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Précis of *Thinking and Perceiving*

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To be in the world is to be in contact with it. Whether animate or inanimate, worldly objects seem to be objects that can be in contact with other objects. This may just be what it means to say that something is *in the world*. This is the provocative bit of metaphysics with which I begin *Thinking & Perceiving*. It is also a bit of metaphysics that I do not go on to defend in the pages that follow in the book. Instead, I defend a more modest claim, or at least one narrower in scope. Human beings are certainly in contact with the world. And human minds can be in cognitive contact and perceptual contact with the world; both are important means by which we acquire (and store) information about our worldly environment. And contrary to one orthodoxy in cognitive science, perceptual contact is malleable and can be influenced by cognitive contact. Thinking not only affects but improves perceiving. Therefore, our contact with the world is very much our own. This is the provocation with which I conclude the book. And it is a claim that I *do* attempt to support and defend over the course of its pages. If true, the claim has a wide range of metaphysical and epistemological consequences.

**Some familiar background**

Any reader of this journal will be no stranger to the putative distinction in analytic philosophy between cognition and perception. Cognitive states or processes will include belief, knowledge, reasoning, decision making, perhaps concepts. Perceptual states or processes will include seeing, hearing, touching, tasting, smelling, propriocepting. The distinction is not merely philosophical; it is well evidenced by practices in the cognitive sciences. The cognitive psychologist and the vision scientist will (often enough anyway) study importantly distinct phenomena. And psychology and related textbooks are often organized around cognitive, extra-perceptual phenomena versus perceptual phenomena. Nonetheless, how this distinction is substantiated and thus how the two lists are generated is a difficult and open question.

Early chapters in *Thinking and Perceiving*, offer some non-exclusive answers to the question, and some analysis of what is at stake philosophically and scientifically. What is at stake can be largely read off intuitive observations about the importance of perception. What do we use seeing and other forms of perception for? We use perception to know about the world, to understand it, to appreciate it, and to act on it. Perception is thus of fundamental importance to our being in, surviving in and, ideally, thriving in the world. This answer doesn’t require philosophical theory or empirical study, and it encourages a rough answer to a question about the importance of possible cognitive influence on perception. If perception is of fundamental human importance, then its nature and the scope of possible influences on it will be of the same importance (or at least something awfully close to it). How we use vision, say, to successfully act on and know about the world will be informed by what causally influences it. Do such influences include only worldly stimuli and visual processing or that *and* extra-perceptual mental states of the perceiver?

The intuitive observations also offer some imperfect clues to how one might answer the cognition-perception border question. If perception is the fundamental way that we get and maintain contact with the world, then it should in some sense more straightforwardly reflect or represent the world. It should be closer, as it were, to the world than cognition. Accordingly, perception may be involuntary or less active by contrast to cognition, since it should be “turned on” just by the world rather than by the perceiver. Of course there has to be something in the perceiver to “turn on”, and here is another possible mark of distinction. Perception may be different from cognition insofar as it requires present sensory organ activity (in one’s eyes or ears, for example), while cognition is under no such requirement at any one time. Similarly, perhaps perception but not cognition requires presence (in the good cases) of appropriate stimuli. If you perceive a tree it is because there is a tree before you; this is not true of thinking about a tree, say, that you saw yesterday in the mountains. And, some maintain, you can perceive things, but not have beliefs about them, without having concepts about things of that kind. You can have a visual experience of the tree in the mountains without having any TREE concept. Finally, and perhaps again because of the fundamentality or “closeness” of perception, experiences given by vision and other sensory modalities enjoy a far richer phenomenology than cognitive states and processes. Your visual experience of Istanbul involves, in a first personal subjective way, an overwhelming array of qualitative features that (in the good cases) accurately track the visible details of Istanbul. The phenomenal character of your memories of a past trip to Istanbul arguably pale by comparison. This outlines five possible, non-exclusive dimensions for distinction between cognition and perception: Subject activity, Sensory organ activity, Presence of appropriate stimuli, Conceptual requirements, Phenomenology. And without commitment to any one dimension or to any essentialist definitions, the dimensions offer some working grounds for keeping cognition and perception distinct. There are other dimensions briefly discussed in the book, but the sixth and final one deserves extended discussion. That is modularity.

**From modularity vs. to malleability**

On the strong Fodorian notion of modularity, perceptual systems like vision are *informationally encapsulated*, and thus, modular. Once the eyes receive their proprietary input from the environment, the visual system will perform its computations and output a visual representation without influence from the perceiver’s beliefs, knowledge, expectations, desires, and other cognitive systems. This marks another way to distinguish perception from cognition: the first but not the second is modular in this way. Cognition is *cognitively penetrable*; perception is *cognitively impenetrable*. Perception gives us a closer look on the world, since that look provides more direct access to the world, unpermeated by what we think about it (and by contrast to cognition). This view has had a dominant influence on perception studies, in both philosophy and cognitive science, for several decades. So much so, I think, that cognitive penetrability (as a counterexample to informationally encapsulated modular perceptual systems), has become a standard test for possible interesting cases of cognitive influence on perception. I call this the *default position assumption* and argue that the assumption is undermined once we interrogate the central arguments for modularity and shift emphasis to a distinctive range of empirically studied case.

On the first point. To support the default position assumption, arguments for modularity must be strong. They are not. Many of the various arguments for modularity begin with a plausible observation: human perception is by and large successful in providing accurate and useful representations of the world. With remarkable frequency, perceptual systems like vision provide accurate representations of the objects and events in the world. And they do this consistently despite the dynamics of a regularly changing and richly complex environment. The modularist then moves to claim that such reliability and stability would not occur if perceptual systems were not informationally encapsulated. Since the plausible observation is true—perception *is* reliable and stable in said ways—perception must be informationally encapsulated. Ergo, perception is modular. There are too many nuanced iterations of this broad argument to countenance here (I do that in the book, with relevant criticism). But one way to roughly summarize the arguments and their problems is to identify an important linchpin, the *pernicious cognitive effects assumption* (PCE). PCE claims, sometimes explicitly and sometimes under the surface, that any or most cognitive influences on perception would undermine the epistemic and behavioural success of perception. The trouble is that PCE requires separate argument (and persistent illusions such as the Müller-Lyer do not, by themselves, amount to such an argument). And to assume PCE and then employ it to defend informational encapsulation, in a context where cognitive influence on perception is *the* topic of debate, is nothing short of question begging. This is the first prong of attack on modularity, and the accordant default position assumption.

The second prong is partly informed by the following observation. In the literature on modularity and cognitive penetrability, the emphasis has largely been on negative cases, cases where perception seems to suffer some error as a result of an influencing cognitive state or process. This myopic emphasis occurs on both sides of the debate; both advocates and critics of modularity have dominantly focused on cases where subjects misperceive the colours, sizes, distances and other features of stimuli. Some of these cases remain interesting and, as I argue in the book, are best explained in non-modularist ways. I try to shed new light on these cases by focusing on debate-neutral consequences in the cognitive penetrability debate, and on the role of attention in cognitive influence on perception. But even when illuminated in such ways, these cases are not the most interesting ones to consider. Indeed, things begin to look quite different when we turn to apparent cases of perceptual improvement, to empirical studies on perceptual expertise. And in this light, PCE looks all the more unmotivated.

There is a rich and well-established empirical research program, mostly neglected in the above philosophical debates, studying perceptual expertise (for reviews, see Bukach et al. 2006, Scott 2011, Shen et al. 2014). Using both behavioral, neural-physiological, and computational methods, researchers study experts in a wide range of domains: radiology and other medical domains, elite athletics, forensics and fingerprint examination, bird watching and mushroom foraging, among many others. In their respective domain of training, experts’ performance success is above a threshold set by the standards of that domain, and performance non-trivially involves sensory perception. The perceptual skills acquired and executed by such experts also seem to depend in important ways on the concept rich learning regimens that experts undergo. In short, the best explanation of some of these kinds of expertise involve both a sensory and a cognitive component.

It is by appeal to these empirically studied cases of perceptual expertise that I motivate two central claims: thinking affects perceiving (the *TaP thesis*) and thinking improves perceiving (the *TiP thesis*). The *TaP thesis* comprises two claims about mental architecture, one perceptual and one cognitive. The first claim says that there are genuine differences in the perceptual experiences of expert versus non-expert (within a domain of expertise). These differences are evidenced in a number of ways. Experts enjoy rapid, often “automatic” performance—say, diagnosing a tumor in a mammogram—and that performance correlates with distinctive eye movement patterns. They also enjoy advantages in visual working memory. And behavioral and neural studies show similarities and interactions between expert perception and face perception, the latter an undeniably visual phenomenon. None of these pieces of evidence are by themselves conclusive, but taken together they converge on the claim that perceptual expertise is a genuinely perceptual (rather than just post-perceptual) phenomenon. The second, cognitive claim says that the perceptual phenomenon—the differences between experts and novices or naïve subjects—is sensitive to cognitive learning. Experts in domains such as radiology or forensics or football learn fine grained concepts and important contextual factors about the domain, and expert success and its behavioral and neural persistence co-varies with that cognitive etiology. So, although some perceptual learning can occur on the basis of mere exposure or unsupervised learning, much of it apparently cannot. Finally, expert skills do not readily transfer to similarly complex tasks or domains: the expert radiologist is no better than non-radiologists at *Where’s Waldo* puzzles (Nodine et al. 1998), nor are their visual search skills transferable to another domain of expertise, such as architecture (Ivy et al., forthcoming). It is in this sense that perceptual expertise is a cognitively sensitive phenomenon.

The TiP thesis follows from this architecture: some cases of perceptual expertise are cases where thinking improves perceiving. Such experts approach optimality, performing within a domain rapidly and reliably. And because some experts deliberately acquire a perceptual skill through concept-rich cognitive learning, they are to be credited for the development and deployment of that skill. Because of what the expert has done, cognitively, she performs better visually within her domain of specialization. This perceptual success is a kind of performance, and so the most apt epistemology is a virtue-theoretic one. The expert performs, perceptually, in exceptional ways, as a consequence of their deliberate and laborious training. This xceptionnal performance optimally or near optimally satisfies the natural norms of perception, in turn optimally fulfilling the representational function of perception (within that domain). It is in this way that the expert achieves epistemic virtue, and that virtue reaches all the way down to the perceptual. Cognition does not just affect perception, it sometimes improves perception. The mind is thus richly malleable, and in ways that allow for improvement to our most basic modes of contact with the world.

**Consequences of malleability**

The implications and consequences for this malleability are wide reaching. Here are just a handful, of greater or lesser interest to readers from different disciplines and sub-disciplines.

Perhaps the most obvious consequence of the overall analysis of the book, if successful, is that modularity can no longer serve as a means for demarcating cognition from perception. Cognition was supposed to be distinct from perception because the second, but not the first, was modular. But if perception is, like most of the mind, malleable, then this mark of distinction must be abandoned. Some might worry that this undermines the distinction altogether, that if cognition influences perception in such ways then the broad distinction is thereby ungrounded. However, this would be too quick; the marks of distinction outlined above— sensory organ activity, presence of appropriate stimuli, phenomenology, and so on—remain. Some of these issues will figure importantly in the commentary and replies that follow.

*Perceptual attention*

One way the expert improves is to better attend to features and patterns that are behaviourally relevant to her task. Contrary to the rejoinder that this is just tantamount to “knowing where to look” and thus changing the inputs to perception without changing perception, the advantages enjoyed by the expert are sometimes bona fide perceptual advantages. This is because some modes of selective attention, such as feature and object-based attention, are plausibly part of rather than a gate-keeper to perception. And so when the expert’s visual attention is weighted towards feature types or patterns that are diagnostically or otherwise task-relevant, the expert sees differently than the non-expert, and in cognitively sensitive ways. This sheds new light on the role of attention in debates about top-down effects on perception.

*Rich perceptual content*

The expert radiologist is highly perceptually sensitive to anatomical structure as shown in a radiograph. The ballet instructor can just see how the movements of their students are balanced or serene. The expert goalkeeper is remarkably adept at visually identifying relevant patterns of play in an offensive attack. In each of these cases, the expert enjoys enhanced perceptual sensitivity that is relevant to their task, be it diagnosing a tumor or blocking a shot on goal. This is enhanced visual sensitivity to more than low-level perceptible properties; it is sensitivity to patterns, gestalts, diagnostic cues, and organizational features. These features of perceptual expertise encourage an argument for rich perceptual content, but without admission of natural kinds into that content.

*From perceptual accuracy to perceptual success*

A standard way to characterize perceptual content is in terms of accuracy conditions: the content of one’s visual experience is given by the environmental conditions that would have to be satisfied in order for that experience to be accurate. It is also standard to assume that these conditions will be determined in a purely mind-independent Objective way. But an analysis of perceptual expertise teaches two contrasting lessons. First, facts about the perceiver and the perceiver’s epistemic community are relevant to determining perceptual accuracy and, thus, content. Second, and related, those same factors provide conditions for *perceptual success* (which subsumes perceptual accuracy). Success for the expert also involves increased sensitivity to patterns, diagnostic cues, gestalts, feature types, and this is achieved rapidly, with less distraction, and therefore more efficiently integrated with action. Therefore perceptual success, and perhaps content, is an inter-subjectively objective matter. Two perceivers specialized in distinct domains, viewing the same scene, could enjoy equal perceptual success while having experiences distinct in content.

*Theory-ladenness of perceptual observation*

With perceptual malleability comes the theory-ladenness of perception. Cases of perceptual expertise suggest that the epistemic consequences can be good, even virtuous. With virtue comes the risk for vice. Resulting threats can be mitigated by the same inter-subjective checks and balances—shared communal values and methodological principles—that philosophers of science have long identified for general threats of theory-ladenness and bias in science. Scientific investigation, observational or otherwise, doesn’t occur in a vacuum of idiosyncrasy. But there are some more socially worrisome possible instances of theory-laden perception, such as those that concern racial bias. For instance, the “cross-race effect” (CRE) is a well-studied phenomenon in facial recognition, where subjects are much less skilled at recognizing faces “across race” than “within race” (Young et al. 2011). If some instances of racial bias are grounded in the CRE, then herein lies both a problem and a possible solution. Malleability allows for a bad theory (socially constructed and biased notions of race) to bias visual perception. Malleability also allows for correction: subjects can be trained to recognize “cross-race” faces. If implicit and explicit bias sometimes reaches all the way down to the perceptual, then one way to combat some of their insidious effects may involve training individuals to better recognize faces different than their own.

*Perceptual expertise as a general phenomenon*

Traditional modularists have made some mention, albeit mostly dismissive, of cases of perceptual expertise. Fodor claimed that because such experts “*are* highly skilled they may tell us very little about the character of normal perceptual processing” (Fodor 1983: 54). This implies that either such experts have somehow transcended “normal” perception, or they have not and therefore are plausible counterexamples to the informational encapsulation of putative perceptual modules. Pylyshyn suggests that experts simply know where to look and this does not amount to cognitive influence *on perception* (1999: 360). But this rejoinder fails to acknowledge how selective attention can be weighted in behaviorally relevant ways (as discussed just above). Most importantly to my mind, both rejoinders overlook the generality of perceptual expertise. Empirically studied perceptual experts are often exceptionally skilled and studied in elaborate ways. But this is an idiosyncrasy of the constraints and challenges of studying the phenomena, not an idiosyncrasy *of the phenomena*. Instead, it is plausible, given the fact that all humans form habits and partake in activities that are highly perceptual in nature, and in often highly specialized contexts, that most if not all mature humans are perceptual experts in their own lives.[[1]](#footnote-1)

If the central claims of *Thinking and Perceiving* are true, if the mind is malleable all the way down to the perceptual, then how we make mental contact with the world is importantly informed by who we are, what we have learned, what skills we have acquired, and what our goals and tasks are. How you perceive the world may well be different from how I perceive it, and this because of our cognitive backgrounds. In the best of cases, this will amount to achieving epistemic virtue, being optimally sensitive to the patterns, structure, and feature types that serve one’s needs and epistemic goals. This comports well with how recent virtue epistemologies have characterized the notion of *understanding*: an appreciation of order and pattern, of how things cohere or hang together. The perceptual sensitivities of the expert thus engender *perceptual understanding*. The radiologist can visually recognize and grasp the patterns, organization, and coherence of stimuli within her domain. She can sometimes “just see” an anomaly and how it situates in the overall structure of the lung. Likewise for many other kinds of perceptual experts.

One final provocation. A common intuition across widely diverse philosophers is that who we are as individuals is, at least in part, our consciousness, our mind, our psychology. We each have an important role to play in who we are as selves. One can change and improve not only one’s cognitive states, but also one’s perceptual processes and content. This further grounds an important intuition that we are autonomous agents, responsible for important aspects of our lives. A malleable architecture bears the result that this responsibility concerns not only our actions and thoughts but our perceptual experiences, our sensory contact with the world. As we persist as persons, we can influence and enrich our very own perceptual processes. In this sense, we are active participants in the contact that we make with the world, where the cognitive contact we have and have had informs the sensory contact we have and can have. Thus the understanding that one achieves of the world is partly a function of who one is. And understanding oneself, in these richly agential ways, reveals how and when we can be credited for the worldly, perceptual understanding we enjoy. It is in this way that the book concludes that our contact with the world is very much our own.

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1. Thanks to Becko Copenhaver for pressing me repeatedly on this point. [↑](#footnote-ref-1)