on a Classical Theme,” *Cognitive Science*, 14: 355–384.

Week 5: Levels of Description/Explanation

*Question*: What is the best way to understand the distinction between personal and sub-personal?

***Primary Reading***

1. Cummins, R. 2006: ‘How does it work?’ versus ‘What are the laws?’: Two conceptions of psychological explanation. In J.L. Bermúdez (ed.), *Philosophy of Psychology: Contemporary Readings*. London: Routledge: 90–98.
2. Dennett, D.C. 2006: Personal and sub-personal levels of explanation. Extract from *Content and Consciousness* (1969), reprinted in J.L. Bermúdez (ed.), *Philosophy of Psychology: Contemporary Readings*. London: Routledge: 17–21.

***Additional Reading***

1. Cummins, R. 1983: *The Nature of Psychological Explanation*. Cambridge, MA: MIT Press, Chapter 1, ‘Analysis and subsumption’ and Chapter 2, ‘Functional analysis’.
2. Davies, M. 2000: Persons and their underpinnings. *Philosophical Explorations*, 3: 43–62.
3. Davies, M. 2000b: Interaction without reduction: The relationship between personal and sub-personal levels of description. *Mind and Society*, 1: 87–105.
4. Dennett, D.C. 1978: Artificial intelligence as philosophy and as psychology. In *Brainstorms: Philosophical Essays on Mind and Psychology*. Brighton: Harvester Press, 109–26.
5. Drayson, Z. 2012: The uses and abuses of the personal/subpersonal distinction. *Philosophical Perspectives*, 26 (1): 1-18.
6. Feest, U. 2003. '[Functional Analysis and the Autonomy of Psychology](http://www.jstor.org/stable/10.1086/377379)' in *Philosophy of Science* 70(5), pp. 937–948.
7. Fodor, J. 1974: Special sciences. *Synthese*, 28, pp. 97–115. Reprinted in *Representations: Philosophical Essays on the Foundations of Cognitive Science*. Brighton: Harvester Press, 1981.
8. Hornsby, J. 2000: Personal and sub-personal: A defence of Dennett’s early distinction. *Philosophical Explorations*, 3: 6–24.
9. McDowell, J. 1994: The Content of Perceptual Experience. *Philosophical Quarterly*, 44: 190–205.
10. Peacocke, C. 1986. '[Explanation in Computational Psychology: Language, Perception and Level 1.5](http://doi.org/10.1111/j.1468-0017.1986.tb00321.x)' in *Mind & Language*, 1(2), pp. 101–123.
11. Piccinini, G. and Craver, C.F. 2011: Integrating Psychology and Neuroscience: Functional Analyses as Mechanism Sketches. *Synthese* 183: 283-311.
12. Sterelny, K. 1990: *The Representational Mind*. Chapters 3 and 9.
13. Stich, S. 1978: Beliefs and Subdoxastic States. *Philosophy of Science*, 45: 499–518. Reprinted in J.L. Bermúdez (ed.), *Philosophy of Psychology: Contemporary Readings*.

Week 6: Consciousness: Access vs. Phenomenal

*Question*: Can scientific studies provide good evidence for the existence of phenomenal consciousness in the absence of access consciousness?

***Primary Reading***

1. Block, N. 2008: ‘Consciousness and Cognitive Access’, *Proceedings of the Aristotelian Society* 108(1): 289-317.
2. Block, N. 2011: ‘Perceptual Consciousness Overflows Cognitive Access’, *Trends in Cognitive Sciences* 12: 567-575.
3. Phillips, I. 2011: ‘Perception and Iconic Memory’ *Mind & Language* 26.

***Additional reading***

1. Akins, K. 1993: ‘What is it Like to be Boring and Myopic?’’ In J. Dahlbom (ed.) *Dennett and his critics* (pp. 124-160). Oxford: Blackwell.
2. Block, N. 1995: ‘On a Confusion about a Function of Consciousness’, *Brain and Behavioral Sciences* 18:227-247.
3. Baars, B. J. 1997: ‘In the Theatre of Consciousness: Global Workspace Theory, a Rigorous Scientific Theory of Consciousness’, *Journal of Consciousness Studies* 4: 292–309.
4. Chalmers, D. 2004. ‘How Can we Construct a Science of Consciousness’? In M. Gazzaniga (ed.), *The Cognitive Neurosciences III*. Cambridge, MA: MIT Press. Reprinted in D. Chalmers.
5. Cohen, M. and Dennett, D. 2011: ‘Consciousness Cannot be Separated from Function’, *Trends in Cognitive Sciences* 15(8): 358-64.
6. Dennett, D. 1991: *Consciousness Explained*. Penguin Press, ch. 4.
7. Goldman, A. 2000: ‘Can Science Know When You’re Conscious? Epistemological foundations of consciousness research’, *Journal of Consciousness Studies*, 7: 3-22.
8. Irvine, E. 2013: ‘Measures of Consciousness’, *Philosophy Compass,* 8: 285–297
9. Lamme V.A.F. 2004: ‘Separate Neural Definitions of Visual Consciousness and Visual Attention; a case for phenomenal awareness’, *Neural Networks*, 17: 861-872.
10. Phillips, I. 2016. ‘No watershed for overflow: recent work on the richness of consciousness.’ *Philosophical Psychology* 29 (2).
11. Shea, N. 2012: ‘Methodological Encounters with the Phenomenal Kind’, *Philosophy and Phenomenological Research* 84: 307-44.
12. Stazicker, J. 2011. ‘Attention, Visual Consciousness, and Indeterminacy’, *Mind and Language*.

Week 7: Agency and Free Will

*Question*: Do results from cognitive science show there is no such thing as free will?

***Primary Reading***

1. Bayne, T. 2011: ‘Libet and the Case for Free Will Scepticism’, In Richard Swinburne (ed.) *Free Will and Modern Science*. British Academy.
2. Libet, B. 1985: ‘Unconscious Cerebral Initiative and the Role of Conscious Will in Voluntary Action’, *Behavioral and Brain Sciences*  8: 529-539.

***Additional Reading***

1. Bayne, T. 2006: ‘Phenomenology and the Feeling of Doing: Wegner on the conscious will’, In Pockett, S. P., Banks, W.P. and Gallagher, S. *Does Consciousness Cause Behavior?* Cambridge, MA: MIT Press.
2. Flanagan, O. 1996: ‘Neuroscience, Agency, and the Meaning of Life’, In his *Self-Expressions*. Oxford: Oxford University Press.
3. Jo, H-G. et al. 2014: ‘First-person Approaches in Neuroscience of Consciousness: Brain dynamics correlate with the intention to act’, *Consciousness and Cognition* 26: 105–116.
4. Jo, H-G. et al. 2013: ‘Spontaneous EEG fluctuations determine the readiness potential: is preconscious brain activation a preparation process to move?’ *Experimental Brain Research* 231: 495–500.
5. Lau, H. 2009: ‘Volition and the Functions of Consciousness’, In M. Gazzaniga (ed)

*Cognitive Neurosciences*. Cambridge, MA: MIT Press: pp 1191-1200.

1. Levy, N. 2005: ‘Libet’s Impossible Demand’, *Journal of Consciousness Studies* 12: 67–76.
2. Libet, B. 1999: ‘Do we Have Free Will?’, *Journal of Consciousness Studies* 6: 47-57.
3. Marcel, A. 2003: ‘The Sense of Agency: awareness and ownership of action’, *Agency and Self-Awareness*. J. Roessler and N. Eilan (eds). Oxford: Clarendon Press.
4. Nichols, S. 2004: ‘The Folk Psychology of Free Will: fits and starts’, *Mind and Language*. 19: 473-502.
5. Proust, J. 2000: ‘Awareness of Agency: three levels of analysis’, In T. Metzinger (ed) *The Neural Correlates of Consciousness*. Cambridge, MA: MIT Press.
6. Roskies. G. 2010: ‘How Does Neuroscience Affect our Conception of Volition?’, *Annual Review of Neuroscience*, 33: 109-130.
7. Sebanz, N. and Prinz, W. 2006: *Disorder of Volition*. Cambridge, MA: MIT Press.
8. Wegner, D. M. 2002: *The Illusion of Conscious Will*. Cambridge: MA: MIT Press.

Week 8: Delusions

*Question*: In what sense, if any, do delusional patients respond to unusual experiences?

***Primary Reading***

1. Campbell. J. 2001: ‘Rationality, Meaning and the Analysis of Delusion’, *Philosophy, Psychiatry and Psychology* 8: 89-100.
2. Davies, M., Coltheart, M., Langdon, R. and Breen, N. 2001: Monothematic Delusions: towards a two-factor account*’*, *Philosophy, Psychiatry and Psychology*, 8: 133–58.
3. Egan, A. 2006: ‘Imagination, Delusion, and Self-deception’, in T. Bayne and J. Fernandez (eds) *Delusions, Self-Deception, and Affective Influences on Belief-formation*. Psychology Press.

***Additional Reading***

1. Bayne. T. & Pacherie, E. 2005: ‘In Defense of the Doxastic Account of Delusions’, *Mind and Language* 2: 163-188.
2. Coltheart, M., Langdon, R., & McKay, R. 2011: Delusional Belief, Annual Review of Psychology, 62, 271-298.
3. Coltheart, M., Menzies, P. & Sutton, J. 2010: ‘Abductive Inference and Delusional Belief’, Cognitive Neuropsychiatry, 15: 261-287.
4. Corlett, et. al. 2010: ‘Toward a Neurobiology of Delusions’ *Progress in Neurobiology*, *92*, pp. 345- 369.
5. Currie, G. 2000: ‘Imagination, Delusion and Hallucinations’, *Mind and Language* 15: 168-183.
6. Davies, M. and Egan, A. 2013: ‘Bayesian Inference and Compartmentalisation’, In K.W.M. Fulford, M. Davies, R.G.T. Gipps, G. Graham, J. Sadler, G. Stanghellini and T. Thornton (eds),*The Oxford Handbook of Philosophy and Psychiatry*. Oxford: Oxford University Press.
7. Ellis, H. D. and Young, A. W. 1990: ‘Accounting for Delusional Misidentifications’, *British Journal of Psychiatry*, 157: 239-248.
8. Feeney, E., Groman, S., Taylor, J. and Corlett, P. 2017: ‘Explaining Delusions: Reducing Uncertainty Through Basic and Computational Neuroscience’, *Schizophrenia Bulletin*, 43, pp.263-272.
9. Fletcher, P. and Frith, C. 2009: ‘Perceiving is Believing: a Bayesian Approach to Explaining the Positive Symptoms of Schizophrenia’, *Nature Reviews Neuroscience*, *10*, pp. 48-58.
10. Maher. B. 1988: ‘Anomalous Experience and Delusional Thinking: the logic of explanations’, In T. F. Oltmanns and B. A. Maher (eds) *Delusional Beliefs*. Chichester: Wiley.
11. McKay, R. 2012: ‘Delusional Inference’, *Mind and Language* 27: 330-355.
12. Parrott, M. 2016: ‘Bayesian Models, Delusional Beliefs, and Epistemic Possibilities', *The British Journal for the Philosophy of Science* 67: 271-296.
13. Parrott, M. forthcoming: ‘Delusional Predictions and Explanations’, *The British Journal for the Philosophy of Science* (online)
14. Sterzer, P. et al. 2018. ‘The Predictive Coding Account of Psychosis’, *Biological Psychiatry,* 84, pp. 634-43.