
Phenomenal Precision and Some Possible Pitfalls

A Commentary on Ned Block

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Ground Representationism is the position that for each phenomenal feature there is a representational feature that accounts for it. Against this thesis, Ned Block has provided an intricate argument that rests on the notion of “phenomenal precision”: the phenomenal precision of a percept may change at a different rate from its representational counterpart. If so, there is then no representational feature that accounts for a specific change of this phenomenal feature. Therefore, Ground Representationism cannot be generally true.

Although the notion of phenomenal precision is intuitive, it is admittedly in need of clarification. Here I reconstruct Block’s argument by suggesting a way of estimating phenomenal precision that is based on the assumption that parts of perceptual wholes can share phenomenal features independently of their place in the whole. Understood like this, the overall argument shows what it is supposed to show.

A more thorough look at the notion of phenomenal precision suggests tension with Block’s other work: in order to be non-trivial, we have to accept that some of our phenomenality is not concrete, but only generic. Such “solely generic phenomenology”, however, is a position mainly held by opponents to Block’s *Access- vs. Phenomenal Consciousness*-distinction. Interpreting phenomenal imprecision as constituted by introspective imprecision does not suffice as a way out. It seems that phenomenal precision is either trivial, self-contradictory, or incompatible with Block’s position elsewhere. So some additional elucidation on this crucial notion is needed.

Keywords

Access consciousness | Grounding | Perception | Perceptual experiences | Phenomenal consciousness | Phenomenal unity | Phenomenality | Precision | Psychophysics | Representation | Representationism | Supervenience | Veridicality | Vision science

1 Introduction: Running representationism into the ground

Imagine yourself in an elevator. You press the button for the upmost floor when, all of a sudden, you smell something nauseating: a foul metallic odor permeates your nostrils and raises disgust until all your attention is focused (unfortunately) on this olfactory catastrophe. *How* it smells is not the question. The odor has a very determinate character—and it is funky! But *what* is it that you smell, what is this sensation *about*? Maybe you left a cheese sandwich

in your pocket and forgot about it? Maybe some wiring went faulty? Or the breaks? Maybe your colleague cut one out? Even though you don’t know *what* it is you are experiencing—what your experience is about, its content, or *representational* aspect—, you do know *how it is like* to smell this stench—you know its appearance, its character, its configurational¹ or

¹ For the distinction between representational and configurational aspects see Wollheim (1987). Nanay (2005) used these termini vis-à-vis

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phenomenal aspects. What is the relation between content and character in such percepts?

Representationists give the following answer to this question: all phenomenal features of an experience (its appearance or character) are dependent on its representational features (its content): *how* you experience is determined by *what* you experience. Ned Block (forthcoming 2015)² has provided a useful way of taxonomizing Representationists further: Identity-Representationism (IR) is the claim that the character of an experience is nothing but its content. However, content here cannot be more basic than character, because identity is symmetrical. Character then determines content just as content determines character, because both are just one and the same. Also, if we want to *explain* or *reduce* character to content, then IR is not the way to go, because reduction—unlike identity—is *asymmetric*, and so is explanation.³

That an experience's content is more basic and determines its character (but not *vice versa*) can be captured in two ways: Supervenience-Representationism (SR) is the claim that every change in phenomenal character necessitates a change in the content of the experience, but not vice versa. But SR leaves open *which* change in content determines a specific change in character. In Ground-Representationism (GR), however, not any change will do: the change in character must have a change in content that *accounts* for the change in character.

Say you experience a change in the size of a gap, e.g. it grows larger. If that experience's character merely *supervenes* on its content, then the appearance of a growing gap does not necessitate that your experience is *about* a growing gap—*something* has to change in content, but it doesn't need to be this specific change. This appearance may be brought about by a change from being about a gap of size x to a smaller gap of size y , or about the gap changing color,

or about your toe starting to twitch while you look at the gap—any change might do without violating the letter of SR. However, if an experience's character is *grounded* in its content, then the change in content must account for the appearance. It seems that only being about a growing gap truly accounts for the appearance of a growing gap. If we want to be Representationists, GR seems like our best option: it allows us to (i) differentiate content from character, (ii) see content as more basic than character, (iii) capture that phenomenal character is dependent on content, but not *vice versa*, and (iv) make content accountable for character.

However, character is *not* grounded in content, Block argues:⁴ GR is false. This assessment is motivated by empirical considerations. There are many gems in Block's article, but I will focus mainly on the crown jewel, which is the argument based on "phenomenal precision". It is subtle and intricate, so my first step is to reconstruct it (with a bit of elaboration) in section 3. In section 4, I point to a few oddities and tensions I see with Block's other work. I do not see these tensions as offering a decisive blow to his argument, but as a plea for an elaboration on how Block thinks about phenomenal precision. (My main argument meanders through the main text. I keep it concise, but some points deserve some technical elaboration—thus the abundance of footnotes. They may be treated like beetroot on a buffet, i.e. skipped with clean conscience.)

2 "Phenomenal precision"

The notion of *phenomenal precision* plays an important role in Block's argument. He ([this collection](#), p. 45 & 47) admits that it is a notion in need of clarification—but one where a lack of definition ought not give us headaches, since many concepts pertaining to phenomenality lack definability.⁵

aesthetic pictorial experiences. We may apply this distinction to experiences more generally.

² See also the article in [this collection](#).

³ At least, most often explanations are seen as asymmetric. For example, Schindler (2013) has remarked that the mechanistic explanations à la Craver (2007) violate asymmetry, which he sees as a shortcoming of Craver's account.

⁴ This is not his first argument against Representationism (see e.g., Block 1996), but I will focus mainly on his *The Puzzle of Perceptual Precision* in [this collection](#).

⁵ This has become somewhat like a signature move for Block. Consider e.g.: "You ask: What is it that philosophers have called qualitative states? I answer, only half in jest: As Louis Armstrong said when asked what jazz is, 'If you got to ask, you aint

We can think of precision as connected to bandwidth. What does that mean? Some variations in the external world do not factor into how the world feels to us. For example, one cannot differentiate a grating of 20% contrast from one of 20.2%, or a pain caused by heat of 480 millicalories per second per square centimeter from one caused by 640 mc/sec/cm² (Hardy et al. 1940; Hardy et al. 1952). However, there is a point where the variance in the stimulus becomes just noticeable, e.g., a pain of 660 mc/sec/cm² does feel different from one at 480. This can be measured behaviorally, namely if a subject is able to distinguish one item of type A from another of type B above chance based on the relevant feature (e.g., if 75% of all presented items are distinguished correctly). So all the variance that I cannot distinguish perceptually between two just noticeable differences (JNDs) is covered by percepts with the same phenomenal character. That is, if I have a percept *a*, different states of affairs may have caused *a*—and the phenomenal character of the percept does not convey its real cause. So percepts ought to count as a bit imprecise. The more cases are covered by a percept, the less precise: a visual-contrast-percept that can be caused by 20±1% contrast is more precise than one that can be caused by 20±3%.

never gonna get to know.” (Block 1991, p. 217)

Or: “I cannot define [phenomenal consciousness] in any remotely noncircular way. I don’t consider this an embarrassment. The history of reductive definitions in philosophy should lead one not to expect a reductive definition of anything. The best one can do for [phenomenal consciousness] is in some respects worse than for many other concepts, though, because really all one can do is point to the phenomenon (cf. Goldman 1993a). Nonetheless, it is important to point properly.” (Block 1997, p. 230)

He continues by stating that synonyms and examples are the best way of conveying what is meant by “phenomenal consciousness”. I do not think that this is unreasonable, but instead intellectually honest. Chalmers (2011, p. 545) may have provided a good explanation of why it is so hard to provide a real definition for “phenomenality”: It might be a bedrock concept, which cannot be decomposed into more basic concepts, because it is itself most basic—it captures the fundamental distinction between reality and its appearance to us:

“[...] a dispute is bedrock relative to an expression: so the dispute over ‘Mice are conscious’ might be bedrock with respect to ‘conscious’ but not with respect to ‘mice’. A substantive dispute is bedrock relative to an expression *E* when no underlying dispute can be found by applying the method of elimination to *E* [i.e., replacing *E* in disputes by another expression where people agree on the meaning]: roughly, when there is no underlying dispute that does not involve *E* or cognates.”

If an expression is bedrock, then it cannot be elucidated by conceptual analysis—and there cannot be any non-stipulative real definition.

Percepts have representational and phenomenal aspects—content and character. Precision certainly makes sense when it comes to content, because “[t]he representational content of a perception is—constitutively—the veridicality conditions”, Block writes (this collection, p. 27).⁶ So we can look at the range of cases in the world that make a percept veridical, and thereby determine its degree of representational precision based on the range of cases that may have caused it in that obtaining condition. If, for example, a Gabor patch with 22% contrast looks just like one with a 28% contrast, then the representational content of this percept has a degree of precision of at least 6%, because all cases between 22% and 28% are covered by the same phenomenal appearance. Otherwise, these two Gabors would not look the same.

Representational precision makes sense—but how about *phenomenal* precision? Intuitively, phenomenal precision sounds good: things may appear *red* or *crimson*, and because all things crimson are a subset of all things red, the bandwidth of both ways of seeing-as differs—and therefore they ought to count as differently precise.

But if we can diagnose differences in the degree of phenomenal precision, we need a way of estimating its degree. How would we do this? GR provides an easy answer: phenomenal precision is grounded in representational precision, so we can use the same methods by which we estimate representational precision to estimate phenomenal precision. But in an argument where GR is under scrutiny, one cannot presume this without begging the question. So we must look for another way of estimating phenomenal precision.

For this purpose, Block suggests the Phenomenal Precision Principle (PPP), which we may reconstruct as: If the percept of item i_1 and the percept of item i_2 are phenomenally indistinguishable with respect to some feature *F* under condition *A*, but phenomenally indeterminately different vis-à-vis *F* under condition *B*, then the experience in *A* is less precise than in *B*.

⁶ This is in the spirit of Burge (2010, pp. 55–60), whom Block cites in this context.

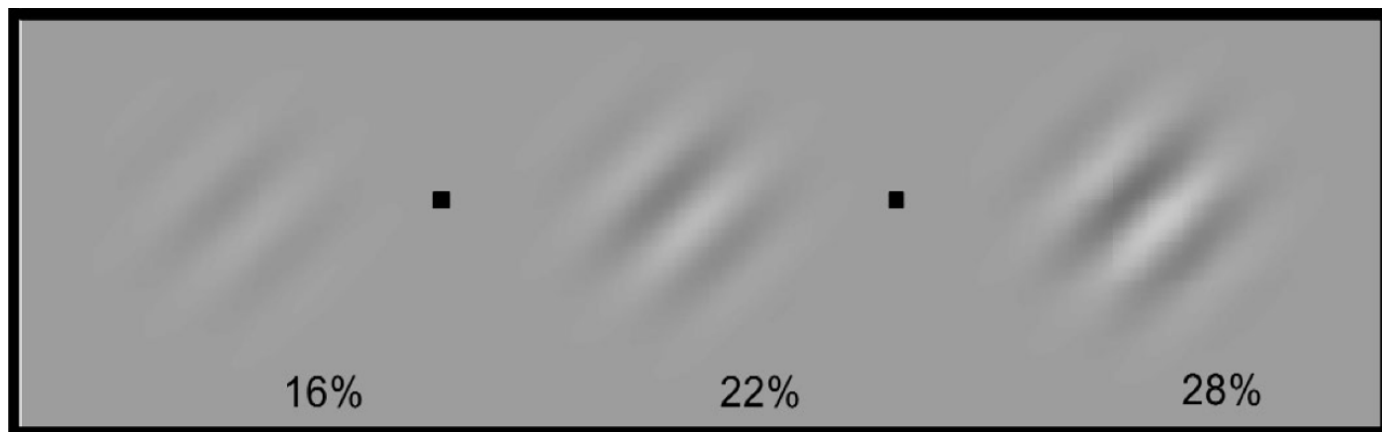


Figure 1: If one fixates on one of the black dots but actively attends to the lower-contrast patch to the left, the two patches to the right and left of the dot will appear alike. If one gazes freely or attends to the right, the difference in contrast is obvious or even more pronounced. Taken from Carrasco et al. (2004, p. 310).

So if I cannot differentiate two stimuli by their contrast in condition *A*, but can differentiate the two by contrast in condition *B*, then my experience in *A* is less precise than in *B*. Why? Because if I can tell the two items apart phenomenally, then I can distinguish cases, and therefore the bandwidth of that experience is narrower.

Block uses differences in phenomenal precision prominently in an argument against GR: he believes that in some cases, phenomenal precision (*p*-precision) and representational precision (*r*-precision) can fall apart. If GR were true, such that representational features must account for phenomenal ones, then this cannot be the case. But this is exactly what happens, according to Block: “there is evidence that attended and foveal perception can be greater in [phenomenal precision] without involving awareness of more precise environmental properties” (this collection, p. 41). Then, GR is false.

3 Block’s precision argument

What evidence speaks for Block’s thesis that “attended and foveal perception can be greater in [phenomenal precision] without involving awareness of more precise environmental properties” (this collection, p. 41)? (For those who have read the original article and have a firm grasp of the argument based on precision, this part may be skipped for the discussion in section 4.)

3.1 The stimulus and the conditions of viewing

Consider the stimuli in figure 1 taken from Carrasco et al. (2004, p. 310), and mentioned by Block twice (figure 7 and 9 in his article). It shows three Gabor patches of 16%, 22%, and 28% contrast—call these stimuli g_{16} , g_{22} , and g_{28} respectively. If we look directly (i.e., foveate) *at* and attend *to* each of these stimuli, the percepts they cause are decidedly different to each other. Call this condition “SFAG” for *stimuli foveated, attention on gabors*. However, if we fixate on the black spot between the patches (such that the patches are more in the periphery of our visual field) but attend to the one with lower contrast (i.e., to the left of where we fixate), then the percepts they cause appear indistinguishable from one another. Call this condition “SPAL” for *stimuli peripheral, attention on lower contrast*. This comparative indistinguishability does not arise if we attend to the higher contrast patch or to the spot in the middle. Call these conditions “SPAH” for *stimuli peripheral, attention to higher contrast* and “SPAF” for *stimuli peripheral, attention to fixation spot*, respectively.⁷

⁷ See also table 1. We may also introduce the following formalism: $Ch(x)$ stands for the character of a percept of x (the external stimulus); $Ch(x\&y)$ stands for the character of perceiving stimuli x and y together, i.e., a mereological fusion of simultaneously occurring characters at a moment in time t . The comparative character is then:

Table 1: The character in each condition of viewing/attending to the stimulus of 22% and 28% in figure 1. (See also footnote 7.)

Abbreviation	Condition	Character
SFAS	Stimulus foveated, attention on stimulus	distinguishable
SPAS	Stimulus peripheral, attention on fixation spot	distinguishable
SPAH	Stimulus peripheral, attention on higher contrast	distinguishable
SPAL	Stimulus peripheral, attention on lower contrast	indistinguishable

3.2 The evidence for attention influencing appearance

It seems that attention alters appearance. Our main evidence is introspective: we can reliably produce such changes in appearance from SPAH to SPAF to SPAL by shifting attention. This works even if we know of the effect.

To an external observer, there is evidence available from naïve subjects: If these subjects have to name the orientation of the patch with the higher contrast (\swarrow vs. \searrow), they choose at chance level in SPAL *even if there is a contrast difference of 6%*.⁸ (The shift in attention was

SFAG: $Ch(g_{22}) \neq Ch(g_{28})$

SPAF: $Ch(g_{22} \& g_{28}) \approx (Ch(g_{22}) \neq Ch(g_{28}))$

SPAH: $Ch(g_{22} \& g_{28}) \approx (Ch(g_{22}) \neq Ch(g_{28}))$

SPAL: $Ch(g_{22} \& g_{28}) \approx (Ch(g_{22}) = Ch(g_{28}))$

Note that just because phenomenal parts share identical phenomenal character, these parts themselves need not be identical: they may occur at different moments in time, be part of different phenomenal wholes, or be arranged in a different manner; if any of these extrinsic properties were among the identity conditions of phenomenal parts, then $a \neq b$; however, the character of some a may still be identical to the character of b .

If phenomenally-unified percepts are mereologically organized, as suggested by Bayne (2010), as well as Wiese & Metzinger (2012), then: if a percept at $t1$ has $Ch(x \& y)^{t1} = (Ch(x)^{t1} \neq Ch(y)^{t1})$ and a percept at $t2$ has $Ch(x \& y)^{t2} = (Ch(x)^{t2} = Ch(y)^{t2})$, then $Ch(x)^{t1} \neq Ch(x)^{t2}$ or $Ch(y)^{t1} \neq Ch(y)^{t2}$. This is the case in the experiment by Carrasco et al. (2004, p. 310); so under these presumptions, the appearances of parts of the overall percept must change between the conditions, because the character of the whole changes.

⁸ That is, the point of subjective equality (PSE) differs between the conditions. PSEs are determined by that configuration where a forced choice between stimuli is chancy. Carrasco et al. (see 2004, p. 311, figure 5a) kept a g_{22} fixed (standard) and varied the other patch (test). So one condition (cue to test) covered what I call here SPAH and SPAL, as in some cases, the test patch had a lower, in some a higher contrast than the standard g_{22} . (This is merely a difference in presentation, which does not influence the overall argument. Their presentation simply provides a continuous psychometric

exogenously triggered by a visual cue 27ms prior to stimulus onset.) Because subjects have to decide which grating *looks* higher in contrast, and pick the lower or the higher contrast patch at random, it is reasonable to assume that the two look the same: they have identical character in SPAL. Thus, attention affects appearance.

3.3 The contents and degree of r -precision in different conditions

So the character of comparative percepts (the character of experiencing two patches together) differs between these conditions, even if the stimuli and the way we fixate remain the same. But what about the respective *contents*?

In SFAG, we can clearly tell the patches apart. If percepts are constitutively veridical (because otherwise they are not percepts, but illusions or hallucinations), then the content of a percept is determined by the actual world. Thus, the content of each percept of a patch is (approximately) its actual contrast.⁹

In SPAF, the patches look different. However, as our ability to tell contrasts apart is a bit lower in the periphery, the contrast-JND is a bit higher—say, 3%.¹⁰ So the content of the comparative percept is one where the content of each percept is less precise, but still discernible from another: its actual contrast within the range of a peripheral contrast-JND.

In SPAH, the comparative contrast between the patches is more pronounced. We cannot explain this if the content in SPAH is the same as in

curve.) If the fixation spot was cued, the PSE reflects reality: a g_{22} looks most like g_{22} ; if the standard (g_{22}) was cued, the test patch had to have a higher contrast to look similar: a g_{28} looked most like a g_{22} ; if the test patch was cued, the uncued patch had to have a lower contrast to look most similar to the test: a g_{16} looked most like a g_{22} .

⁹ The actual content is a bit more imprecise, i.e., within the range of 1 foveal contrast-JND, which is roughly 1%. Block suggests 2% overall. In personal communication, Frank Jäkel estimated that (under ideal experimental conditions with optimal stimuli) the contrast-JND could be a log-unit lower than that: 1% provides a good ballpark estimate for many conditions. He based this estimation on his own work done for the study published in Jäkel & Wichmann (2006). See also Carney et al. (2000), Pelli & Bex (2013), and the *locus classicus*: Fechner (1860, pp. 150ff.).

¹⁰ See Banks et al. (1991, p. 1779). Although they do not specifically mention JNDs, they do provide data about contrast sensitivity in different degrees of peripheral eccentricity, which suggests some increase: “[T]he ideal [contrast sensitivity functions] do not exhibit the large contrast sensitivity losses that one observes in humans with increasing eccentricity.”

SPAF. Somehow, the contents ought to differ more than in SPAF. One way to do this is to see one as more r -precise than the other. Then it is easier to tell the two apart, because there is no content-overlap. Another way would be to assume that one becomes less r -precise. Then it is easier to tell them apart because the respective minima and maxima are further apart.¹¹

Table 2: The content and its degree of precision in each condition of viewing/attending to the stimulus of 22% and 28% in figure 1. (See also footnote 12.)

Condition	Content + Bandwidth estimation
SFAS	% of actual contrast ± 1 foveal JND _{attended} ($\sim 1\%$);
SPAS	% of actual contrast ± 1 peripheral JND _{unattended} ($\sim 3\%$);
SPAH	% of actual contrast ± 1 peripheral JND _{attended} / ± 1 peripheral JND _{unattended} ; (my estimation: $\sim 2\%/ \sim 3\%$; see also footnote 11)
SPAL	at least the open interval between actual contrasts, here $\geq 6\%$;

In SPAL, the comparative percept (g_{22} & g_{28} together) is such that the two patches are indistinguishable. So our percept is strictly speaking non-veridical. In order to make it veridical, one has to assign a quite imprecise content: it must at least cover both actual contrasts—i.e., be greater or equal to the interval that includes the actual contrasts as endpoints: [22%, 28%].¹²

¹¹ Block might argue that we lack a principled reason to choose one over the other as being more or less imprecise. The argument mirrors the one he gives concerning veridicality (see Block this collection, pp. 26ff.). As veridicality determines the contents of percepts, one can easily adapt it: intuitively, one might think that the patch one attends to is more veridical; but attention changes appearance, so the unattended one might be more veridical; but as one mostly acts on what one attends to, it would be advantageous if what one acts on was most veridical. So we are stuck in a rut. The comparative percept in SPAL is illusory, but as a percept, it must be (partially) veridical. Block's suggestion is (or ought to be) that we should assume that each is veridical, but less r -precise. I'd agree. But I think we can do more: when we focus on the higher contrast Gabor, this increases the distance in r -precision between the compared percepts, and thereby ought to render them more discernible. If so, then this might apply to SPAL as well, such that the one we attend to is more precise. I pick up on this in footnote 12.

¹² See table 2. More formally, let $Co(x)$ stand for the content of our percept of x , and $Co(x&y)$ for the content of the comparative percept of x and y together. Given the external content-determination of percepts and our understanding of JNDs, we can be a bit more precise about how imprecise content is in the different conditions.

SFAG: $Co(g_{22})=22\pm \sim 1\%$; $Co(g_{28})=28\pm \sim 1\%$

SPAF: $Co(g_{22}\&g_{28})\approx (Co(g_{22})\geq 22\pm \sim 3\%, Co(g_{28})\geq 28\pm \sim 3\%)$

SPAH: $Co(g_{22}\&g_{28})\approx (Co(g_{22})\geq 22\pm \sim 3\%, Co(g_{28})\geq 28\pm \sim 2\%)$

SPAL: $Co(g_{22}\&g_{28})\approx (Co(g_{22})\geq [22\%, 28\%], Co(g_{28})\gg [22\%, 28\%])$

3.4 Estimating the degree of p -precision in the different conditions

So we know the percepts' contents and r -precision in the different conditions—but how about their p -precision? Block agrees that this is hard to estimate correctly. But the PPP gives us a rough guide: if the percept of item i_1 and the percept of item i_2 are phenomenally indistinguishable with respect to some feature F under condition A , but phenomenally determinately different vis-à-vis F under condition B , then the experience in A is less precise than in B vis-à-vis F . However, the case becomes more complicated, because we also have to think of the p -precision of comparative percepts (experiences as a whole) in addition to the percepts compared (the parts of whole experiences), akin to what we did in the case of r -precision.

3.4.1 Perceptual wholes and perceptual parts

At each moment, you have a broad range of different sensations; but all of these together are parts of one massive phenomenal *me-here-now-with-this-and-that-whole*: at a bar, you smell the mixture of spilt beer and sweat, taste the medicinal-peaty taste of your Lagavulin, while you ogle a lovely co-member of your species—who makes you feel your heart pumping in your chest. But you don't feel all these separately; they are fused into one fleeting holistic experience.

If phenomenal wholes are not character-identical, there must be a difference in their parts; but some distinguishable phenomenal wholes may still share parts with identical phenomenal character: the feel of your beating heart while ogling may be phenomenally identical to the feeling of your beating heart after escaping the oglee's significant other.

3.4.2 Unattended parts can share character with attended parts

Just as temperature can alter the taste of sugar to caramel without being sugar or caramel, attention can affect phenomenal character without itself having a phenomenal character: attention *alters* the appearance of x , but there seems to be no additional phenomenal character

as of *attending to x*. If so, then the phenomenal character of a perceptual part itself does not determine whether this part is attended to or not.¹³ So a percept that is now in the attentional limelight may share its character with a counterpart in the attentional shadow: If I attend to a leaf in a tree, the leaf I focus on may look just as green as a leaf in my visual periphery that I experience but don't care about. This is one interpretation of SPAL: the percept of the attended peripheral g_{22} shares its character with the percept of the unattended peripheral g_{28} -patch.¹⁴

3.4.3 An estimation of p -precision in the different conditions

Now, we may consider what the p -precision is in our cases. In SFAG, over the range of 1 foveal contrast-JND, all percepts look the same. This is the most p -precise that the character of a percept can be. The p -precision range is then roughly centered around some value $n \pm x\%$, where x is approximately 1 foveally attended contrast-JND.¹⁵

In SPAF, the patches look determinately different; and in SPAH, they look even more dif-

¹³ One reviewer doubted whether this holds generally. It might be that a weaker version is easier to defend: an appearance does not *necessarily* specify whether it is attended to or not. I suspect that Block tends towards a stronger reading, as it seems to be in line with the dissociation between phenomenal consciousness and access. My reconstruction hinges on the strong version. For otherwise, the stability of p -precision I suggest in section 3.4.3 does not arise. So if there are good reasons to doubt the strong version, there are good reasons to doubt my reconstruction \downarrow and also Block's argument itself, I believe. Here, I simply admit this weakness, but cannot follow up on this criticism due to lack of space. However, I see no good reason for assuming that attention has a unique and distinguishable perceptual character. (It might even be contentious whether it has a cognitive, agentive, or any phenomenal character at all, but I will not get into this here.)

¹⁴ It is unclear whether the identity in character must be part of the experience for Block's argument. It seems that he thinks this way. But consider Williamson (1990, p. 60; my emphasis), who writes that the "discriminability of a pair of characters as presented by a pair of experiences depends on *non-qualitative* relations between the experiences — relations not fixed by the way in which the experiences present their characters — which facilitate or hinder discrimination [...]." He envisions *where* the compared characters are placed in time and the visual field, but one might also consider, as I do in section 4.3, that our ability or inability to tell characters apart is a dependent on our cognitive abilities.

¹⁵ We cannot give the exact value of n , because the character of a percept is independent of whether one attends to it or foveates on it; and in SPAL, percepts of different actual contrast can share the same character. So we cannot associate the p -precision value with any value pertaining to a stimulus. Still, we may assume that it has a value. So I use some mock-value n .

ferent. It is in the spirit of PPP (see p. 3) that the comparative percept in SPAH is more p -precise than the comparative percept in SPAF.

But because the character of a percept is independent of whether one attends to or foveates on it, each compared percept (the parts of which the comparative percept is composed) ought to be similarly p -precise as in SFAG: if parts inside and outside the focus of attention can share phenomenal character, and if this holds for all characters, then the same range of characters can appear anywhere in our visual experience. So we ought to expect the same range of PPP-cases in the periphery as in the fovea. Then, the character ought to count as similarly p -precise.

3.5 The argument

If I am correct so far, we can state the following: (P1) If the character of an attended and an unattended percept can be identical (section 3.4.2), then perceptual parts are overall more p -precise than r -precise, because the range of p -precision-values of compared percepts is stable in all conditions (table 3), but the range of r -precision must vary in order to account for the veridicality of percepts (table 2). (P2) If the character of an attended and an unattended percept can be identical, then our compared percepts (the parts of the comparative percept) are more p -precise than r -precise in SPAL.¹⁶ But if GR were true, then there must be a representational feature that accounts for each phenomenal feature. This applies to precision as well, because—according to Block— p -precision is a phenomenal feature of one's perception. So if GR were true, representational precision must account for phenomenal precision. But (P1) and (P2) stand in direct opposition to this. So, by *modus tollens*, GR ought to be considered false.

4 On the notion of "phenomenal precision"

Any argument against Representationism has an initial appeal to me. Ned Block's is at the cutting edge of empirical research and subtle in its argu-

¹⁶ Block's main argument rests on (P2) \downarrow but I hope that (P1) is in his spirit.

mentation. But I suspect that its crown jewel, “phenomenal precision”, has a few shady facets.

“Phenomenal precision”, Block admits, is in need of clarification. The guiding example for Block (this collection) is where “[t]he experience of a color as red is less phenomenologically [sic] precise than the experience of a color as crimson”. Here I want to focus a bit more on how we may understand p -precision, what it might and what it ought not to mean in the context of Block’s work.

Table 3: The approximated phenomenal precision in each condition of viewing/attending. How p -precise the comparative percepts ($g_{22}\&g_{28}$ perceived together) are can be ordered from lowest to highest: SPAH>SPAF>SPAL. (See also footnotes 7 and 12.)

Condition	Approximated Phenomenal Bandwidth
SFAG	$n_1 \pm x\%$ of contrast, where x is roughly 1 foveal JND; $\text{Ch}(g_{22\%}) = n_1 \pm x\%$; $\text{Ch}(g_{28\%}) = n_2 \pm x\%$
SPAF	$\text{Ch}(g_{22\%}\&g_{28\%}) =$ $((\text{Ch}(g_{22\%}) = n_3 \pm x\%) < (\text{Ch}(g_{28\%})n_4 \pm x\%))$
SPAH	$\text{Ch}(g_{22\%}\&g_{28\%}) =$ $((\text{Ch}(g_{22\%}) = n_5 \pm x\%) \ll (\text{Ch}(g_{28\%})n_6 \pm x\%))$
SPAL	$\text{Ch}(g_{22\%}\&g_{28\%}) =$ $((\text{Ch}(g_{22\%}) = n_7 \pm x\%) = (\text{Ch}(g_{28\%})n_4 \pm x\%))$

4.1 Lower bounds of p -precision

The way I estimated phenomenal precision in my reconstruction was as follows: consider, first, how a controlled stimulus appears under ideal conditions (e.g., rested, attending, etc.) as some phenomenal feature. For example, how $blue_{34}$ in a standardized patch looks *as blue*, how an olfactory sample (e.g., a *CAS 93686-30-7, Ext. Sup. I, 1000ppm*) smells *as Ylang-Ylang*, how 480 mc/sec/cm² feels *as pain*, and so on. Then, see how much variance in the stimulus is *not* mirrored in the appearance as F : for example, the pain caused by 480 mc/sec/cm² is not reliably discernible from one caused by 640 mc/sec/cm²; instead both feel *as pain near maximal intensity*. Because I cannot differentiate between 480 mc/sec/cm² and 640 mc/sec/cm² by the feeling they cause, my pain feeling’s p -precision must at least cover these values. This provides us with a lower bound

for that specific feeling of pain. More broadly, for any phenomenal character—i.e., experiencing something as F (e.g., a color as red, a tone as $C\sharp$, a patch as having 28% contrast)—, the lower bound of its p -precision is that range of cases one cannot distinguish by experiencing as F under ideal conditions. That’s what the PPP suggests (see p. 3).

This allows us to make sense of the *red vs. crimson* example: *crimson* is a very specific phenomenal feel, which allows for very little variation while remaining crimson. *Red*, on the other hand, allows variation along the whole spectrum, from coral and vermillion, via crimson and oxblood, to maroon. So any experience of a color as *crimson* is also likely to be¹⁷ an experience of a color as *red*—but so is an experience of a color as *vermillion*. And the range of cases that may cause an experience of red compared to those that may cause an experience of crimson under ideal condition is larger. So experiencing as crimson is more p -precise than experiencing as red.

4.2 A need for solely generic phenomenology?

I think that triviality or contradiction looms if we do not add another constraint to be satisfied: In order for p -precision to be non-trivial, there must be the possibility of experiencing a color as red, but *not* as crimson₄₂, vermillion₁₁, coral₁₉, oxblood₈₁, etc. That is, there must be a way of experiencing something as a higher-order property \mathfrak{F} , *without* experiencing it as any first-order property F_1, F_2, \dots subsumable under \mathfrak{F} . Rick Grush (2007) has called this *Generic Phenomenology*—but I am speaking more specifically of *solely generic phenomenology* (SGP), i.e., generic phenomenology without an accompanying and subsumable concretum.¹⁸

Why ought we commit ourselves to SGP? Because otherwise the p -precision of an experience

¹⁷ Likely but not necessarily, because *experiencing as crimson* is not necessarily related to *experiencing as red*. Conceptual or nomological relations do not necessarily transfer to the realm of experiences. Imagine seeing an animal *as a mouse*. One does not thereby see it *as an owner of a heart*, or *as a member of the phylum chordata* even though all mice belong to each category necessarily.

¹⁸ See also the discussion and specifically Block’s response R2 on Block (2007) for more on generic phenomenology.

is either contradictory, generally minimal, or generally maximal, which trivializes the notion. Why?

Look at the color in figure 2. What is the p -precision of this color impression?



Figure 2: A stimulus of color 660000 or 16-86-94-42 CMYK.

You probably experience this color as red, but also as having a specific shade of red—for which you might lack a name, but let us baptize it *cayenne*₆₆. It is natural to assume that this holds for all color impressions, e.g., that whenever you experience a color as red, you also experience it as a most specific shade. In this case, there is no SGP—just a generic phenomenology accompanied by concrete and “subsumable” phenomenology. What might be the p -precision of your color impression in this scenario?

You might think that this color experience has two p -precision values:¹⁹ The first value is for being experienced as red, and the second for being experienced as *cayenne*₆₆. But this seems contradictory: why should one and the same experience of a color have two p -precision values, but only one for r -precision? And for that matter, why not three values for p -precision? You likely experience the color not only as *cayenne*₆₆ and as red, but also *as a color*? Why not four, then, if you experience it *as a visual experience*? Or five, if you experience it *as something*? Or even six, if you experience it *as phenomenal*? The more options we consider, the less sense it makes to speak of *the* p -precision of a percept at all. But this is needed for Block’s argument, where changes in p -precision are lower than the respective changes in r -precision. This hardly works if we allow multiple values. So we should assign experiences only one p -precision value.

If we have to assign this color experience only *one* p -precision value, we could either choose

¹⁹ I speak as if we could know the determinate value of p -precision given as a real number here. But this is not required: There could be a determinate value without us being able to know it.

the lowest or the highest feature. Either option looks arbitrary, which is already bad. But it gets worse if we reject SGP: If we chose the lowest feature (*cayenne*₆₆) and if there must always be a lowest feature, then all experiences of a type have the same level of p -precision *and* this value must be stable. If we chose the higher feature (red), then there is no reason to stop there: we certainly experience the color as a color, as a visual impression, or as *something*. But the character of *being something* applies to (almost) every experience. So all experiences would again be equally and fixedly p -precise. Both cases seem to trivialize the notion of p -precision, because it always stays the same. So p -precision seems either contradictory or static and trivial without SGP.

We ought to accept SGP in order to allow for variance in p -precision: we can experience some color as red, but *not* as e.g., *cayenne*₆₆ and so on. More generally, we can experience something *only* as a higher-order property \mathfrak{F} *without* experiencing it as any lower order property F_1, F_2, \dots subsumable under \mathfrak{F} . Then, different experiences allow for different degrees of indeterminacy and therefore different degrees of p -precision.

However, SGP has been introduced to argue *against* Block: According to Grush (2007), if we accept the possibility of generic phenomenology, then we could see something as *some* letter without seeing it as *a specific* letter (A, B, ...). This affects one’s interpretation of the Sperling experiment: Sperling (1960) showed participants a grid of letters, which they identified *as letters* from the short impression they got. Yet they could not identify and recount all of them. But when they were cued to repeat a specific line by a tone *after* the stimulus disappeared, they were able to recount the letters in that line without fault. Block (2007) has used this and other experiments to argue that phenomenality goes beyond what we can cognitively access: people have a full phenomenal impression, but cannot access all the information available in their experience. Their experience is concrete, but their introspective access is shaky. SGP proponents counter that one can have generic experiences while all the underlying concrete information is subconscious. So before the cue, subjects experience concretely according to Block, but generically according to

proponents of SGP. Allowing SGP thus blocks Block.

Additionally, generic phenomenology seems to be closely associated with *symbolic* or *rule-based*²⁰ representation. *Imagistic* representation, on the other hand, does not allow for such indeterminacy, because images exploit the isomorphisms between concreta. I can write “The cat is on the mat” without saying anything about whether the cat is a Siamese or a Maine Coon, or whether the mat is filled with feathers or made of bamboo, or whether the cat reclines, sits, or scratches on the mat. The sentence can represent the fact without resembling a cat or a mat at all. However, if I want to represent the fact that *the cat is on the mat* in an image, I have to depict something concrete: a specific cat at some position on a mat doing something. The common understanding of images is that they are concrete and as such determined in all their lowest-order properties. Analogue representations more generally exploit concreteness in order to represent by isomorphism.²¹

Introspectively, our phenomenal experiences resemble images. If phenomenal experience represents imagistically, then there cannot be SGP—and p -precision seems dangerously close to being trivial; if phenomenal experience is non-imagistic, then we can allow for SGP and render p -precision non-trivial—but this is in tension with some of Block’s other work and our introspective evidence.

Maybe a fixed p -precision value need not be bad for Block’s argument: if the p -precision of percepts is fixed, but r -precision varies, then there is a phenomenal feature that is not grounded in a representational feature. Thus, GR is false. However, Representationist have an easy reply: GR does not claim that all changes in representational features must be mirrored in phenomenal features; representational features only need to account for phenomenal features. If p -precision is fixed, then it might be grounded in

there being r -precision *at all*. For Block, accepting SGP might be a good option here—but not elsewhere.

4.3 Introspective imprecision?

There might be a way to reject SGP, but still account for our belief that we can experience a color as red without experiencing it as crimson. Maybe *experiencing as \mathfrak{F} without experiencing as any subsumable F* does not apply to phenomenal experiences, but to our *access* to them. That is, maybe there is *introspective* rather than phenomenal precision.²² This might go along the lines of Block’s interpretation of the Sperling experiment: we experience very specific shapes, but introspectively, we are only able to label them as *letters*, not as *A*, *B*, etc. So maybe the phenomenal aspects of our experience have fixed precision because it is never solely generic; but our introspective judgements are not fixed in precision because we can introspect some experience solely generically. That is, we may *judge* an experience of cayenne₆₆ to be red although we actually experience it as cayenne₆₆. If perception can be more or less imprecise, why can’t “internal perception”?²³

The notion of introspective imprecision, however, is not easily applied to the example of the patches in Carrasco et al. (2004): if we introspect on their appearance, then we judge them not as imprecise, but as of precisely the same contrast.

But maybe the imprecision of introspective access is not itself introspectively available: Our introspective access might be limited, such that all we can tell is that the patch

²² A reviewer noted that the limits of our vocabulary and our verbalization skills more generally might account for the lack of discrimination skills just as well as introspective imprecision. Even though this is a valuable point, I do not develop it here. First because I want to stick as close to the occurrent percepts as possible, not to our cognitive grasp of such percepts; second because introspective access precedes verbalization of the introspected; and third because failures of verbalization do not account for “introspective data”. Block is unapologetic about taking introspection seriously; a supportive critic should take it seriously as well.

²³ Many philosophers liken introspection to a form of perception, e.g., Locke (2008, II.xxvii.§9 & II.i.§4), Kant (2008, AA,III,tr.Äst.,§2), Brentano (1874), James (1890), Boring (1953, p. 170), Armstrong (1980, p. 61), Lycan (1996, p. 334), and to some degree Goldman (2006, pp. 242ff.) as well as Churchland (1985, 2005).

²⁰ The rule might be cultural, as with language, but also natural, as with causes: that the word “red” means the color ■ is based on a cultural rule; that *smoke* means *fire* is based on a natural rule.

²¹ This case has been made by Kosslyn (1980, p. 31) as well as Gombrich (2002). But see also Haugeland (1981), Lewis (1971), and Jackson (1960).



Figure 3: A 24-bit picture compared to a 6-bit picture. Shifting attention between the two while focusing on the + ought to provide some experience of indistinguishable character if experience in the periphery is more coarse grained.

we attend to is like the patch we don't attend to *in some respect*. However, our general introspective bias—that we think ourselves as authoritative about our own minds leads us to overrate what introspection offers: what we introspect as being more or less alike is judged as being strictly alike. This bias towards seeing ourselves as introspectively authoritative independent of whether we introspected successfully or not might lead to a wide variety of false beliefs about phenomenality.

The upshot would be that introspective imprecision is compatible with Block's distinction between access- and phenomenal consciousness. But introspective imprecision leaves it open whether SGP holds or not. It seems that we cannot decide based on introspection whether the character of our percepts or our introspective access to them is imprecise. We would need some other access to our phenomenality in order to settle the issue; but at this moment in time, nothing comes to mind that offers decisive evidence.²⁴

²⁴ This differs from the argument Block discusses: the attentional effect could be perceptual and conscious, but it is not really accessible what or how much actually changes in these circumstances due to introspective imprecision.

Block's writing suggests that he rejects introspective imprecision in this article (although he ought to accept it when defending the distinction between access- and phenomenal consciousness). If we reject it with him, how can we save the idea of percepts being more or less *p*-precise?

4.4 Limitation on characters?

The idea that parts of perceptual wholes can be more or less imprecise seems to stand in tension with the idea that all appearance-features can turn up anywhere in the phenomenal field: any appearance of contrast may appear in the fovea or periphery or where I attend or don't attend, etc. This had the odd consequence in my reconstruction that all phenomenal parts have the same degree of *p*-precision. How might we avoid this?

We could assume that the range of characters in the focus of attention and in the fovea is most fine-grained. Imagine being able to experience 100 shades of crimson in the attended fovea, but only 20 shades of crimson in the unattended periphery. This is reasonable for

contrasts as our sensitivity to it declines with eccentricity (Banks et al. 1991).

But this suggests that our experience is less continuous in the periphery. Instead, it is stepwise. This fits to the idea of precision having to do with bandwidths: in the attended fovea, we experience with a higher bit-rate than in the unattended periphery. It is like seeing a picture in 24- instead of 6-bit color depth (see figure 3).²⁵

But the coarse-grained character of experience outside of attention is not introspectable: if a light slowly changes color in our periphery, it does not look like it is doing so stepwise. It looks smooth and continuous. So somehow this idea only makes sense if we add the idea of introspective imprecision—and thereby inherit its problems.

So it is open how we should marry the idea of variances in phenomenal precision of a specific character with Block's overall view of conscious experience. Some more elucidation would be highly appreciated.

5 Conclusion

Ned Block has provided a beautiful argument against Ground Representationism—the position that for each phenomenal feature there is a representational feature that accounts for it. At its core is the notion of “phenomenal precision”: if we accept it, it seems that the degree of phenomenal precision of a percept changes differently to its degree of representational precision. Thus, there is no representational feature that accounts for this change in phenomenality—and Ground Representationism is false.

I have suggested a way of estimating phenomenal precision based on the assumption that parts of perceptual wholes can share characters independently of where they occur in the perceptual whole, and on the notion of a just noticeable difference as a lower bound of p -precision, which is inspired by Block's Phenomenal Precision Principle. Understood in this way, the argument shows what it is supposed to show: Ground Representationism is false.

But a deeper look at the notion of phenomenal precision suggests some tension with

Block's other work or with introspective evidence, which Block takes seriously. In order to allow for variation in the degree of precision, we have to accept that some of our experiences are not concrete, but solely generic. Such “solely generic phenomenology”, however, is a position mainly held by opponents to Block's *Access- vs. Phenomenal Consciousness-distinction*. Without accepting solely generic phenomenology, however, phenomenal precision seems either trivial (there is no variation) or contradictory (a percept can simultaneously have various degrees of p -precision). So the argument against Ground Representationism either hinges on a trivial or self-contradictory notion, *or* it is incompatible with Block's positions elsewhere. Patching this problem by allowing a limited range of characters outside our attention is again at odds with Block's other writing and with introspective evidence.

What is needed is a better understanding of phenomenal precision. What is it? How can we estimate it? I have suggested some possible ways to answer these questions, but all that I could come up with seems at odds with what Block has in mind. This certainly does not mean that there cannot be a suitable version of phenomenal precision that avoids these pitfalls—I am just unable to find it, and all that I can construct somehow goes against Block. I hope that Block has some ace up his sleeve, because the notion of phenomenal precision appears too fruitful to be abandoned too hastily.

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²⁵ The difference is one of 16.777.216 to 64 different colors.

References

- Armstrong, D. M. (1980). *The nature of mind and other essays*. Ithaca, NY: Cornell University Press.
- Banks, M. S., Sekuler, A. B. & Anderson, S. J. (1991). Peripheral spatial vision: Limits imposed by optics, photoreceptors, and receptor pooling. *Journal of the Optical Society of America A*, 8 (11), 1775-1787. [10.1364/JOSAA.8.001775](https://doi.org/10.1364/JOSAA.8.001775)
- Bayne, T. (2010). *The unity of consciousness*. Oxford, UK: Oxford University Press.
- Block, N. (1991). Troubles with functionalism. In David Rosenthal (Ed.) *The nature of mind* (pp. 211-228). Oxford, UK: Oxford University Press.
- (1996). Mental paint and mental latex. *Philosophical Issues*, 7, 19-49. [10.2307/1522889](https://doi.org/10.2307/1522889)
- (1997). On a confusion about the function of consciousness. In N. Block, O. Flanagan and G. Güzeldere (Eds.) *The nature of consciousness: Philosophical debates* (pp. 375-415). Cambridge, MA: MIT Press.
- (2007). Consciousness, accessibility, and the mesh between psychology and neuroscience. *Behavioral and Brain Sciences*, 30 (5-6), 481-548. [10.1017/S0140525X07002786](https://doi.org/10.1017/S0140525X07002786)
- (2015). The puzzle of perceptual precision. In T. Metzinger and J. M. Windt (Eds.) *Open MIND*. Frankfurt a. M., GER: MIND Group.
- (forthcoming 2015). The Canberra Plan neglects ground. In T. Hogan, M. Sabates and D. Sosa (Eds.) *Qualia and mental causation in a physical world: Themes from the philosophy of Jaegwon Kim*. Cambridge, UK: Cambridge University Press. <http://www.nyu.edu/gsas/dept/philo/faculty/block/papers/Kimfestschrift.pdf>
- Boring, E. (1953). The history of introspection. *Psychological Bulletin*, 50 (3), 169-189. [10.1037/h0090793](https://doi.org/10.1037/h0090793)
- Brentano, F. (1874). *Psychologie vom empirischen Standpunkt*. Leipzig, GER: Duncker & Humblot.
- Burge, T. (2010). *Origins of objectivity*. Oxford, UK: Oxford University Press.
- Carney, T., Tyler, C. W., Watson, A. B., Makous, W., Beutter, B., Chen, C.-C., Norcia, A. M. & Klein, S. (2000). Modelfest first year results and plans for year two. In B. E. Rogowitz and T. N. Pappas (Eds.) *Human vision and electronic imaging V* (pp. 140-151). The International Society for Optical Engineering.
- Carrasco, M., Ling, S. & Read, S. (2004). Attention alters appearance. *Nature Neuroscience*, 7 (3), 308-313. [10.1038/nn1194](https://doi.org/10.1038/nn1194)
- Chalmers, D. J. (2011). Verbal disputes. *Philosophical Review*, 120 (4), 515-566. [10.1215/00318108-1334478](https://doi.org/10.1215/00318108-1334478)
- Churchland, P. M. (1985). Reduction, qualia, and the direct introspection of brain states. *The Journal of Philosophy*, 82 (1), 8-28.
- (2005). Chimerical colors: Some phenomenological predictions from cognitive neuroscience. *Philosophical Psychology*, 18 (5), 527-560.
- Craver, C. F. (2007). *Explaining the brain: Mechanisms and the mosaic unity of neuroscience*. Oxford, UK: Oxford University Press.
- Fechner, G. T. (1860). *Elemente der Psychophysik*. Leipzig, GER: Breitkopf & Härtel.
- Goldman, Alvin I. (2006). *Simulating minds*. Oxford, UK: Oxford University Press.
- Gombrich, E. (1982/2002). The visual image. *The image and the eye: Further studies in the psychology of pictorial representation* (pp. 137-161). London & New York: Phaidon.
- Grush, R. (2007). A plug for generic phenomenology. *Brain and Behavioral Sciences*, 30 (5/6), 504-505. [10.1017/S0140525X07002841](https://doi.org/10.1017/S0140525X07002841)
- Hardy, J. D., Wolff, H. G. & Goodell, H. (1940). Studies on pain. A new method for measuring pain threshold: Observations on spatial summation of pain. *The Journal of Clinical Investigation*, 19 (4), 649-657. [10.1172/JCI101168](https://doi.org/10.1172/JCI101168)
- Hardy, J. D., Wolff, H. G. & Goodell, H. (1952). *Pain sensations and reactions*. New York, NY: Hafner.
- Haugeland, J. (1981). Analog and analog. *Philosophical Topics*, 12 (1), 213-225.
- Jackson, A. S. (1960). *Analog computation*. New York, NY: McGraw-Hill.
- James, W. (1890/1957). *The Principles of Psychology*.
- Jäkel, F. & Wichmann, F. A. (2006). Spatial four-alternative forced-choice method is the preferred psychophysical method for naïve observers. *Journal of Vision*, 6 (11), 1307-1322. [10.1167/6.11.13](https://doi.org/10.1167/6.11.13)
- Kant, I. (1787/2008). *Kritik der reinen Vernunft*. Essen, GER: Korpora.
- Kosslyn, S. M. (1980). *Image and mind*. Cambridge, MA: Harvard University Press.
- Lewis, D. (1971). Analog and digital. *Nôus*, 5 (3), 321-327.
- Locke, John (1690/2008). *An essay concerning human understanding*. Oxford, UK: Oxford University Press.
- Lycan, W. G. (1996). *Consciousness and experience*. Cambridge, MA: MIT Press.
- Nanay, B. (2005). Is twofoldness necessary for representational seeing? *British Journal of Aesthetics*, 45 (3), 248-257. [10.1093/aesthj/ayi034](https://doi.org/10.1093/aesthj/ayi034)

- Pelli, D. G. & Bex, P. (2013). Measuring contrast sensitivity. *Vision Research*, 90 (0), 10 - 14. <http://dx.doi.org/10.1016/j.visres.2013.04.015>. <http://www.sciencedirect.com/science/article/pii/S0042698913001132>
- Schindler, S. (2013). Mechanistic explanation: Asymmetry lost. In D. Dieks & V. Karakostas (Eds.) *Recent Progress in Philosophy of Science: perspectives and foundational problems*. Dordrecht, NL: Springer. http://philsci-archive.pitt.edu/9557/1/Craver_symmetry_final.pdf
- Sperling, G. (1960). The information available in brief visual presentations. *Psychological Monographs: General and Applied*, 74 (498), 1-29. [10.1037/h0093759](https://doi.org/10.1037/h0093759)
- Wiese, W. & Metzinger, T. (2012). Desiderata for a mereotopological theory of consciousness. In S. Edelman, T. Fekete and N. Zach (Eds.) *Being in time: Dynamical models of phenomenal experience* (pp. 185-209). Amsterdam, NL: John Benjamins.
- Williamson, T. (1990). *Identity and discrimination*. Oxford, UK: Blackwell.
- Wollheim, R. (1987). *Painting as an art*. Thames & Hudson Ltd.