

Cognitive penetration, hypnosis and imagination

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Abstract: The thesis of cognitive penetrability, according to which cognitive states can affect perceptual experiences, remains the topic of intense debate among philosophers. A new candidate for a case of cognitive penetration is presented and defended. The candidate is based on studies involving suggestions that something is a certain way, which are usually given under hypnosis, rather than mere request to imagine that things are a certain way.

According to the thesis of cognitive penetrability, cognitive states such as beliefs and hopes can affect perceptual experiences. Candidates for cases in which cognitive penetration has been suggested to occur include, for instance, altered phenomenology after learning recognitional concepts (Siegel 2006), possible memory effects on colour perception (Macpherson 2012), and the possible effects of desires on visual size perception (Stokes 2012). Each of these candidates, as well as others, has been disputed because they can also be explained without assuming cognitive penetration. Moreover, these alternative explanations, which vary with the candidate in question, are usually empirically more plausible than cognitive penetration.¹ Consequently, no candidate is even remotely uncontroversial and the plausibility of the thesis remains the topic of intense debate among philosophers. The objective of this paper is to present and defend a new candidate for a case of cognitive penetration.

My candidate for a case of cognitive penetration is based on the proposal that hypnotic suggestions—suggestions that something is a certain way (e.g., a paper in front of you is red) which are usually given under hypnosis—can change or bring about perceptual experiences. This proposal is not new and is accepted by many hypnosis researchers. It has been claimed, for example, that hypnotic suggestions can cause auditory hallucinations (Szechtman et al. 1998) and experiences of pain in (otherwise) pain-free participants (Derbyshire et al. 2004). These claims are based on findings that subjective reports and the neural activation pattern of the experiences allegedly caused by hypnotic suggestions are similar to those obtained with real auditory or pain experiences. Interestingly, in both cases, subjective reports and neural activation patterns induced by hypnotic suggestions differed from the subjective reports and neural activation patterns obtained when participants were asked to imagine having auditory and pain experiences. Accordingly, these studies suggest that imagination does not change or bring about experiences.

¹ For alternative explanations of the candidates mentioned, see (Macpherson 2012; Arstila 2016b; Arstila 2016a; Connolly 2014). See also Firestone and Scholl (2016) for the pitfalls of several other candidates for a case of cognitive penetration.

Although many hypnosis researchers maintain that hypnotic suggestion can change perceptual experiences, this can also be contested since the results can be explained in another way. According to the judgment interpretation, beliefs caused by hypnotic suggestion change our judgments of experiences but they do not change our experiences. Thus, for instance, when a participant reports that she hears someone talking, she merely judges or reports hearing speech, but she does not in fact hear it. Because the reports are the same whether hypnotic suggestions change experience or merely our judgment about our experience, these reports do not support either of the alternatives over the other. Moreover, one could also account for the brain-imaging data by holding that different neural activation patterns partly reflect the different judgments of our experiences—which they are likely to do in any case—and that the remaining differences caused by imagination and hypnotic suggestions do not mean that the experiences of the participants differed (not all increases in activation, say, in the auditory cortex result in changes in experiences). If this explanation is plausible, then the brain-imaging data do not make a distinction between the two alternative interpretations either. It is worth noting that these sceptical responses against the claim that hypnotic suggestions change experiences are not based on results contradicting the claim. Instead, they are rooted in the view that the results do not provide strong enough support to endorse the claim.

The case for cognitive penetration that I think can avoid the previous sceptical responses comes from the study by Milton H. Erickson and Elizabeth Moore Erickson (1938). Their study involved participants trained to achieve a deep hypnotic trance, which in turn implies that these participants were highly suggestible persons. In the *first* step, the participants were presented with a typical white paper. The experimenter told the participants that the paper has a bright solid colour (red, yellow, green, or blue). The colours attributed to the papers were randomized and the experimenter described the colour to be different in each succeeding round. The participants looked at the paper and were instructed to nod when they saw it to be of the colour the experimenter described. This paper was then replaced with another white paper and, on this *second* step, the participants were asked to name the colour they saw the second paper to be. These two steps were repeated twice for each colour (altogether eight times).² Control tasks involved word association tasks before, during and after hypnosis. There were a hundred cue words for which the participants named the word that came to mind. The cue words included the four used colours words and “bright”. At the end of the study, the participants were directly asked to state the complementary colours for blue, yellow, red and green.

² Before the repetition, the participants were presented with actual sheets of brightly coloured paper (red, green, yellow, and blue). They were presented in pairs to prevent colour-pair-associations.

The main results can be summarized as follows. *First*, four out of a total of five participants succeeded in the first task, that is, they reported by nodding that they saw the colours the experimenter described. The effect took one to two minutes to occur. *Second*, the colour attributed to the second paper by the four participants was without exception complementary to the colour that the first paper was described as being. For example, when the experimenter stated that the first paper was red and the subject reported (by nodding) seeing it as such, the participants stated that the following paper was green even though it was in fact white. *Third*, the participants did not show any preference for the complementary colour pairs in word association tests and were “unable to define or to name complementary colours when asked directly.” (Erickson and Erickson 1938, 583) Repetition of the first two steps of the experiment and the word association tests produced identical results.

These results can be explained in the framework of cognitive penetration as follows. Hypnotic suggestion led the participants to believe that the paper was coloured in the first step. This belief, in turn, influenced their perceptual experiences of the paper—they saw the paper illusorily as coloured—and reported it as such. Since the belief about the colour of the paper brought about a matching colour experience, this explanation subscribes to the thesis of cognitive penetration. As the first step lasted more than one minute, the visual system became adapted to the illusory colour, similar to cases in which one stares a coloured paper for a minute. This adaptation produced negative afterimages (the colour of the afterimages is complementary to the colour of the paper) which the participants reported in the second step. Since the colour experiences in the second step are consequences of adaptation taking place in a colour vision system, the reports reflect the real experiences and how a colour vision system functions rather than the participants’ colour associations or beliefs about colours. Thus, this explains how the reported colours could be complementary in the first and second steps even though the participants had no knowledge about complementary colour pairs and were only shown white papers.

The Ericksons’ claim that hypnotic suggestion can induce phenomenal experiences concurs with the above-mentioned studies in which participants report altered experiences due to hypnotic suggestions. It is thus empirically plausible.³ Unlike in the other studies, in the Ericksons’ case the claim is supported not only by reports of experiences directly related to the hypnotic suggestion (i.e., nodding during the first step), but also by reports that indirectly uncover something about the experiences related to the hypnotic suggestion (i.e., verbal reports in the second step). The latter

³ While Erickson and Erickson’s (1938) results agree with the received view among hypnosis researchers, Hibler (1940) was unable to confirm their results. However, as Hibler did not use the same methods as the Ericksons, they and others (e.g., Oswald 1957) do not think his study refutes those results.

justification is crucial because the first can also be explained with the judgment interpretation: when a participant reports seeing a paper as red, for instance, it is possible that she experiences the paper as white and merely judges herself to be having an experience of red paper. Since both the cognitive penetration interpretation and the judgment interpretation hold that four participants would report having experiences of coloured sheets, these reports cannot distinguish between the two interpretations.

The second and third results uncouple the interpretations. Whereas the cognitive penetration interpretation can explain these results plausibly—by appealing to the colour experiences and normal adaptational functioning of the colour vision system—the same is not true of the judgment interpretation. Here, the main problem is how to account for the fact that the colours participants reported seeing in the second step were without exception complementary to the described colour of the previous piece of paper. Explaining this result is problematic for those who endorse the judgment interpretation because the third step showed that the participants did not have prior knowledge of complementary colour pairs or preferences for such pairs. Hence, it appears that the reports can only be explained if we assume that the participants report the colour experiences they had in the second step—something which would also explain why four participants reported having such experiences. But if the judgment interpretation is correct, these colour experiences could not be considered afterimages because no colours were experienced in the first step. Accordingly, the judgment interpretation does not explain why the participants would have had colour experiences in the second step and how they could describe their colour to be complementary to the colours named in the first step of the experiment.⁴

The argument that the Ericksons' experiment illustrates cognitive penetration is crucially dependent on the claim that the second step of the experiment involved afterimages. For this reason, it is important to note two things concerning the nature of the afterimages involved. First, under normal conditions, afterimages result from staring at a coloured stimulus (say, a paper) for a little while, and such afterimages are often explained by the adaptation of cells in the retina. The argument for cognitive penetration assumes, however, that we can also have afterimages when the colour of the

⁴ Other interpretations are less likely to bear relevance on this experiment. For example, it is not clear how attention would bring about different colour experiences in each case (the attentional-shift interpretation), no perceptual learning is involved (the perceptual learning interpretation) and the magnitude of the stimuli remains the same in the first and second step (the magnitude perception interpretation). Moreover, the second and third results cannot be explained plausibly with the remaining pitfalls listed by Firestone and Scholl (2016), which include for instance “demand and response bias”, “peripheral attentional effects” and a need to rule out the possibility that reports reflect only “memory and recognition” rather than perceptual experience.

paper is illusory. Moreover, they cannot be explained in the “usual” way because the cognitive processes postulated to cause colour experiences in the first step are cortical, and cortical feedback processes do not extend to the retina. Thus, if retinal processes are the origin of the usual afterimage signals, then, for neurophysiological reasons, the belief caused by hypnotic suggestion simply cannot cause such afterimages.

Based on the previous examination, it does not follow that the experiences in the second step would not be afterimages. This is because afterimages are not caused only by the adaptation taking place during peripheral processing in the visual sensory system. Instead, “adaptation operates throughout most, if not all, levels of sensory coding and thus impacts all aspects of perception” (Webster 2015, 561) and due to the modulation of cortical processes, the afterimages can even be seen in the “retinal locations that were not originally adapted” (Webster 2015, 552). This means that although peripheral processes might be responsible for the most common afterimages, in other cases afterimages are produced by cortical processes either directly (e.g., after vivid dreams) or by modulating the sensory signal originating from the retina. (For examples of after-images occurring without prior visual stimulus, see Oswald 1957; Phillips 2013, 420)

Second, the participants reported the colour of the papers in the second step of the experiment. Hence, the alleged afterimage is attributed to the material object in the external world. One could object to this by arguing that afterimages are sensations that do not represent external properties. However, as Ian Phillips (2013) has convincingly criticized, this view is not tenable on empirical and theoretical grounds. Given that “usual” afterimages are also sometimes attributed to the external world (e.g., when people look at John Sadowski’s Spanish Castle illusion), this feature of the reports does not prevent afterimages from being involved in the second step.

To summarize, the most plausible explanation for the Ericksons’ result is that four of their participants experienced colour in the first step of the experiment and had negative afterimages in the second step. The plausibility of this explanation is not diminished by the nature of the processes that cause afterimages, as these processes are more common than one might think. Accordingly, their experiment gives reason to believe that cognitive penetration can occur.

In the context of the debate over cognitive penetration, the candidate presented here is interesting in at least two respects. First, it concerns the basic features of the visual system (colours), and thus, unlike some other candidates (e.g., Siegel’s candidate), it is not subject to controversy about whether such properties are represented in the experience in the first place. Second, the postulated effect of the cognitive state on perceptual experience is rather quick and direct. This separates the candidate from Siegel’s candidate and possibly also from Macpherson’s candidate, as the latter was

willing to accept that our memories of the typical colour of items can influence colour perception even after the memory is replaced.

In light of the hypnosis studies mentioned above, however, the presented candidate for a case of cognitive penetration might be less interesting than other candidates involving “usual” cognitive states. After all, the Ericksons’ study does not provide reasons to think that cognitive penetration occurs without hypnosis, and other studies have proven how experiences induced by hypnotic suggestions differ subjectively and objectively from imagined experiences. Hence, even if the effect reported by Erickson and Erickson (1938) is a case of cognitive penetration, its significance and impact for philosophical debates might be limited.

Drawing such a conclusion is hasty, however, because it has been shown that hypnotic suggestion can change perceptual experiences even when a person is awake (McGeown et al. 2012). The apparent discrepancy between this study and the studies that illustrate the differences induced by imagination and hypnotic suggestion lies in the fact that the latter give different tasks to participants when they are awake as opposed to when they are under hypnosis. Whereas in the first situation they are asked to imagine the experiences (e.g., “remember and visualize seeing a red paper”), when under hypnosis they receive hypnotic suggestions (e.g., “the paper is red”). Hence, the latter group of studies did not investigate whether the reported altered experiences induced by hypnotic suggestions are due to the suggestions themselves or due to the participants being in an altered state of consciousness (namely hypnosis).

It is worth noting that William McGeown et al.’s study (2012) does not support the idea that cognitive penetration caused by hypnotic suggestion is a generally occurring phenomenon. In their study, the participants were divided into groups of high suggestibility and low suggestibility.⁵ They were asked to rate the vividness of their colour experience (on a scale from one to five; from no colour to full colour) when shown stimuli consisting of grey or coloured patterns for at least 30 seconds. When presented with grey patterns, the participants received the suggestion that they add colour to the stimuli; when presented with the coloured patterns, they received the suggestion that they drain colour from the stimuli. The participants did this both awake and under hypnosis. fMRI data was collected during the tasks.

The hypnotic suggestion showed a small or negligible effect on participants in the group with low suggestibility. They rated the vividness of colour experiences related to the grey pattern as 1.1 (1 being “no colour”) and those of the coloured pattern as 4.5 (5 being “full colour”) (McGeown et al.

⁵ Depending on the criteria, the prevalence of highly suggestible people is estimated to be 10–18% of the population (Barnier and McConkey 2004).

2012, fig. 2). The difference in results obtained while participants were under hypnosis versus awake was insignificant.

The effect of hypnotic suggestion was considerable for the highly suggestible group. When they were required to add colour to the grey pattern, they rated the vividness of their colour experiences as 3.4 (awake) and 3.9 (under hypnosis). With the coloured pattern, the mean ratings were 2.8 (awake) and 2.3 (under hypnosis). That is, the hypnotic suggestion increased the vividness of colour experiences of grey stimuli and decreased the vividness of colour experience of coloured stimuli. Hypnosis increased the effect, but the main effect of hypnotic suggestion occurred even when the participants were not hypnotized. Moreover, the self-reported degree of vividness of colour experience correlated with the strength of neural activation in the visual cortex, including those areas uniquely associated with colour perception (i.e., V4).

These results hence support the claim that hypnotic suggestions can induce colour experiences, as the claim concurs with the self-reports and provides a parsimonious explanation of the correlation between the rated vividness and strength of neural activation. If the self-reports were only due to changes in the judgment of experiences, then this correlation would remain unaccounted for. Accordingly, the results provide additional support for the cognitive penetration interpretation of the Ericksons' results.

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