

# Teaching & Learning Guide for: 'Border Disputes: Recent Debates along the Perception–Cognition Border'

Sam Clarke<sup>1,2</sup> | Jacob Beck<sup>3,4</sup> 

<sup>1</sup>MindCORE, University of Pennsylvania, Philadelphia, Pennsylvania, USA

<sup>2</sup>Department of Philosophy, University of Southern California, Los Angeles, California, USA

<sup>3</sup>Department of Philosophy, York University, Toronto, Ontario, Canada

<sup>4</sup>Centre for Vision Research, York University, Toronto, Ontario, Canada

## Correspondence

Sam Clarke.

Email: [sam.clarke@usc.edu](mailto:sam.clarke@usc.edu)

## Funding information

Social Sciences and Humanities Research Council of Canada; Canada First Research Excellence Fund

## 1 | AUTHOR'S INTRODUCTION

The idea that perception is distinct from cognition is not just intuitive, it is central to countless debates in philosophy and psychology. For example, when researchers ask *which properties can be visually represented or visually experienced?* They are assuming that there is a difference between properties being represented in (visual) perception, and them merely being represented in post-perceptual thought and cognition. Indeed, many researchers define their careers in terms of this distinction, identifying as *philosophers of perception* or *vision scientists* rather than *decision theorists* or researchers *studying human reasoning*. With these points in view, it is prudent to ask: What does the distinction between perception and cognition actually amount to? How exactly might a perception-cognition border be drawn, and how much indeterminacy between the categories of perception and cognition should a satisfactory account permit? Perhaps there are, in fact, many perception-cognition borders, each of which is perfectly objective and demands to be recognised by a completed science of the mind – how would we know? Or perhaps the notion of a perception-cognition border is simply confused – a relic of pre-scientific thought, that ought to be eliminated from our scientific ontology? In our main article, we considered recent work which seeks to answer these questions. Here, we provide resources for teaching that material.

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This guide accompanies the following article: Clarke, S., & Beck, J. (2023). 'Border disputes: Recent debates along the perception–Cognition border', *Philosophy Compass*, 18(8), e12936. <https://doi.org/10.1111/phc3.12936>

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## 2 | AUTHORS RECOMMEND

Firestone, Chaz & Scholl, Brian J. (2016). Cognition does not affect perception: Evaluating the evidence for “top-down” effects. *Behavioral and Brain Sciences* 39:1-72.

Currently, the most sophisticated empirical defence of the claim that perception is cognitively impenetrable. (For some important precursors, see Jerry Fodor's classic [1983] *The Modularity of Mind*, MA: MIT Press, and Zenon Pylyshyn's [1999] 'Is vision continuous with cognition? The case for cognitive impenetrability of visual perception', *Behavioral and Brain Sciences* 22(3): 366-423.)

Macpherson, Fiona (2012). Cognitive Penetration of Colour Experience: Rethinking the Issue in Light of an Indirect Mechanism. *Philosophy and Phenomenological Research* 84 (1):24-62.

An influential argument that perception can be cognitively penetrated. (Important precursors include the work of *new look psychologists*, like Jerome Bruner, and philosophical discussions by Thomas Kuhn in his [1962] *The Structure of Scientific Revolutions* and Paul Churchland in his [1988] Perceptual plasticity and theoretical neutrality: A reply to Jerry Fodor, *Philosophy of Science* 55, 167-87.)

Green, E. J. (2020). The Perception–Cognition Border: A Case for Architectural Division. *Philosophical Review* 129 (3):323-393.

Defends a version of the modularity thesis which is compatible with certain forms of cognitive penetration.

Block, N. (2023). *The Border Between Seeing and Thinking*. Oxford: Oxford University press.

Offers a sustained defence of a perception-cognition border and argues that perception is ‘constitutively couched in a non-propositional, non-conceptual, and iconic format.

Quilty-Dunn, Jake (2020). Perceptual Pluralism. *Noûs* 54 (4):807-838.

An influential critique of the view that perception is demarcated by its pictorial or iconic format.

Clarke, Sam (2022). Mapping the Visual Icon. *Philosophical Quarterly* 72 (3):552-577.

Argues that perception is more plausibly characterised by a non-pictorial map-like format.

Camp, E. (2007). Thinking with maps. *Philosophical Perspectives* 21(1): 145-82.

An exemplary discussion of the ways in which various format types (appealed to in the above disputes) differ and relate.

Helton, Grace (2018). Visually Perceiving the Intentions of Others. *Philosophical Quarterly* 68 (271):243-264.

Argues that the intentions of others are sometimes represented in the contents of visual perception; the argument draws on Helton's proposal that perception is marked by its unrevisability.

Beck, Jacob (2018). Marking the Perception–Cognition Boundary: The Criterion of Stimulus-Dependence. *Australasian Journal of Philosophy*, 96(2), 319–334.

A defense of the view that perception is demarcated by its stimulus dependence.

Phillips, Ben (2019). The Shifting Border Between Perception and Cognition. *Noûs* 53 (2):316-346.

Argues for pluralism; the view that there are multiple objective and perfectly legitimate perception-cognition borders in the mind.

Clark, Andy (2013). Whatever next? Predictive brains, situated agents, and the future of cognitive science. *Behavioral and Brain Sciences* 36 (3):181-204.

Offers a ‘grand unified theory of the mind’ which threatens to eliminate the perception-cognition border entirely.

### 3 | SAMPLE SYLLABUS

#### 3.1 | Week 1: Is Perception Distinguished by its Phenomenology?

##### 3.1.1 | Main reading

- Montague, Michelle (2023). The sense/cognition distinction. *Inquiry: An Interdisciplinary Journal of Philosophy*, 66(2):229-245.
- Kriegel, Uriah (2019). Phenomenal Intentionality and the Perception/Cognition Divide. In Arthur Sullivan (ed.), *Sensations, Thoughts, Language: Essays in Honor of Brian Loar*. New York: Routledge. pp. 167-183.

##### 3.1.2 | Further readings

An important precursor to a phenomenologically demarcated perception-cognition border is found in Hume's distinction between impressions and ideas:

- Hume, David (1739/2000). *A Treatise of Human Nature*. New York: Oxford University Press.

A challenge to a phenomenologically demarcated border comes from evidence that perception is easily confused with visual imagery and memory:

- Dijkstra, Nadine, Bosch, S.E. & van Gerven, M.A.J. (2019). Shared neural mechanisms of visual perception and imagery, *Trends in Cognitive Sciences*, 43(5), 423-434.
- Nanay, Bence (2012). The philosophical implications of the Perky experiments: reply to Hopkins. *Analysis* 72 (3):439-443.
- Firestone Chaz & Scholl, Brian J. (2015). Enhanced visual awareness for morality and pajamas? Perception vs. memory in 'top-down' effects. *Cognition*. 136: 409-16.

A further challenge concerns the (contested) existence of unconscious perception:

- Peters, M.A.K., Kentridge, R.W., Phillips, I., & Block, N. (2017). Does unconscious perception really exist? Continuing the ASSC20 debate. *Neuroscience of Consciousness* 3(1): nix015.
- Phillips, I. (2021). Blindsight is qualitatively degraded conscious vision. *Psychological Review* 128(3):558-584.
- Taylor, Henry (2018). Fuzziness in the Mind: Can Perception be Unconscious? *Philosophy and Phenomenological Research* 101 (2):383-398.

#### 3.2 | Week 2: Modularity 1 - Is Perception Cognitively Impenetrable?

##### 3.2.1 | Main reading

- Macpherson, F. (2012). Cognitive penetration of colour experience: Rethinking the issue in light of an indirect mechanism. *Philosophy and Phenomenological Research*.
- Firestone, C. & Scholl, B. (2016). Cognition does not affect perception: Evaluating the evidence for "top-down" effects. *Behavioral and Brain Sciences*.

### 3.2.2 | Further reading

There is a huge background literature on this topic. But here are a few starting points:

- Firestone and Scholl's paper was published with lots of critical commentaries, reacting to their claim that cognition does not affect perception – enthusiastic students can check these out.
- Important precursors to the view that Firestone and Scholl defend are found in:
  - Fodor, J. (1983) *The Modularity of Mind*, MA: MIT Press
  - Pylyshyn, Z. (1999). Is vision continuous with cognition? The case for cognitive impenetrability of visual perception, *Behavioral and Brain Sciences* 22(3): 366-423.
- If you would like to examine some of the empirical work that Macpherson and Firestone & Scholl are reacting to, see:
  - Delk, J.L. & Fillenbaum, S. (1965). Differences in perceived color as a function of characteristic color. *The American Journal of Psychology*, 78(2): 290-3.
  - Hansen, T. et al., (2006). Memory modulates color appearance. *Nature Neuroscience*, 9(11): 1367-8.
  - Proffitt, D.R., et al. (2003). The role of effort in perceiving distance. *Psychological Science*, 14(2): 106-12.
  - Levin, D.T. & Banaji, M.R. (2006). Distortions in the perceived lightness of faces: The role of race categories. *Journal of Experimental Psychology: General*, 135: 501-12.
- For replies to Macpherson, see:
  - Zeimbekis, J. (2013). Color and Cognitive Penetrability. *Philosophical Studies*, 165(1): 167-75.
  - Gross, S., Chaisilprungraung, T., Kaplan, E., Menendez, J.A. & Flombaum, J.I. (2014). Problems for the purported cognitive penetration of perceptual color experience and Macpherson's proposed mechanism. *Baltic International Yearbook of Cognition, Logic and Communication*, 9(1), 6.
- For experimental evidence against the sort of memory color effects that Macpherson draws upon, see:
  - Valenti, J.J. & Firestone, C. (2019). Finding the 'odd one out': Memory color effects and the logic of appearance. *Cognition*, 191.

## 3.3 | Week 3: Modularity 2 - Is a Modular Perception-Cognition Border Compatible with Cognitive Penetration?

### 3.3.1 | Main reading

- Green, E. J. (2020). The Perception-Cognition Border: A Case for Architectural Division. *Philosophical Review* 129 (3):323-393.
- Carey, S. (2009). Chapter 1 of *The Origin of Concepts*. Oxford: Oxford University Press.

(Carey's postulation of modular 'core systems' presents a challenge for Green's *Dimension restriction hypothesis* since these systems may be dimensionally restricted yet post-perceptual).

### 3.3.2 | Further reading

There is a large recent literature exploring (a) whether perception is encapsulated and (b) whether encapsulation/modularity is compatible with various forms of cognitive influence. On topic (a), further readings include:

- Deroy, O. (2013). Object-sensitivity versus cognitive penetrability of perception. *Philosophical Studies*, 162: 87-107.
- Briscoe, R. (2015). Cognitive penetration and the reach of phenomenal content. In Raftopoulos, J. & Zeimbekis, A. (eds.), *The Cognitive Penetrability of Perception: New Philosophical Perspectives*, Oxford University Press (pp.174-199).
- Wu, W. (2017). Shaking up the mind's ground floor: The cognitive penetration of visual attention. *The Journal of Philosophy*, 114(1): 5-32.
- Gross, S. (2017). Cognitive penetration and attention. *Frontiers in Psychology*, 8.
- Lupyan, G. (2017). Changing what you see by changing what you know: The role of attention. *Frontiers in Psychology*, 8.

On topic (b), further readings include:

- Clarke, S. (2021). Cognitive penetration and informational encapsulation: Have we been failing the module? *Philosophical Studies*, 178: 2599-2620.
- Mylopoulos, M. (2021). The Modularity of the Motor System. *Philosophical Explorations*, 24: 376-93.
- Quilty-Dunn, J. (2020). Attention and encapsulation. *Mind & Language*, 35(3): 335-49.
- Burnston, D.C. & Cohen, J. (2015). Perceptual Integration, Modularity, and Cognitive Penetration. In Raftopoulos, J. & Zeimbekis, A. (eds.), *The Cognitive Penetrability of Perception: New Philosophical Perspectives*, Oxford University Press.

### 3.4 | Week 4: Format 1 - Is perception non-conceptual?

#### 3.4.1 | Main Reading

- Block, N. (2023). Chapter 6 of *The Border Between Seeing and Thinking*. Oxford: Oxford University Press.
- Mandelbaum, E. (2018). Seeing and Conceptualizing: Modularity and the Shallow Contents of Perception. *Philosophy and Phenomenological Research* 97 (2):267-283.

#### 3.4.2 | Suggested Reading

For related discussion, see:

- Block, N. (2023). Chapters 4 & 8 of *The Border Between Seeing and Thinking*. Oxford: Oxford University Press. (Block replies to Mandelbaum's arguments)
- Burnston, Daniel. (forthcoming). How to think about high-level perceptual contents? *Mind & Language*.
- Quilty-Dunn, Jake (2020c). Concepts and predication from perception to cognition. *Philosophical Issues* 30 (1):273-292.

For classic background, see:

- Heck, Richard (2000). Nonconceptual content and 'the space of reasons'. *Philosophical Review*, 109.
- McDowell, John (1994). *Mind and World*. Cambridge: Harvard University Press.
- Peacocke, Christopher (1992). Chapter 3 of *A Study of Concepts*. Cambridge: MIT Press.

### 3.5 | Week 5: Format 2 - Is perception distinctively picture-like?

#### 3.5.1 | Main reading

- Quilty-Dunn, Jake (2020). Perceptual Pluralism. *Noûs* 54 (4):807-838.
- Clarke, Sam (2022b). Mapping the Visual Icon. *Philosophical Quarterly* 72 (3):552-577.

#### 3.5.2 | Further reading

- Quilty-Dunn responds to some of Clarke's arguments in:
  - 'Sensory binding without sensory individuals' (In: Mroczko-Wasowicz, A. & Grush, R. [Eds] *Sensory Individuals, Properties, & Perceptual Objects: Unimodal and Multimodal Perspectives* [forthcoming]).
- Quilty-Dunn's arguments build on influential work by Jerry Fodor:
  - Fodor, Jerry A. (2007). The revenge of the given. In Brian P. McLaughlin & Jonathan D. Cohen (eds.), *Contemporary Debates in Philosophy of Mind*. Blackwell. pp. 105--116.
- For more on object representations, see:
  - Spelke, E. (1988). Where perceiving ends and thinking begins: The apprehension of objects in infancy. In Yonas, (ed.), *Perceptual Development in Infancy: Minnesota Symposium on Child Psychology*, 20.
  - Carey, Susan (2009). Chapters 2-3 of *The origin of concepts*. Oxford: Oxford University Press.
  - Green, E.J. & Quilty-Dunn, 2020. What is an Object File? *British Journal for the Philosophy of Science*. axx055.
- For more on cartographic icons, see:
  - Burge, Tyler (2018). Iconic Representation: Maps, Pictures, and Perception. In Wuppuluri Shyam & Francisco Antonio Dorio (eds.), *The Map and the Territory: Exploring the Foundations of Science, Thought and Reality*. Springer. pp. 79-100.
  - Camp, E. (2007). Thinking with maps. *Philosophical Perspectives* 21(1): 145-82.
  - Matthen, M. (2005). *Seeing, Doing, and Knowing*. Oxford: Oxford University Press.
- For other characterisations of perceptual format or iconicity, see:
  - Beck, Jacob (2019). Perception is Analog: The Argument from Weber's Law. *Journal of Philosophy* 116 (6):319-349.
  - Maley, C. (2011). Analog and digital, continuous and discrete. *Philosophical Studies* 155(1): 117-31.

### 3.6 | Week 6: Format 3 - Can format demarcate the perceptual?

#### 3.6.1 | Main Reading

- Block, N. (2023). Chapter 5 of *The Border Between Seeing and Thinking*. Oxford: Oxford University Press.
- Green, E.J. (2023). The Perception-Cognition Border: Architecture or Format? In B.P. McLaughlin & J. Cohen (eds.) *Contemporary Debates in Philosophy of Mind*. Oxford: Blackwell.

### 3.6.2 | Further Reading

- Beck, Jacob (2019). Perception is Analog: The Argument from Weber's Law. *Journal of Philosophy* 116 (6):319-349.
- Fodor, Jerry A. (2007). The revenge of the given. In Brian P. McLaughlin & Jonathan D. Cohen (eds.), *Contemporary Debates in Philosophy of Mind*. Blackwell. pp. 105--116.
- Carey, S. (2009). Chapter 4 of *The Origin of Concepts*. Oxford: Oxford University Press.

## 3.7 | Week 7: Format 4 - Is cognition partly nonconceptual and iconic?

### 3.7.1 | Main Reading

- Beck, Jacob (2012). The Generality Constraint and the Structure of Thought. *Mind* 121 (483):563-600.
- Camp, E. (2007). Thinking with maps. *Philosophical Perspectives* 21(1): 145-82.

### 3.7.2 | Further reading

- Carey, S. (2009). Chapter 4 of *The Origin of Concepts*. Oxford: Oxford University Press.
- Rescorla, M. (2009). Cognitive Maps and the Language of Thought. *British Journal for the Philosophy of Science* 60(2): 377-407.
- Rescorla, M. (2009). Chrysippus' dog as a case study in non-linguistic cognition. In R. Lurz (ed.) *The Philosophy of Animal Minds*. Cambridge University Press.
- Shea, N. (2014). Exploitable Isomorphism and Structural Representation. *Proceedings of the Aristotelian Society* 64(2): 123-44.

## 3.8 | Week 8: Is perception demarcated by its stimulus dependence?

### 3.8.1 | Main reading

- Beck, Jacob (2018). Marking the Perception–Cognition Boundary: The Criterion of Stimulus-Dependence. *Australian Journal of Philosophy*, 96(2), 319–334.
- Camp, E. (2009). Putting thoughts to work: Concepts, systematicity, and stimulus-independence. *Philosophy and Phenomenological Research*, 78: 275-311.

### 3.8.2 | Further reading

The idea that perception is stimulus-dependent arguably has roots in Locke and Kant, as well as in the causal theory of perception defended by Grice and then Strawson. Some more recent places where stimulus-dependence or -independence comes up:

- Prinz, J. (2006). Is emotion a form of perception? *Canadian Journal of Philosophy* 36: 137-60.
- Nanay, B. (2015). Perceptual content and the content of mental imagery. *Philosophical Studies*, 172:

For some recent critical reactions, see:

- Cermeño-Ainsa, Sergio (2021). Is Perception Stimulus-Dependent? *Review of Philosophy and Psychology*:1-20.
- Burge, Tyler (2022). *Perception: First Form of Mind*. Oxford University Press.
- Quilty-Dunn, Jake (2020c). Concepts and predication from perception to cognition. *Philosophical Issues* 30 (1):273-292.
- Block, N. (2023). Chapter 1 of *The Border Between Seeing and Thinking*. Oxford: Oxford University Press.
- Nes, A. (2023). Perception needs modular stimulus-control. *Synthese*, 201(6), 188.

### 3.9 | Week 9: Can a Perception-Cognition Border be drawn in terms of perception's unrevisability?

#### 3.9.1 | Main reading

- Helton, Grace (2020). If You Can't Change What You Believe, You Don't Believe It. *Noûs* 54 (3):501-526.
- Helton, Grace (2018). Visually Perceiving the Intentions of Others. *Philosophical Quarterly* 68 (271):243-264.

#### 3.9.2 | Further reading

The idea that perception is somehow insulated from the will can be traced back to Descartes (Meditation III) and Berkeley (1710/1982, Part I, §§28-29).

A classic challenge to the idea that perception's unrevisability would mark a perception-cognition border concerns the case of belief, since beliefs are plausibly unrevisable too. For contrasting views, see:

- Williams, Bernard (1973). Deciding to believe. In *Problems of the Self*. Cambridge University Press. Pp. 136–51.
- Ginet, C., 2001. Deciding to Believe, in: Steup, M. (Ed.), *Knowledge, Truth, and Duty: Essays on Epistemic Justification, Responsibility, and Virtue*. Oxford University Press, Oxford, pp. 63–76.
- Hieronymi, P., 2006. Controlling Attitudes. *Pacific Philosophical Quarterly* 87, 45–74.

For other plausible forms of unrevisable cognition, see:

- Carey, Susan (2009). *The origin of concepts*. Oxford: Oxford University Press.
- Spelke, Elizabeth S. (2000). Core knowledge. *American Psychologist*, 55, 1233–1243.
- Apperly, Ian A & Butterfill, Stephen Andrew. (2009). Do humans have two systems to track beliefs and belief-like states? *Psychological Review* 116 (4):953-970.

A separate issue concerns whether Helton's arguments support the view that humans visually represent *intentions* or just *teleological goals*. See:

- Gergely, György & Csibra, Gergely (2003). Teleological reasoning in infancy: the naïve theory of rational action. *Trends in Cognitive Sciences* 7 (7):287-292.
- Westfall, Mason (forthcoming). Perceiving Agency. *Mind and Language*.



### 3.10 | Week 10: Does adaptation enable us to identify the contents of perception?

#### 3.10.1 | Main reading

- Block, N. (2014). Seeing-as in the light of vision science. *Philosophy and Phenomenological Research*, 89(1): 560-72.
- Smortchkova, J., (2020). After-effects and the reach of perceptual content. *Synthese*, 198: 7871-7890.

#### 3.10.2 | Further reading

Further concerns about the use of adaptation effects in the identification of perceptual content is found in:

- Burge, T. (2014). Reply to Block: Adaptation and the upper border of perception. *Philosophy and Phenomenological Research*, 89(3): 573-83.
- Phillips, I. & Firestone, C. (forthcoming). Visual Adaptation and the Purpose of Perception. *Analysis*.

Block replies in:

- Block, N. (forthcoming). Adaptation, Signal Detection and the Purposes of Perception: Reply to Ian Phillips and Chaz Firestone. *Analysis*.

There has been considerable debate whether perception merely represents "thin" contents such as shapes and colors, or also represents "rich" contents such as emotions and natural kinds. The most prominent defender of the rich view is Susanna Siegel. See:

- Siegel, S. (2010) *The Contents of Visual Experience*, Oxford: Oxford University Press.

For debate on this topic, see:

- Hawley, K. & Macpherson, F. [Eds.] (2011). *The admissible contents of experience*. Wiley Blackwell.

For an introductory article on this topic, see:

- Helton, G. (2016). Recent Issues in High-Level Perception. *Philosophy Compass*, 11(12): 851-862.

Two empirical case studies, that are well explored by vision scientists are causation and number. For causation, see:

- Rolfs, M. et al. (2013). Visual adaptation of the perception of causality. *Current Biology*, 23 (3): 250-4.
- Kominsky, J.F. & Scholl, B.J. (2020). Retinotopic adaptation reveals distinct categories of causal perception. *Cognition*, 203: 104339.
- Vroomen, J. & Keetels, M. (2020). Perception of causality and synchrony dissociate in the audiovisual bounce-inducing effect (ABE). *Cognition*, 204: 104340.

For number, see:

- Burr, D. & Ross, J. (2008). A visual sense of number, *Current Biology*, 18, 425-8.
- Fornaciai, M., Cicchini, G.M. & Burr, D.C. (2016). Adaptation to number operates on perceived rather than physical numerosity. *Cognition*, 151, 63-67.
- Arrighi, R., Togoli, I., & Burr, D. C. (2014). A generalized sense of number. *Proceedings of the Royal Society B: Biological Sciences*, 281, 20141791-20141791.

- Clarke, Sam & Beck, Jacob (2021). The number sense represents (rational) numbers. *Behavioral and Brain Sciences* 44:1-57.

### 3.11 | Week 11: Is there one perception-cognition border or many?

#### 3.11.1 | Main reading

- Phillips, Ben (2019). The Shifting Border Between Perception and Cognition. *Noûs* 53 (2):316-346.
- Taylor, Henry (2018). Fuzziness in the Mind: Can Perception be Unconscious? *Philosophy and Phenomenological Research* 101 (2):383-398.

(Taylor's article presents a helpful discussion of what it would be for perception and cognition to each constitute distinct natural kinds; he argues that on a plausible account, many contested phenomenon are neither determinately perceptual nor cognitive; this may call into question some of the reasons Phillips provides for positing multiple perception-cognition borders in the human mind).

#### 3.11.2 | Further reading

Other philosophers who flirt with a pluralism about the perception-cognition border include disjunctivists, who argue that we should distinguish factive and non-factive perceptual kinds. See:

- Soteriou, Matthew (2016). Chapter 2 of *Disjunctivism (First Edition)*, Routledge.
- French, Craig & Phillips, Ian (2023). Naïve Realism, the slightest philosophy, and the slightest science. In B.P. McLaughlin & J. Cohen (eds.) *Contemporary Debates in Philosophy of Mind*. Oxford: Blackwell.

For critiques and challenges to these proposals, see:

- Pautz, A. (2023). Naïve Realism versus Representationalism: An argument from science. In B.P. McLaughlin & J. Cohen (eds.) *Contemporary Debates in Philosophy of Mind*. Oxford: Blackwell.
- Burge, T. (2005). Disjunctivism and perceptual psychology. *Philosophical Topics*, 33(1): 1-78.

### 3.12 | Week 12: Should a perception-cognition border just be eliminated from our scientific ontology?

#### 3.12.1 | Main reading

- Clark, Andy (2013). Whatever next? Predictive brains, situated agents, and the future of cognitive science. *Behavioral and Brain Sciences* 36 (3):181-204.
- Shea, Nicholas (2014). Distinguishing Top-Down From Bottom-Up Effects. In D. Stokes, M. Matthen & S. Biggs (eds.), *Perception and Its Modalities*. Oxford University Press. pp. 73-91.

#### 3.12.2 | Further Reading

Clark and Shea's articles flirt with eliminativism about the perception-cognition border. Others who do the same are often (like Clark) motivated by "predictive coding" approaches to the mind. See:

- Lupyan, Gary (2016). Cognitive Penetrability of Perception in the Age of Prediction: Predictive Systems are Penetrable Systems. *Review of Philosophy and Psychology* 6 (4):547-569.

- Macpherson, Fiona (2017). The relationship between cognitive penetration and predictive coding. *Consciousness and Cognition* 47: 6-16.

For philosophical critiques of predictive processing, see:

- Cao, R. (2020). New labels for old ideas: Predictive processing and the interpretation of neural signals. *Review of Philosophy and Psychology*, 11(3): 517-46.
- Sun, Z., & Firestone, C. (2020). The dark room problem. *Trends in Cognitive Sciences*, 24, 346–348.
- Orlandi, Nico & Lee, Geoffrey (2018). How Radical is Predictive Processing? In *Andy Clark and his Critics* (Eds., M. Colombo, E. Irvine, and M. Stapleton), Oxford University Press.

A challenge to some of Shea's concerns can be found in:

- Taylor, Henry (2018). Fuzziness in the Mind: Can Perception be Unconscious? *Philosophy and Phenomenological Research* 101 (2):383-398.

## 4 | FOCUS QUESTIONS

- Do folk psychological distinctions (like the intuitive distinction between perception and cognition) provide an appropriate starting point when trying to understand the structure of the human mind?
- Does cognition penetrate perception? If so, what are the consequences a perception-cognition border and the idea that perception is modular?
- Do alternative accounts of the perception-cognition border, such as those framed in terms of format or stimulus dependence, succeed?
- Should proponents of a perception-cognition border expect there to be one border or many?
- Do adaptation effects enable us to identify properties which are or aren't represented in perception?

## ACKNOWLEDGMENTS

We received financial support from Social Sciences and Humanities Research Council of Canada and Canada First Research Excellence Fund. USC paid to make this teaching and learning guide open access.

## ORCID

Jacob Beck  <https://orcid.org/0000-0002-2991-3124>

**How to cite this article:** Clarke, S., & Beck, J. (2023). Teaching & learning guide for: 'Border disputes: Recent debates along the perception–cognition border'. *Philosophy Compass*, e12949. <https://doi.org/10.1111/phc3.12949>