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The real epistemic significance of perceptual learning

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ABSTRACT

In 'The Epistemic Significance of Perceptual Learning' (this issue) Elijah Chudnoff argues that cases from perceptual learning show that perception not only generates reasons for beliefs but also preserves those reasons over time in perceptual learning cases. In this paper, we dispute the idea that perceptual learning enables the preservation of perceptual reasons. We then argue for an alternative view, viz. the view that perceptual learning is epistemically significant insofar as it modifies our perceptual system in such a way as to make us capable of perceiving subtle low-level properties (e.g. lightness) and high-level properties (e.g. chess configurations). Acquiring the capacity to perceive these properties is what enables us to achieve expertise in a variety of subject matters (e.g. chicken sexing, chess playing, language fluency). Along the way, we argue against two main points in Chudnoff's paper. The first is that, pace Chudnoff, perceptual learning does not result in the acquisition of new facts. It only results in the acquisition of a new perceptual capacity. The second is that experiences resulting from perceptual learning can always serve as immediate justifiers of beliefs and hence do not need supporting background information in order to serve as reasons.

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1. Presentational phenomenology vs. felt evidence insensitivity

In 'The Epistemic Significance of Perceptual Learning' (in this issue) Elijah Chudnoff seeks to answer the following question: What is learned in perceptual learning?¹ His reply is that cases from perceptual learning show that

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¹Perceptual learning is as Eleanor Gibson puts it 'an increase in the ability to extract information from the environment, as a result of experience and practice with stimulation coming from it' (Gibson 1969, 4) For a classification about the mechanisms underlying perceptual learning see Goldstone 1998.

perception not only generates reasons for beliefs but also preserves those reasons over time. In this paper, we dispute the idea that perceptual learning enables the preservation of perceptual reasons. Chudnoff's argument presupposes the following thesis for, at least, some visual experiences (Pryor 2000, 2005; Tucker 2010; Brogaard and Chudnoff *forthcoming*):

Phenomenal Dogmatism: If it visually appears to *S* as if *p*, then, in the absence of defeaters, *S* thereby has immediate and full justification for her belief that *p*.

For example, if the scribble on the piece of paper next to your computer visually looks like a square, then, in the absence of defeaters, you have immediate and full justification for your belief that the shape of the scribble is a square. A defeater is a belief you have that either undercuts or rebuts your justification (Pollock 1986, 1987). For example, if a reliable witness has told you that the drug you are on causes you to have a hallucinatory experience and that the scribble is a rectangle, then the justification for your belief is defeated. The perceptual justification, however, is nonetheless *prima facie justification* for your belief.

Phenomenal dogmatism, as stated, is neutral with respect to the question of which visual experiences can serve as reasons. There are two possible positions one can hold in regard to this question. Using Chudnoff's terminology, these can be summarized as follows (Chudnoff 2016a)²:

Epistemic Egalitarianism: If a perceptual experience immediately *prima facie* justifies believing some of its content, then it immediately *prima facie* justifies believing all of its content.

Epistemic Elitism: A perceptual experience might immediately *prima facie* justify believing some of its content, but not other of its content because of some difference between them.

Unlike epistemic egalitarianism, epistemic elitism imposes a requirement on when visual experience can serve as immediate and full justification for a belief formed on the basis of it. On the latter view, visual experience must possess a certain mark in order for it to serve as the sole immediate justifier of a belief formed on the basis of it.

Like Chudnoff, we find epistemic elitism more intuitive than epistemic egalitarianism (Brogaard 2013, 2016a, 2016b, 2017, *forthcoming-a*). Consider, for example, a case of amodal perception. You may perceive a man sitting at a table. Although his legs are hidden under the table, you perceive a man, not just the upper part of a man. Still, if you form the belief that the man has legs, there is nothing in your experience of the man that can immediately

²Defenders of epistemic egalitarianism include Huemer (2001), Silins (2013), Pryor (2000), Brogaard (2013), and Chudnoff (2013, 2014) endorse forms of Elitism.

and wholly justify that belief. Your belief turns out to be justified since most people have legs. But it is justified, not just by your experience but also by your background information about the typical constitution of humans.

Like Chudnoff, we are thus, strong supporters of epistemic elitism. Where we differ concerns the mark experiences must have in order to serve as justifiers. On Chudnoff's view, perceptual experience immediately, *prima facie* justifies believing a proposition p in virtue of having presentational phenomenology with respect to p . For an experience to have presentational phenomenology with respect to p is for it to represent that p and make it seem as if you are aware of a truth-maker for p (see Chudnoff 2012, 2014, 2016b). Suppose, for example, that you have a visual experience of a red apple. In having the visual experience, (a) you represent that there is a red apple, and (b) you appear to be directly aware of a truth-maker for the proposition that there is a red apple in front of you, *viz.* the red apple that appears to be in front of you.

On the view we prefer, the mark of justifying experiences is not its presentational phenomenology. Rather, it is the feeling that the experience is so solid that it would not disappear even if we were to discover that it is non-veridical. Call this 'the felt evidence insensitivity of experience'. To fully appreciate this notion, consider the Müller-Lyer illusion (Figure 1). Even when you know that the line-segments are the same length, your experience persists regardless.

This is a case of evidence insensitivity. While we have argued that this is the mark of perceptual justifiers in previous work (see e.g. Brogaard 2017, forthcoming-b), and while we still maintain that typically it is the mark in question, we now defend a stronger internalistic view, according to which the evidence insensitivity must be a property of the phenomenology of the experience. The reason for this turns on what we have called 'the new evil demon problem' (Brogaard 2017). Consider a demon world in which an evil demon would make all of your looks evidence sensitive were you

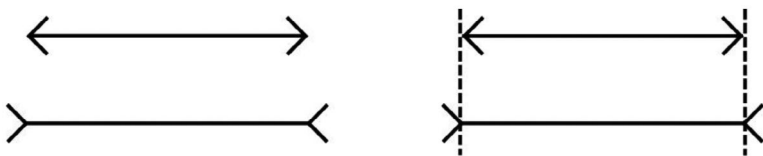


Figure 1. In the Müller-Lyer illusion on the left you experience the two line segments as having different lengths, even after learning (as illustrated on the right) that they have the same length. This illustrates a case in which a perceptual experience is evidence-insensitive, *i.e.* immune to counter evidence.

to form a belief on the basis of them. For example, you look at the Müller-Lyer illusion, but you do not form a belief that the line-segments have the same length because you know that they do not. However, your experience is not evidence-insensitive, because an evil demon would make you see things as they are, were you to form a belief on the basis of the illusion. So, if evidence insensitivity is the mark that makes your experience a prima facie reason, then you fail to have a prima facie reason for said belief. Yet your doppelganger in this world, where there are no evil demons has prima facie justification. So, in spite of the fact that you and your doppelganger are internal duplicates, you are not justified to the same extent on the basis of your experience. This is potentially problematic for the same reason that the standard evil demon problem is problematic.

Felt evidence sensitivity avoids this problem insofar as you feel your experience is solid (evidence insensitive) in both the evil demon world and in the actual world. As we will see below, there are many cases where experiences that have presentational phenomenology are also felt as evidence insensitive, and vice versa. But the two notions do come apart.

Let us now return to Chudnoff's argument. Chudnoff uses a perceptual learning experiment carried out by Gibson and Gibson (1955) to argue that perceptual learning enables past experiences to retain reasons over time. In the experiment, a shuffled set of 34 cards was presented to 32 subjects (12 adults, 10 older children ranging from ages 8 1/5 to 11, and 10 younger children ranging from ages 6 to 8). Of the 34 cards, 17 represented items indistinguishable from the target item (see Figure 2), 12 represented items

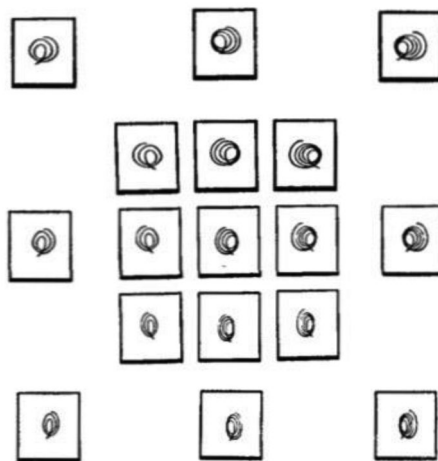


Figure 2. Nonsense items differing in three dimensions of variation.

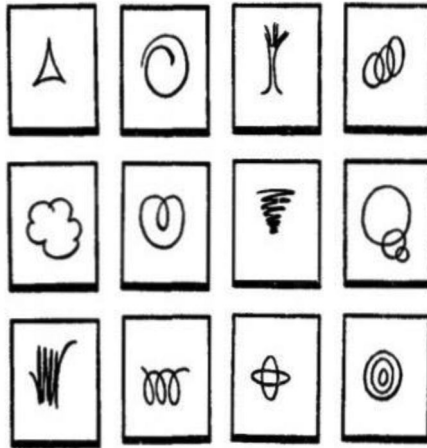


Figure 3. Nonsense items differing in many dimensions of variation.

distinguishable from the target item (see Figure 3), and four were duplicates of the target item (i.e. the four-coiled scribble which appears in the center of Figure 2).

Subjects were shown the target item for about 5 s and were told that some of the items in the shuffled set of cards would be exactly like it. Each card from the set of 34 shuffled cards was then shown for 3 s and subjects were asked to identify the target item. The process was repeated until subjects made only the four correct identifications in a single trial (that is, they made no mistakes). Subjects were not told whether their identifications were correct or incorrect during or after each trial. So, subjects learned to identify the target item as a result of repetition. These results support the occurrence of perceptual learning, understood in terms of an increase in the correct identification of the target item. Since the subjects were not told whether their answers were correct or not, the results also suggest that discrimination improves with practice even without knowledge of the results. Interestingly, each group had a different learning curve. The adult group needed the fewest trials while the younger group needed the most. For the older children, the results were intermediate between the adult and the younger children groups.

On the basis of this case, Chudnoff argues that perceptual learning transforms potential cues (e.g. number of coils, compression and orientation) into actual cues. This presents a change in perceptual content.³ He thus, maintains that this case satisfies a principle he refers to as 'High-Level Perceptual Learning:'

Facts about diagnostics: In some cases of perceptual learning what is learned is which detected stimulus variables are diagnostic for classifications.

This contrasts with another principle which Chudnoff refers to as 'Low-Level Perceptual Learning:'

Abilities to detect: In some cases of perceptual learning what is learned is an ability to detect previously undetected stimulus variables.

A simple case of this is the chicken sexer case. Determining the sex of day-old chicks is a very difficult perceptual task, which requires extensive practice. In an experiment carried out by Biederman and Shiffrar (1987), 36 subjects who had no knowledge of chick sexing were presented with 18 pictures (not shown here) arranged in a random order. They were told that the pictures were divided equally between males and females and were asked to identify which of those were male and which were female without receiving feedback on the accuracy of their judgments. The experiment consisted of a pre- and post-test. Subjects were told that the arrangement of the 18 pictures would not be the same in the pre- and post-tests. Half of the subjects received no instructions before the pre- or the post-test. The other half of the subjects were given a set of written instructions describing the location and mapping of critical contours after the pre-test (Figure 4) and were asked to reclassify the pictures during the post-test. The naive subjects showed improvement, averaging 60% correct answers in the pre-test and 84% in the post-test after viewing the instructions. The professional sexers averaged 72% correct answers. Performance for the subjects who did not receive instructions declined by 4.9%, i.e. from 59% in the pre-test to 54.1% in the post-test.

The results indicate that visual learning in the classification of the 18 pictures was achieved by briefly describing the shape of the relevant areas (as seen in Figure 4). After learning to distinguish the sex of the chicks, the chicken sexer is able to recognize features of the chick's genitals that novices do not recognize.

³According to Gibson and Gibson (1955, 40), repetition and practice gives rise to an increased sensitivity to the stimulus, which is not based on memory, imagination, implicit assumptions, etc. The stimulus information is there at all times, but we come to make more discriminations as time passes. They treat this as an increasing correspondence between the items and stimulation presented and the items of response recorded. The response gains univocality, which is what makes it gain in the feeling of recognition and allows it to acquire meaning. So it ceases to be ambiguous. It is not, therefore, clear that they would accept Chudnoff's assessment that perceptual learning involves a change in perceptual content.

Now you will be asked to sex-type another set of chickens. You should use the following rules to discriminate between the male and female genitals. The first part of your task should be to locate the informative region. In order to find this point, you should look for the two large cylindrical side lobes near the bottom of each picture. The genitals are located either between the ends of these two lobes (1) or slightly above the ends (2).



After you have found this area, you should study the swellings present there. It is at this point that males may be differentiated from females. Male chicken genitals tend to look round and fullish like a ball or watermelon. Here are two examples:



Female chicken genitals can take on two different appearances. They can look pointed, like an upside down pine tree, or fatish. Here are two examples:



Usually, but not always, male genitalia are larger. Sometimes either sex will appear to have double genitalia. You should differentiate the following 18 pictures based on this set of rules. Again, nine of the pictures are male and nine female in random order. You should begin the task by studying all of the pictures carefully. If you decide that a pictured set of chicken genitals belongs to a male, circle the "M" after the corresponding number on your answer sheet. If you decide that the pictured genitalia belong to a female chicken then circle the "F" after the corresponding number on your answer sheet. Please work carefully. Once you understand these rules, you may turn this paper over and begin. Any questions?

Figure 4. The experimental instructions for chick sexing.

Recall that Chudnoff uses Gibson and Gibson's (1955) experiment to argue that perception serves a preservative epistemic role by preserving immediate perceptual justification over time. In what follows, we argue that the epistemic significance of perceptual learning is not to preserve immediate justification of belief over time. Rather, it is one of the major ways in which we can acquire knowledge-how on an expert level.

The plan for the paper is as follows. In Section 2, we shed doubt on Chudnoff's stipulation that a negative belief receives its justification not just from the corresponding experience but also from related experiences about the features of objects. In Section 3, we discuss three ways of understanding the notion of 'preserving' justification for belief and argue that, contrary to Chudnoff, it cannot be that a new fact (associated with high-level perceptual

learning) is learned. In Section 4, we argue that the epistemic significance of perceptual learning is not to preserve immediate justification of belief over time but to acquire knowledge-how at an expert level.

2. Immediate justification for negative beliefs

Chudnoff's view that perceptual learning can preserve perceptual justification over time partially derives from his belief that unlike the experiences that a trained subject may have in the Gibson and Gibson experiment (articulated in b and c below), the experience articulated in (a below) does not have presentational phenomenology.

- (a) That [demonstrating the seen scribble] is not the target.
- (b) That [demonstrating the seen scribble] has five moderately compressed coils oriented leftward.
- (c) The target has four moderately compressed coils oriented leftward.

If (a) is an experience of a negative fact, then, it is certainly true that it does not have presentational phenomenology. Just like experiences of occluded parts of objects don't have presentational phenomenology, experiences of something not being the case are unlikely to have presentational phenomenology.⁴ Yet there is no doubt that after the perceptual training process has taken place, we come to have a justified belief that (a) is true. As presentational phenomenology is the mark of experiences that puts them in a position to immediately justify belief, on Chudnoff's view, (a) cannot immediately justify our belief that (a). Chudnoff, therefore, stipulates that our belief that (a) receives its justification not just from the corresponding experience but also from (b) and (c). The experiences corresponding to (b) and (c) are somehow preserved in the visual system in some form that allows them to be constituent parts of the whole reason for our belief that (a).

When formulated in this way, this suggestion looks rather implausible. There is good reason to think that the visual system does not perform standard logical inferences. To see that consider the below illustration from Pylyshyn (1999) (Figure 5).

The partially occluded figure in the middle has a shape that might be that of the surrounding figures. The outer-most octagons should in fact make it more likely that the occluded figure is also a regular octagon. So, if logic or statistical principles governed the visual system, we ought to perceive

⁴One exception may be the experience of absences and holes (see e.g. Farennikova 2013), which may be entities in their own rights, in which case it could be argued that you can stand in a direct awareness relation to them.

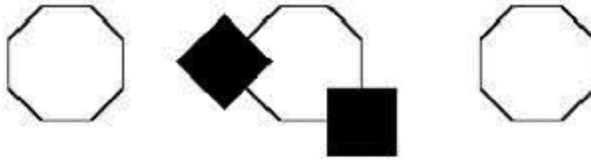


Figure 5. Kanizsa amodal completion.

Note: Despite the flanking cases of octagons, the occluded figure is not seen as a regular octagon. Pylyshyn (1999).

the middle figure as having the same shape as the surrounding figures. But the fact is that we do not. Intra-perceptual principles appear to modulate the visual processes (Brogaard and Gatzia 2017), completing the hidden parts of the occluded figure. These perceptual principles are not rational principles, such as maximum likelihood or semantic coherence.⁵ They work according to their own algorithms. Accordingly, the occluded object is not experienced as a regular octagon.

Granted, the fact that amodal completion works this way does not show that the visual system could not make any valid logical deductions or statistical inferences. It is certainly possible that the visual system could logically deduce (a) from (b) and (c). But given that the visual system works according to its own intra-perceptual principles, it is highly implausible that the visual system performs these types of pure logical deductions.

Chudnoff foreshadows something like this objection, when he attempts to clarify that what he claims is that ‘your justification for believing (a) is mediated by your justification for believing (b) and (c)’, not that ‘you infer (a) from (b), (c), or anything else’. This claim, however, still presupposes that the visual system is capable of logically deducing (a) from (b) and (c).

Notice that no problem of this sort arises if the mark of justifying experience is felt evidence insensitivity. After perceptual learning takes place, experience (a) is bound to be felt as evidence insensitive. So, while the experience cannot immediately justify your belief that (a) on Chudnoff’s view, it is clearly in a position to immediately justify this belief if felt evidence insensitivity is the mark of justifying experiences.

The question, however, is whether there really is a problem here to begin with. It is somewhat doubtful that we have experiences such as (a), viz. the experience that that [demonstrating the seen scribble] is not the target. We certainly form beliefs of this sort but the experiences justifying them

⁵These principles are akin to what Helmholtz called ‘unconscious inferences’ (Gordon 2004), what Gregory (2009) calls ‘hypotheses’, or what Bayesians call ‘implicit assumptions’ (Rescorla 2013).

are more likely to be simple. Your belief that that [demonstrating a circle] is not a square is likely immediately justified by a perceptual experience of the shape of the demonstrated figure. This experience has presentational phenomenology and is evidence insensitive. There is no reason to think that your belief that (a) could not be immediately justified by the experience that the demonstrated scribble has five moderately compressed coils oriented leftward.

3. Why perceptual reasons for beliefs cannot be preserved diachronically

The lesson Chudnoff takes away from the Gibson and Gibson experiment is nicely summarized in this quote:

So when you believe (a) on the basis of your perceptual experience of the neighboring scribble your justification is constituted in part by your immediate, prima facie justification for believing (b) and in part by your preserved, prima facie justification for believing (c).

The justification for believing (b) is a past experience to the effect that that [demonstrating the seen scribble] has five moderately compressed coils oriented leftward. Likewise, your justification for believing (c) is a past experience to the effect that that the target has four moderately compressed coils oriented leftward. The question, however, is what exactly is meant by 'preservation'. Here, are three possibilities:

Possibility 1: The perceptions are preserved in memory and retrieved. The retrieval of the information inherent in (b) and (c) is what prima facie justifies (c).

This is clearly not what Chudnoff has in mind. We have already seen that Chudnoff does not think that the justification proceeds via personal-level inferences. Furthermore, even if it did proceed in this way, memory is not very good at preserving information. On the now standard distributed reinstatement model of memory (see e.g. Eichenbaum 2004; Serences et al. 2009; Rissman and Wagner 2012; Brogaard 2017), memories are dismantled and stored in separate parts of the brain. The information that the demonstrated scribble has five coils is a number fact and may thus, be stored in the parietal cortex. The information that the demonstrated scribble is moderately compressed is a fact about form and may be stored in the form area LO (which sits next to the motion area MT in the visual cortex). Finally, the orientation of the demonstrated scribble may be stored in sub-cortical areas of the visual system (e.g. LGN). Upon retrieval, these pieces of information need to be

put back together again. This frequently introduces errors, which frequently makes the output different (or at least slightly different) from the input.

Possibility 2: The memorized perceptual experiences justify, but not by being retrieved (on some level). Rather, they justify the belief that that [demonstrating the seen scribble] is not the target while staying in their distributed dismantled form, stored in various places in the brain.

At first glance, it is not entirely implausible that reasons can be distributed. Some think that groups can have distributed reasons for a group-based belief (for an overview and criticism, see Ludwig 2015). Consider a group of trans* people who (as a group) believe that trans* people should have a right to use the bathroom designated for the gender with which they identify. Even if no individual in the group knows all of their comrade's reasons, the group belief might be fully justified (only) by the sum of all the reasons the group members have.

The problem in this case is that distributed memory, stored in different parts of the brain, is not a compilation of many reasons. There is no single reason stored in any single place in the brain. There is only a reason once the fragments are put together again upon memory retrieval, which leads us back to Possibility 1.

Possibility 3. This third possibility turns out to be the one Chudnoff has in mind when he says that perceptual reasons can be preserved. On this view, experiences are preserved by causing a change to perceptual processing.

However, it is not clear how (b) and (c) could be preserved in any meaningful sense of the word via a simple change to how the visual system processes information. If there is a change in how the visual system processes information, then there is a change in the *capacity* of the visual system. This is suggested by both of the experiments discussed above as they show that discrimination improves with practice even without knowledge of the results. But this is inconsistent with the idea that a new fact is learned, which is what Chudnoff suggests is going on in the case of high-level perceptual learning. What is learned is merely the perceptual capacity to acquire new facts. Reasons, however, are not capacities. So, a change in the perceptual capacities of the visual system cannot constitute a *reason*. Perceptual reasons, if preserved at all, therefore, are not preserved in the way suggested by Chudnoff.

4. What then is the epistemic significance of perceptual learning?

If the epistemic significance of perceptual learning is not to partly preserve reasons, then what is its epistemic significance? It seems that perceptual

learning always amounts to the acquisition of new perceptual capacities – that is, inherent changes to the perceptual system. These new capacities allow us to perceive properties or features we were not in a position to perceive prior to the learning process. In some cases, it makes us capable of attending to new features that were previously unattended to (as in the chicken sexing case). In other cases, it allows us to see new high-level properties (e.g. complicated chess configurations).

Moreover, perceptual learning secures our experiences in the sense that it ordinarily makes them feel evidence insensitive (or in a less trendy tone: it makes them feel clear and distinct to us, just like the beliefs derived from them). When we have certain expert skills, it takes a lot more defeaters for us to stop seeing things the way they initially seem to us. Perceptual learning can thus turn our appearances into strong immediate justifiers of the beliefs we form as a result of said learning.

The epistemic significance of perceptual learning is, therefore, not to preserve immediate justification of belief over time. Rather, it is one of the crucial ways in which we can acquire knowledge-how at an expert level (Brogaard [forthcoming-a](#)). Knowledge-how that results from expertise based on perceptual learning is not belief-based. It is grounded in neurochemical or cellular changes to areas of low-level sensory processing in the brain (Brogaard [forthcoming-a](#)). So, the answer to the question of what is learned in the case of perceptual learning is this: what is learned is a perceptual expert skill set. To see this let us consider the case of expert chess players.

There seem to be no patent differences in the statistics of the thought process (e.g. number of moves considered, search heuristics) between expert and novice chess players (De Groot 1966). However, studies have found that there is a difference in working memory between expert and novice chess players: experts were able to recall a chess position almost perfectly after viewing it for 5 s. What seems to account for this difference is not the experts' superior memory abilities but rather their immediate perceptual experiences, specifically their ability to perceive structure in certain positions and encode them in configurations.

Chase and Simon (1973b) tested the hypothesis that recall is limited by the number of configurations (e.g. clusters or pieces of the same color, castled-King positions, or Pawn sequences) using both a perceptual and a memory task. In the perceptual task, chess players were asked to reconstruct a chess position, while it was visually available. Successive glances at the board were used to test whether the chess player would encode only one configuration per glance, while reconstructing the position. In the memory task, chess players were asked to reconstruct a position from memory after a

five-second exposure. The timing in recall was used to segment the output into configurations. The aim was to determine whether the configurations defined by the data in the perceptual task had the same size and character as the configurations defined by the data in the memory task. The findings indicated that the superior performance of expert players can be attributed to their ability to encode the position into larger perceptual configurations, which are within the memory span.

In a separate experiment intended to test long-term memory, Chase and Simon (1973a) asked chess players to first memorize a game and then reconstruct a given position of the game from memory. The experiment consisted of three chess players, a beginner, a master, and a Class A player, each playing a game consisting of 25 positions. Subjects had to learn all 25 positions until they were able to reproduce the game perfectly twice in a row. The initial hypothesis was that the chess players would rely more on the games' function (e.g. an attack) and less on spatial properties (e.g. configurations). Indeed, the results show that beginners had limited access to larger patterns in long-term memory: 80% of the recalled pattern configuration consisted of a single piece, indicating that the beginner had to reconstruct the game one piece at a time. For the master and Class A player, by contrast, the percentage of recall pattern configurations consisting only of a single piece was much smaller, 26 and 37%, respectively, indicating that they had greater access to larger patterns in long-term memory. In addition, the more skilled chess players were able to retrieve successive new configurations almost two to three faster than the beginner: 3–4 s for the master, 6–8 s for the Class A player, but approximately 12 s for the beginner.

Skilled players recalled the configurations by starting with a constructing one move on the chessboard and then filling in the rest by reference to it, indicating a reliance on perceptual spatial features. These results suggest that when training to become a chess expert, we acquire the perceptual capacity to perceive large chess configurations – a capacity which novice chess players do not have. For example, you might instantaneously see a configuration as a case of checkmate. Your experience of this configuration may not have presentational phenomenology insofar as you may not be consciously aware of the truth-maker for the proposition *this configuration is a case of checkmate*. But it is highly likely that the chess expert is going to feel that her experience is evidence insensitive. She is not going to waver one bit before uttering the word 'checkmate'.

Chudnoff argues on independent grounds that felt evidence sensitivity (and even evidence sensitivity) cannot be the mark of those experiences that can serve as immediate perceptual justifiers. Here's his main criticism:

The point in Brogaard's reasoning that I would resist is the assumption that if a perceptual experience is evidence insensitive with respect to a content then it immediately, *prima facie* justifies believing that content. Consider deep seated biases or unfounded emotional evaluations. Deep seated biases might be evidence insensitive, but they do not immediately, *prima facie* justify believing their contents. Unfounded emotional evaluations might be evidence insensitive, but they do not immediately, *prima facie* justify believing their contents. Suppose, for example, that someone is afraid of dogs. Walking past a park in which a cheerful cocker spaniel is gleefully playing with some children this person experiences intense anxiety and fear representing the dog as a threat. The experience persists in the face of evidence against its evaluative content. One might claim that just because of this it does immediately, *prima facie* justify believing that the cocker spaniel is a threat, though that justification is defeated by countervailing information. But this strikes me as implausible. What might this person point to in his or her experience as supporting the claim that the cocker spaniel is a threat? There is just the unfounded emotion. It seems more plausible to me to claim that the experience does not immediately, *prima facie* justify believing that the cocker spaniel is a threat, and the evidence insensitivity with respect to this content is epistemically irrelevant.

We agree that the concern expressed here is alarming. In some cases of unjustified conscious deep-seated biases and irrational emotions, we have defeaters of the justification. Consider a racist who genuinely believes that most black people are intrinsically bad. He may simultaneously hold the more general belief that the look of a person is not a determiner of their personality. If he has this defeater, his racist belief is not *prima facie* justified. Still, it seems mistaken to think that racists without defeaters can be justified in their racist beliefs on the basis of their deep-seated biases or irrational emotions. Moreover, it is arguably very unintuitive that racist beliefs can be *prima facie* justified on those grounds. As it happens, however, Chudnoff's objection does not present a problem for the view we have defended in this paper. For, we are committed only to a particular version of phenomenal dogmatism about visual experience, not about biases and emotions. In fact, as argued elsewhere, emotional dogmatism has its own independent problems (Brogaard and Chudnoff 2016).

Disclosure statement

No potential conflict of interest was reported by the authors.

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