Ludwig-Maximilians-Universität München (LMU Munich)
Geschwister-Scholl-Platz 1 80539 München,
Germany
marco.hausmann1@gmx.de

References

Braun, D. 1993. Empty names. *Noûs* 27: 449–69.

Brock, S. 2004. The ubiquitous problem of empty names. *Journal of Philosophy* 101: 277–98.

Brock, S. 2014. Review of Kripke's *Reference and Existence*. *Notre Dame Philosophical Reviews*. <https://ndpr.nd.edu/news/reference-and-existence-the-john-locke-lectures/>, last accessed 3 January 2019.

Kripke, S. 2011a. A puzzle about belief. In his *Philosophical Troubles: Collected Papers*, vol. 1, 125–61. Oxford: Oxford University Press.

Kripke, S. 2011b. Vacuous names and fictional entities. In his *Philosophical Troubles: Collected Papers*, vol. 1, 52–74. Oxford: Oxford University Press.

Kripke, S. 2013. *Reference and Existence: The 1973 John Locke Lectures*. Oxford: Oxford University Press.

Lycan, W. 2015. A reconsidered defence of haecceitism regarding fictional individuals. In *Fictional Objects*, eds. S. Brock and A. Everett, 24–40. Oxford: Oxford University Press.

Plantinga, A. 1978. The Boethian compromise. *American Philosophical Quarterly* 15: 129–38.

Van Inwagen, P. 2006. Names for relations. *Philosophical Perspectives* 20: 453–77.

Amodal completion and knowledge

GRACE HELTON AND BENCE NANAY

Suppose you see a large pumpkin partly occluded by a vertical slat in a fence. It will seem to you that this pumpkin is one whole pumpkin; you will not represent the object before you as two disconnected pumpkin parts. Were the slat removed to reveal two pumpkin parts cleverly connected by piano wire to create the illusion of one whole pumpkin, you would be extremely surprised.

The representation of occluded parts of perceived objects is the phenomenon of *amodal completion*. When you visually perceive the occluded pumpkin as one whole pumpkin, you represent the obscured portion of the pumpkin by amodal completion. When you represent a building across the street as having sides and a back, you represent its sides and back by amodal completion.

Analysis Vol 79 | Number 3 | July 2019 | pp. 415–423 doi:10.1093/analys/any063

Amodal completion occurs in all sense modalities, and it is ubiquitous: in the vast majority of everyday perceptual scenarios, whatever you see occludes what is behind it and you represent what is behind it by means of amodal completion. Also, even if there is only one object in your visual field, as long as this object is three-dimensional, you will use amodal completion to represent the back of this object.

In this paper, we make three claims: first, at least some amodal completion-involved experiences can ground knowledge about the occluded portions of perceived objects. Second, at least some instances of amodal completion-grounded knowledge are not *sensitive*, that is, it is not the case that in the nearest worlds in which the relevant claim is false, that claim is not believed true. Third, at least some instances of amodal completion-grounded knowledge are not *safe*, that is, it is not the case that in all or nearly all near worlds where the relevant claim is believed true, that claim is in fact true. Thus, certain instances of amodal completion-grounded knowledge refute both the view that knowledge is necessarily sensitive and the view that knowledge is necessarily safe. Since both of these views continue to enjoy support, this is an important result.[1]

For present purposes, we are neutral on the question of whether amodal completion should be understood as a form of perception, mental imagery or belief (or something else). We know from a large number of empirical studies that amodal completion happens very early on in visual processing – as early as the primary visual cortex (Bakin et al. 2000, Komatsu 2006, Ban et al. 2013). So, it is early cortical perceptual processing that is responsible for amodal completion, but this would be compatible with competing claims about what kind of mental state amodal completion is (e.g. mental imagery also involves a form of early cortical perceptual processing, see Nanay 2010, 2018a, 2018b).

We are also neutral on whether all kinds of amodal completion are realized by the same type of attitude or whether different kinds of amodal completion are realized by different kinds of mental states (see Briscoe 2011 for discussion). What matters for our purposes is that amodal completion has different counterfactual tendencies than does the sort of perception that does not involve amodal completion. We argue that as a consequence, at least some kinds of knowledge grounded by amodal completion are neither sensitive nor safe.

1 Those who defend the view that knowledge is necessarily sensitive include Adams et al. (2012), Adams and Clarke (2005), Becker (2007, 2009), Black and Murphy (2007), DeRose (1995), Nozick (1981), Roush (2007), Wallbridge (2017, 2018a, 2018b) and Zalabardo (2012). Those who defend the view that knowledge is necessarily safe include Pritchard (2007, 2008a, 2008b, 2012), Sosa (1999) and Williamson (2000).

1. *Knowledge from amodal completion*

Amodal completion plays an important role in many of our beliefs about the objects in our environment. For instance, when viewing a pumpkin behind a slat, amodal completion elicits beliefs like: '*that* (pumpkin) is roughly spherical', '*that* (pumpkin) is one whole object' and '*that* (pumpkin) is partly obscured by *that* (fence)'. On our view, amodal completion not only elicits such beliefs, it can elevate such beliefs to the status of knowledge.

We provide a *reductio* argument in favour of the claim that amodal completion can ground knowledge. Very briefly: since many of our beliefs about objects in our environment are based on amodal completion, if those beliefs do not amount to knowledge, very few of our beliefs about the objects in our environment will amount to knowledge. But, surely, we enjoy a lot of knowledge about the rough shape, size and integrity of the objects in our environment. The preponderance of amodal perception in everyday perception would be difficult to reconcile with the claim that amodal completion could not itself ground knowledge.

More slowly: rejecting the view that amodal completion can ground knowledge about the occluded parts of perceived objects would pose difficulties for the widely held *foundationalist* approach to knowledge about the external world. On the foundationalist approach, beliefs about the external world can amount to knowledge in one of two ways: they can be justified by perceptual states, in which case they are dubbed *perceptual beliefs*. Or, they can be justified by beliefs which are themselves justified by perceptual beliefs.[2] Thus, a well-populated set of perceptual beliefs is required if foundationalism is to successfully account for the full range of external world knowledge. If amodal completion cannot ground knowledge, then the set of perceptual beliefs will be too poorly populated to explain the full range of external world knowledge.

Recall that amodal completion is ubiquitous in experience. In fact, it is very difficult to come up with an everyday perceptual experience which does not involve amodal completion. For instance, it is very likely that all objects currently within your line of sight are at least partly occluded, either because parts of their surface are obscured by another object or because their sides or back are not within your line of sight. Now consider some of the beliefs which you might form on the basis of this experience, beliefs such as '*that* object has a back' or '*that* object is one whole object'. You will have many such beliefs, and these make possible more sophisticated beliefs, such as 'there are three objects over there' or 'I could lift *that* object'. Since these

2 On one view, perceptual beliefs don't require justification, owing to their special relation to perception (an exemplar of this view is Brandom 1994). On another view, perceptual beliefs are prima facie justified by perception (an exemplar of this view is Pryor 2000). On either view, perceptual beliefs enjoy a privileged epistemic status that other beliefs do not enjoy.

amodal completion-derived beliefs are crucial for these more sophisticated beliefs, the former must amount to knowledge if the latter are to amount to knowledge.

Elijah Chudnoff has recently formulated a rival view, one on which amodal completion does not ground knowledge.[3] Chudnoff acknowledges that when you view a pumpkin through a slat, you can know claims such as '*that* (pumpkin) is roughly spherical', but Chudnoff denies that amodal completion plays any epistemic role in this knowledge. Rather, on his view, background beliefs about pumpkins combine with ordinary perception to ground such knowledge (Chudnoff 2018a, 2018b, Brogaard and Chudnoff forthcoming).[4] To be clear, Chudnoff maintains that the mere presence of such beliefs can ground the relevant knowledge, even if they do not serve as part of an inference in the relevant beliefs.

Chudnoff argues for this view by considering a case in which you view an unfamiliar, partly occluded object, a three-dimensional blob. Chudnoff thinks that intuitively, your belief that the blob continues in a certain way behind the occluder is not justified (and therefore, we might suppose, not a candidate for knowledge). This is so even though, as Chudnoff acknowledges, amodal completion plays an important causal role in your belief that the blob continues in a certain way behind the occluder (Chudnoff 2018a: 284–5, 2018b: 525–6, Brogaard and Chudnoff forthcoming). Thus, amodal completion cannot ground knowledge of the object's shape, size or integrity, even though amodal completion plays a causal role in bringing about that belief.

Chudnoff bolsters his interpretation of the 'blob' case by contrasting it with a case in which you view a partly occluded dog. On Chudnoff's view, you are justified in believing that the dog continues in a certain way behind its occluder, even though you're not justified in believing that the blob continues in a certain way behind its occluder. What explains this difference is background beliefs: you are familiar with dogs and have reasonable expectations about their shapes, whereas you are unfamiliar with blobs and lack expectations about their shapes (Chudnoff 2018a: 285, 2018b: 521–526, Brogaard and Chudnoff forthcoming).

Contra Chudnoff, we maintain that amodal completion can itself ground knowledge of the rough shape, size and integrity of wholly unfamiliar objects, such as blobs. That is, while we acknowledge the possibility that

3 Chudnoff's claim is strictly that amodal completion cannot *justify* beliefs. On the assumption that unjustified beliefs cannot count as knowledge, his view entails that amodal completion cannot ground knowledge.

4 More properly, Chudnoff's view is that amodal completion cannot provide *immediate* justification, which is to say, it cannot provide justification of the sort that is independent of your justification for other beliefs (Chudnoff 2018a: 285, 2018b: 521–6). Our claim is that amodal completion can immediately ground knowledge.

amodal completion might be influenced by background beliefs in epistemically beneficial ways (in fact, there is solid empirical evidence for top–down influences on the early cortical perceptual process of amodal completion, see Hazenberg and Van Lier 2016 for a summary), we deny that amodal completion *must* be so influenced in order to ground knowledge. Thus, we think that amodal completion can ground knowledge of both familiar objects, like dogs, and unfamiliar objects, like blobs. To make this point, we appeal once again to the argument from *reductio*.

Suppose a typical perceiver is transplanted into an environment largely populated by unfamiliar objects, such as blobs. There is empirical evidence which suggests that this perceiver will amodally complete these novel objects in a systematic way and that these experiences will cause this perceiver to form many beliefs about those objects' rough size, shape and integrity. (The empirical study of the similarities and differences between the amodal completion of familiar and unfamiliar shapes is a well-established experimental research programme, see Hazenberg et al. 2014, Hazenberg and Van Lier 2016 and Yun et al. 2018.) For instance, this perceiver will have beliefs like '*that* is one whole blob' or '*that* blob is roughly *this* large'. And the perceiver will form other beliefs on the basis of these, such as '*that* whole blob is red' or 'to my left are two different blobs'. Our opponent would need to say that none of these beliefs would amount to knowledge. This is not an impossible position to hold, but we find it to be a counter-intuitive one. Moreover, unless one has some special reason for holding this view, it looks to be an ad hoc way of dismissing the idea that amodal completion can lead to knowledge.

2. *Counterexamples to sensitivity and safety*

Having argued that amodal completion can ground knowledge, we now argue that at least some instances of such knowledge are neither sensitive nor safe. First, to consider sensitivity. Characterized relative to a method, the claim that some subject's belief that p, formed by some method M, is *sensitive* is the claim that in the nearest worlds in which p is false and in which that subject uses M, M does not lead that subject to believe p (Pritchard 2008b, Wallbridge 2018b).

Before arguing that at least some amodal completion-derived knowledge is not sensitive, it will be useful to see how sensitivity is supposed to work in the case of knowledge derived from ordinary (not amodal completion-derived) perception. Suppose you see some black marbles in a bowl, and on that basis, believe the marbles to be black. Your perception-produced belief is sensitive because in the nearest worlds in which the marbles are not black, your visual experience won't lead you to believe that they are. For instance, in a near world in which the marbles have been painted blue, your visual experience will represent the marbles as blue, leading to a belief that the marbles are blue (and not black).

Notice that in order to preserve the claim that beliefs based on ordinary (i.e. not amodal completion-derived) perception are sensitive, the method of perception must be correctly specified. Were you to look at the painted-blue marbles under poor lighting conditions, or from some distance, or through black-tinted glass, your visual experience might represent the blue marbles as black, leading you to falsely believe the marbles to be black. But these conditions should not influence the evaluation of whether your perception-based belief is sensitive. The lesson is that we must characterize the method of perception as involving the visual experience you would have, holding fixed lighting conditions, your vantage point and the relative positions of objects in the scene. (These points about method will also apply, *mutatis mutandis*, to safety.)

With this characterization of a method in hand, we are now in a position to argue that at least some of your amodal completion-derived beliefs are not sensitive. Consider again your belief, '*that* (pumpkin) is roughly spherical', gained by looking at a pumpkin through a slat. Let's suppose that you amodally complete the obscured portion of the pumpkin's front-facing surface, as well as its bottom, some of its sides and some of its back. Let's further suppose, as we have argued, that this belief amounts to knowledge and that your amodal completion-involved experiences ground this knowledge.

To evaluate whether this belief gained by this method is sensitive, we must determine which are the nearest worlds in which it is false that this pumpkin is roughly spherical. Let's suppose that in the actual world, the pumpkin resides on a typical pumpkin patch and is not about to be harvested. Relative to this world, the nearest worlds in which it is false that the pumpkin is roughly spherical are those in which the pumpkin has an impressive gash or deformity – due, perhaps, to rotting, injury or abnormal growth – but is otherwise intact. Worlds in which the pumpkin has altogether disintegrated or has been chopped up into small pieces are further from this world, so we exclude these.

Now consider what you would believe were you to view this gashed-but-mostly-intact pumpkin through the fence's slat, under the same lighting conditions and from the same vantage point as in the actual world. Would your amodal completion-involved experience lead you to erroneously believe that the pumpkin is roughly spherical? This depends on where the gash is located. If the gash is located on any part of the pumpkin's surface that is represented by amodal completion – that is, on its back, sides, top, bottom or middle front – then your experience will lead you to form the incorrect belief that the pumpkin is roughly spherical. For amodal completion will complete these portions the same way, whether or not they are gashed. But now notice that in *most* worlds where the pumpkin is gashed, the gash will be located on one of the occluded surfaces, since these comprise a majority of the pumpkin's total surface. Thus, in most nearby worlds where the pumpkin is not roughly spherical, your amodal completion-involved experience will lead you to

incorrectly believe it to be spherical. So, your amodal completion-derived knowledge of the pumpkin's rough shape is not sensitive.

Your knowledge about the pumpkin's rough shape is not only insensitive. It is also, as we will now argue, unsafe. Some belief gained by some method is *safe* just in case: in all or nearly all near worlds where you form that belief on the basis of that method, that belief is true (Sosa 1999, Williamson 2000, Pritchard 2008b). In some small but not insignificant portion of near worlds, the pumpkin is not roughly spherical. It is gashed or deformed, due to rotting or irregular growth. And in a statistical majority of *those* worlds, your amodal completion-involved experience does not track this fact. This is because most of the pumpkin's surface is amodally completed, and so, if the gash is on any of these completed portions, you will complete the pumpkin as roughly spherical. Thus, your knowledge that the pumpkin is roughly spherical is not safe.

The safety theorist might attempt to block this counter-example as follows: Safety should be interpreted weakly, so as to require true belief in most but not in all or in nearly all near worlds. Your belief that the pumpkin is roughly spherical is safe in this weak sense. For, in the majority of near worlds, your belief is true.

We reject this weak view of safety, on which a safe belief might be true merely in *most* near worlds. If safety is interpreted in this way, the safety account of knowledge permits into the class of knowledge beliefs such as your belief that your lottery ticket will not be a winning ticket. Many theorists have found this result, and many others like it, to be counter-intuitive (Pritchard 2005: 162–63, Wallbridge 2018b: 123–24). We avoid this counter-intuitive result by characterizing safety in the way in which we have. If safety is construed in this (relatively) strong way, your belief about the pumpkin's shape is not safe.

The argument we presented above tells against the centrality of safety and sensitivity in analyses of knowledge. But there are some more general conclusions to be drawn.

Amodal completion is a contingent fact about the human visual system. Also, the empirical sciences have played a crucial role in our understanding of the ubiquity and nature of amodal completion. We have argued that the importance of amodal completion in everyday experience has serious consequences for some of the most central issues in epistemology. In other words, empirical findings about some contingent features of human experience have serious consequences for epistemology. So, in at least this sense, epistemology is constrained by the empirical sciences.[5]

5 We are indebted to the following people for feedback on this paper: Jake Berger, Elijah Chudnoff, Jake Quilty-Dunn, Margot Strohminger, Jacob Berger, Gerardo Viera, Denis Buehler, Peter Fazekas, Nick Wiltshire, Manolo Martinez and Kevin Wallbridge. Special thanks to three anonymous referees.

Funding

Bence Nanay's research was supported by the ERC Consolidator grant [726251], the FWO Odysseus grant [G.0020.12N] and the FWO research grant [G0C7416N].

Princeton University
1879 Hall
Princeton, NJ 08544
USA
ghelton@princeton.edu

Centre for Philosophical Psychology, University of Antwerp
D 413, Grote Kauwenberg 18
2000 Antwerp, Belgium
Peterhouse, University of Cambridge
Cambridge CB2 1RD, UK
bn206@cam.ac.uk

References

Adams, F., J.A. Barker and J. Figurelli. 2012. Towards closure on closure. *Synthese* 188: 179–96.

Adams, F. and M. Clarke. 2005. Resurrecting the tracking theories. *Australasian Journal of Philosophy* 83: 207–21.

Bakin, J., K. Nakayama and C. Gilbert. 2000. Visual responses in monkey areas V1 and V2 to three-dimensional surface configurations. *Journal of Neuroscience* 20: 8188–98.

Ban, H., H. Yamamoto, T. Hanakawa, S. Urayama, T. Aso, H. Fukuyama and Y. Ejima. 2013. Topographic representation of an occluded object and the effects of spatiotemporal context in human early visual areas. *Journal of Neuroscience* 33: 16992–7007.

Becker, K. 2007. *Epistemology Modalized*. London: Routledge.

Becker, K. 2009. Margins for error and sensitivity: what Nozick might have said. *Acta Analytica* 24: 17–31.

Black, T. and P. Murphy. 2007. In defense of sensitivity. *Synthese* 154: 53–71.

Brandom, R. 1994. *Making It Explicit*. Cambridge, MA: Harvard University Press.

Briscoe, R.E. 2011. Mental imagery and the varieties of amodal perception. *Pacific Philosophical Quarterly* 92: 153–73.

Brogaard, B. and E. Chudnoff. Forthcoming. Consciousness and knowledge. In *The Oxford Handbook of the Philosophy of Consciousness*, ed. U. Kriegel. Oxford: Oxford University Press.

Chudnoff, E. 2018a. Epistemic elitism and other minds. *Philosophy and Phenomenological Research* 96: 276–98.

Chudnoff, E. 2018b. The epistemic significance of perceptual learning. *Inquiry* 61: 520–42.

DeRose, K. 1995. Solving the skeptical problem. *Philosophical Review* 104: 1–52.

Hazenberg, S.J., M.L. Jongsma, A. Koning and R. van Lier. 2014. Differential familiarity effects in amodal completion: support from behavioral and electrophysiological measurements. *Journal of Experimental Psychology: Human Perception and Performance* 40: 669–84.

Hazenberg, S. and R. Van Lier. 2016. Disentangling effects of structure and knowledge in perceiving partly occluded shapes: an ERP study. *Vision Research* 126: 109–19.

Komatsu, H. 2006. The neural mechanisms of perceptual filling-in. *Nature Review Neuroscience* 7: 220–31.

Nanay, B. 2010. Perception and imagination: amodal perception as mental imagery. *Philosophical Studies* 150: 239–54.

Nanay, B. 2018a. The importance of amodal completion in everyday perception. *i-Perception* 9: 1–16.

Nanay, B. 2018b. Multimodal mental imagery. *Cortex* 105: 125–34.

Nozick, R. 1981. *Philosophical Explanations*. Cambridge, MA: Harvard University Press.

Pritchard, D. 2005. *Epistemic Luck*. Oxford: Oxford University Press.

Pritchard, D. 2007. Anti-luck epistemology. *Synthese* 158: 277–98.

Pritchard, D. 2008a. Knowledge, luck, and lotteries. In *New Waves in Epistemology*, eds. V. Hendricks and D. Pritchard, 28–51. London: Palgrave Macmillan.

Pritchard, D. 2008b. Sensitivity, safety, and anti-luck epistemology. In *The Oxford Handbook of Skepticism*. ed. J. Greco, 437–55. Oxford: Oxford University Press.

Pritchard, D. 2012. In defence of modest anti-luck epistemology. In *The Sensitivity Principle in Epistemology*, eds. K. Becker and T. Black, 173–92. Cambridge: Cambridge University Press.

Pryor, J. 2000. The skeptic and the dogmatist. *Noûs* 34: 517–49.

Roush, S. 2007. *Tracking Truth: Knowledge, Evidence, and Science*. Oxford: Oxford University Press.

Sosa, E. 1999. How to defeat opposition to Moore. *Philosophical Perspectives* 13: 141–53.

Wallbridge, K. 2017. Sensitivity hasn't got a heterogeneity problem: a reply to Melchior. *Philosophia* 45: 835–41.

Wallbridge, K. 2018a. Sensitivity and higher-order knowledge. *Pacific Philosophical Quarterly* 96: 164–73.

Wallbridge, K. 2018b. Sensitivity, induction, and miracles. *Australasian Journal of Philosophy* 96: 118–26.

Williamson, T. 2000. *Knowledge and Its Limits*. Oxford: Oxford University Press.

Yun, Y., S.J. Hazenberg and R. van Lier. 2018. Temporal properties of amodal completion: influences of knowledge. *Vision Research* 145: 21–30.

Zalabardo, J.L. 2012. *Scepticism and Reliable Belief*. Oxford: Oxford University Press.