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Comment on Crooks's "Intertheoretic Identification and Mind–Brain Reductionism"

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This paper focuses on perception and surveys the scientific evidence that the theory of direct realism adopted by most contemporary philosophers is incorrect. This evidence is provided by experiments on the spatial and temporal "filling-in" of percepts. It also examines the myth of the projection of sensations. The conclusion is that we do not perceive the world as it actually is, but as the brain computes it most probably to be.

Mark Crooks's (2002, this issue) paper rejects the philosophical theory of direct realism that most contemporary philosophers support. I concur with this rejection. Unfortunately for their case there is now abundant evidence from neuroscience, neurology and experimental psychology that the theory is completely false. It has now been established by many experiments that we do not perceive the world as it actually is but rather as the brain computes what it most probably is. Out of a very large range of such experiments I will mention a few.

1. Ramachandran and Blakeslee (1998) present a detailed account of the spatial "filling-in" phenomenon that occurs in scotomata. In this a small blind spot in the visual field is not perceived by the subject as an empty area because the brain fills it in by completing the surrounding pattern into and across it. Scotomata can be caused by local lesions of the visual cortex, occur during migraine and are found in all people where the optic nerve leaves the retina. If such a blind spot is poised over a pattern, the pattern is seen as

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complete without any hole in it. A broken black line is also seen as complete (see Ramachandran and Blakeslee, 1998, for many more details). So, how is it possible for the area around the blind spot (and other scotomata) to be seen "directly" yet the matching area within the blind spot is constructed by brain representative mechanisms?

2. Another dramatic example demonstrates that the visual field, as we experience it, is a TV-like construct by brain mechanisms guided by computations of probability assessment. This experiment was reported by Kovács, Papathomas, Yang, and Fehér (1996). In this they used two pictures — A showing a group of chimpanzees and B showing the dense foliage of a tropical jungle. They then constructed two further pictures C and D. Each of these was constructed by making a patchwork of portions of A interspersed with portions of B. In places where C showed a portion of A, D showed a portion of B with exact fitment. Likewise, where C showed a portion of B, D showed a portion of A. If picture A is shown to one eye of the subject and picture B is shown to the other eye, the subject will, of course, see A, then B, then A, then B and so on, in typical retinal rivalry. So what will happen if we show picture C to one eye and picture D to the other? The direct realist will have to say that the subject will see C, then D, then C, then D and so on in the same process of retinal rivalry. After all, that is what is out there. However, that is not what actually happens. What the subject sees (when presented with C to one eye and D to the other) is A (only chimpanzees) alternating with B (only foliage). Unpublished experiments in this laboratory have shown that the same effect can be obtained with patterns of colored dots or striped lines. The training of the brain's computational networks is based on the input of many coherent patterns such as A and B and very few incoherent ones such as C and D. Therefore, under the conditions of this retinal rivalry experiment, the brain reorganizes the two incoherent pictures C and D (which impact the retinae) into the two coherent pictures A and B, which the subject actually sees, but neither of which is actually "out there." It is obviously wildly implausible to suggest that we see "directly" when we are looking at A and B, but, when we are looking at C and D, we see instead what the brain computes as "most probably there" (see Smythies and Ramachandran, 1998).

3. Recently this "filling-in" process has been shown to extend to temporal gaps in perception as well as to spatial gaps (scotomata). Yarrow, Haggard, Heal, Brown, and Rothwell (2001) studied vision during saccades (rapid eye movements). The experiment involved observation of a silently ticking clock, when, during saccades, the second hand appears to take longer than normal to move to its next position. For a short period, the clock appears to have stopped (chronostasis). Yarrow et al. showed that under such conditions objects presented during a saccade are actually invisible. In other words the

visual system shuts down for a brief instant. Normally we do not notice this because the brain mechanisms retrospectively fill in the visual field with (illusory) visual sensations that the brain computes represent what we would have seen if the visual system had been working normally during the saccade. The reason for this peculiar arrangement, these authors suggest, is to prevent the severe vertigo that would otherwise result from the perception of the world swinging wildly round us during a saccade. It would be most implausible, to suggest — as a direct realist would have to in order to save the theory — that we see "directly" only when our eyes are not in saccadic movement.

As Lord Brain (1960) and I (Smythies, 1954) have emphasized there is in reality no process whereby visual sensations are "projected" out of the brain onto external objects in the way that the direct realists claim when they try to mesh their own "common sense" theory with the scientific account of perception. The need to postulate this mythical process arises because of the almost universal confusion between the physical body and what is called in neurology the "body image." Paul Schilder (1942, 1950) showed, on the basis of clinical studies, that we do not experience any event in our own physical bodies. Almost every one naively regards the "body" that we experience simply as the physical body. However, this is a mistake (Smythies, 1953). What we experience is the body image. This is a construct by the representative mechanisms of somatic sensation which are located mainly in the parietal lobe. Since visual sensations appear to be located outside the "body," the process of "projection" was invented to account for this. However, visual sensations are not external to the physical body — they are only external to the body image. Both visual sensations and somatic sensations (that make up the body image) are located in the phenomenal space of consciousness, not in physical space outside the brain.

Direct realist philosophers defend their theory in the teeth of all these facts by the following argument. Unless the theory of direct realism is true, they claim, how could we ever know that our sensations actually represent external physical objects correctly if we can never compare our internal sensations with these external physical objects. If we attempt to answer this by arguing that natural selection would see to it that organisms whose sensory systems did not depict external reality reasonably accurately would not survive very long, the direct realist will point out that this answer necessarily depends on knowledge about organisms that scientists obtain by perception, and so assumes the truth of what we are trying to demonstrate. I do not think that this argument is valid, because the scientist making these observations is under no obligation to accept that he or she is doing so by a direct realist process. Moreover we can also reply as follows. The question posed by the direct realist is "How can you ever find out that your perceptions really do depict external reality if you cannot compare them directly?' However,

experimental psychology has demonstrated in immense detail that our percepts do not mirror external reality very accurately. The many illusions and constancy effects, such as the Ames room, the effect of wearing prisms that turn the visual world upside down, etc., etc. all demonstrate my primary thesis — that we do not see the world as it is but as the brain computes it most probably to be. Thus, even if we could compare sensations and objects directly, we would find that they are not identical but are instead rather different. Hence the last defense of the direct realist collapses. The correct theory of perception is the scientific representative theory, which is supported by a mountain of evidence. This theory states that what we perceive is the end product of a massive process of neurocomputation. The final step in this process is the mechanical generation of the sensations that we experience in consciousness. Philosophers, who claim to refute this theory on "logical" grounds, are like people who claim that the proper way to do astronomy, as Marshall (1991) put it, is to submit to linguistic analysis the statement "The sun rises in the east and sets in the west."

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