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Jérôme Dokic

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The role of noetic feelings in sensory substitution*

Jérôme Dokic, EHES & Institut Jean-Nicod, Paris, dokic@ehess.fr

Abstract

A central issue in the study of sensory substitution devices is whether and to what extent the original source of knowledge about the world that they seem to enable substitutes for ordinary perception. I argue that this issue divides into two sub-issues, which concern respectively the sensory and the affective aspects of the phenomenology of perception. The sensory aspect determines the representational contents of experience, while the affective aspect is constituted by noetic feelings such as familiarity and presence. A pessimistic view may be formulated according to which neither familiarity nor presence can be reproduced in sensory substitution. There are important phenomenological differences between ordinary perception and sensory substitution due to the massively parallel architecture of the former. However, drawing on a discussion of Capgras syndrome and derealization disorder, I show that we also enjoy higher-level, post-perceptual feelings of familiarity and presence. In the last part of the paper, I draw on the psychological literature on metacognition and sketch a fluency-based account of both these feelings, which leads to a more optimistic view about whether they can be enjoyed by trained users of sensory substitution devices.

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Keywords

Sensory substitution, noetic feelings, metacognition, familiarity, presence, Capgras syndrome, derealization disorder

Introduction

A central issue in the study of sensory substitution devices (henceforth, SSDs) is whether and to what extent the original source of knowledge about the external world that they seem to enable substitutes for ordinary perception. This issue has both theoretical and practical implications. On the theoretical side, the hope is to attain a better understanding of the nature of perception itself. On the practical side, one might be interested in making the use of these devices as comfortable as possible by trying to match relevant aspects of the phenomenology of ordinary perception.

It should be relatively uncontroversial that expert use of SSDs can yield original *non-inferential knowledge* about the world.¹ For instance, trained subjects using the TVSS or the vOICE do not have to start from explicit considerations about the contents of their tactile or auditory experiences to conclude that there is a cube in front of them.² Rather, they spontaneously judge that there is a cube in front of them, without having to pay attention to their tactile or auditory experiences. Moreover, their judgment can even aspire to the status of

¹ Here I use ‘non-inferential’ in the philosopher’s sense, meaning that it does not seem to the subject that she explicitly reasons to the relevant conclusion. This is compatible with there being implicit inferences in the psychologist’s sense.

² The TVSS or Tactile-Vision Sensory Substitution device was created by Paul Bach-y-Rita (Bach-y-Rita 1972) and maps visual information extracted by a camera onto a 2D array of vibrating points. The vOICEe converts the same visual information into auditory events, encoding space by means of time and qualitative dimensions of sounds (Meijer 1992).

perceptual knowledge, at least if ‘perceptual knowledge’ is interpreted in a broad sense, as referring to non-inferential knowledge causally based on sensory stimulations.

However, as Millar (2000: 74) has plausibly argued, ‘perceptual knowledge can embrace more than the perceptually manifest’. This means that the contents of perceptual knowledge can go beyond what is perceptually presented, i.e., the contents of the underlying perceptual experience. We often move spontaneously from a sensory experience with a certain content (for instance, ‘This is a bird’) to a judgment with a richer content (for instance, ‘This is a cardinal’), thanks to purely cognitive, or at least post-perceptual habits or recognition heuristics.³

A more specific question then arises, namely whether SSDs yield genuine perceptual *experience* of the world over and above the contents directly provided by the substituting modality (e.g., touch in the case of the TVSS and audition in the case of the vOICe). In other words, the question is whether SSDs are sources of original perceptual contents. If this question is answered positively, further sub-questions arise, such as whether SSDs produce modality-specific or amodal contents and, if the former is the case, whether the relevant sensory modality is the substituting modality (Dominance interpretation) or the substituted one (Deference interpretation), or perhaps both at the same time (see, e.g., Auvray & Myin 2009, Auvray & Deroy 2012, Ward & Wright 2012).

As I shall argue in this essay, even if the foregoing set of questions is clearly important, it addresses only one aspect of the phenomenology of using SSDs, namely the intentional or representational *contents* that these devices can enact. Another aspect has to do with the varieties of *non-sensory or trans-sensory feelings* that usually accompany ordinary perception,

³ This example comes from McDowell (2008), who acknowledges that the acquisition of non-inferential knowledge that a perceived bird is a cardinal does not entail that the concept of a cardinal must be involved in a canonical specification of perceptual content.

such as feelings of presence and absence, feelings of familiarity and unfamiliarity, feelings of certainty and uncertainty.⁴ Correspondingly, there is a different set of questions that we can ask about the phenomenology of using SSDs, which concerns the kinds of feeling that they are able to generate and their relationship to the feelings usually involved in ordinary perception.

I shall contend that these two sets of questions are relatively independent from each other. That is, claims to the effect that SSDs generate, or do not generate, the same kinds of feeling as ordinary perception may not much depend on whether the expert use of these devices is considered to result from a mere cognitive habit or, more ambitiously, from a genuine extension (or essential modification) of the subject's perceptual competences.

The paper is structured as follows. The next section introduces the claim that the phenomenology of ordinary perception is dual, in the sense that it involves both sensory and affective aspects. This claim is discussed with reference to two pathological cases, namely derealization disorder and Capgras syndrome, which concern respectively feelings of presence and feelings of familiarity. The third section offers preliminary considerations about whether these feelings are in fact involved in the expert use of SSDs. In the fourth section, a pessimistic view is formulated according to which neither kind of feeling can be reproduced in SSDs, because the relevant affective states are realized by low-level stimulus-driven systems present only in ordinary perception. However, the fifth section introduces a different, higher-level sense of presence, which could in principle be reproduced in SSDs. Finally, in the sixth section I sketch a fluency-based account of both experienced presence and familiarity, which leads to a slightly more optimistic view about whether these feelings can be enjoyed by trained users of SSDs.

⁴ I borrow the term 'trans-sensory' from Mangan (2001). The idea is that the same feeling, for instance a feeling of familiarity, can be bound to contents from different sensory modalities. The feeling that a familiar person is present, for instance, can be elicited by a given face or a given voice, or both.

The dual phenomenology of perception⁵

An essential and pervasive aspect of the phenomenology of ordinary perception is provided by the sensory contents of our experiences. However, this does not exhaust perceptual phenomenology. When you are observing the pigeon just there perched on the branch, you may have visual experiences of grayish shades, of shapes, of movements and so on. Now, together with these sensory experiences you also feel that you are looking at a *real* pigeon and not, for instance, a mere figment of your imagination. This feeling of reality or presence, which Husserl called '*Leibhaftigkeit*' (Husserl 1907), constitutes the experiential basis of spontaneous judgments of reality, such as 'There is a pigeon perched on the branch'. Were someone to lose this kind of feeling, she would be prevented from forming such judgments owing to the absence of the relevant experiential basis. What it is like to have a perceptual experience would be different in the absence of feelings of presence. Along with other kinds of feeling which can be bound to sensory contents, such as the feeling of familiarity (or unfamiliarity) and the feeling of certainty (or uncertainty), the feeling of presence contributes to the overall phenomenology of perception.

In order to understand how perceptual feelings work, it is worth making a detour through the psychological theory of metacognition. We can draw a distinction between two sources of metacognitive judgment, specifically *theory-based* judgments on the one hand and *experience-based* judgments on the other hand (Koriat 2000, 2006). Theory-based judgments are conclusions of explicit inferences from our encyclopedic background knowledge or independent knowledge that we have about our own cognitive skills. In contrast, experience-based judgments result from affective experiences, namely what is referred to as *noetic feelings*.

⁵ This section is adapted from Dokic & Martin (forthcoming).

As an illustration, my belief that I know who was the forty-third President of the USA can be based either on reasoning (from the premises that I have learnt the names of all the USA Presidents at school and/or that I have an excellent memory) or on the gut feeling that I know the answer. Feelings of knowing are examples of noetic feelings among others, including feelings of not knowing, feelings of forgetting, and feelings of confidence. These specific affective experiences constitute the output of a monitoring process, which involves implicit inferences from a variety of internal cues, such as availability of partial information or fluency. In this respect, the level of availability of partial information or the level of fluency will modulate the phenomenological profile of the corresponding feeling. In particular, if the information to recall has been fluently encoded, the subject's feeling of knowing will be stronger than if the information has been encoded with difficulty. It appears that feelings are not sensitive to the specific memory contents at stake, but only to the quality of the on-line memory processes (Koriat 2006). Feelings are process- or quality-based rather than content-based (see also Dokic 2012).

In a previous co-authored work, I hypothesized that the distinction between theory-based and experience-based judgments can be applied to metaperceptual judgments (Dokic & Martin 2012). For example, the feelings of certainty or uncertainty present in metamemory are present in metaperception too. The judgment that I am unsure if the particular bird I am looking at is a blackbird or a raven can be based on either theory (for instance, I explicitly try to categorize the bird on the basis of its features, and I eventually fail to determine whether it is a blackbird or a raven) or experience (I have a feeling of uncertainty about the kind of bird perceived, perhaps because it is too dark or there is a mist). Other feelings such as the feeling of familiarity are more peculiar to metaperception. The judgment that I have seen this place before can be based on either theory (for instance, I explicitly remember that it is not the first time that I have visited this town) or experience (the place just feels familiar). Finally, as

described above, our ordinary perceptual experiences are usually accompanied by feelings of presence. The judgment that there is a real as opposed to an imagined pigeon there on the branch can be based on either theory (for instance, I realize that there is no reason to imagine a pigeon and that I have never imagined anything like that in the past) or experience (the pigeon feels real to me). Normally, of course, when we look at things around us, we have the feeling of being related to actual and present things rather than mere representations, imaginings or memories. Feelings of presence are the result of a reality monitoring process, whose function is to determine whether an informational state has been internally or externally generated (Frith 1992). So, like feelings in memory, feelings in perception are not sensitive to presented contents as such but only to the quality of perceptual (and probably also cognitive) processes.

To the extent that perceptual phenomenology is dual, potential dissociations between the sensory and the affective dimensions of perceptual experiences can be predicted. Such dissociations show up in specific pathological cases, including derealization disorder (DD) and Capgras syndrome (CS), which I now briefly present.

Derealization disorder

Patients presenting DD (also called ‘depersonalization’) experience a kind of affective detachment from the external world, which appears strange, inconsistent and unreal (Sacco 2009): ‘[their perception is not] lived but is more like a mechanical, purely receptive sensory process, unaccompanied by its affective tone’ (Parnass and Sass 2001: 105). Patients report that it is as if they were watching a movie or a picture of the world, instead of the real things around them: ‘In fact, the people and things around you seem as unreal to you as if you were only dreaming about them’ (Shorvon et al. 1946: 784). Shorvon et al. report another patient’s description: ‘Through the eyes I look out at a world that might be a picture of the world’ (1946:

784). It is as if patients were confronted with a mere representation of the world. The causes of DD are multiple, including cognitive, neurological and psychiatric disturbances. However, the crucial point to highlight is that the contents of the patients' experiences should motivate the presence of an affective phenomenology which is in fact absent. The patients do not have the feeling of being directly presented with the actual sensory contents that they are nevertheless consciously experiencing. In other words, their perceptual states are not accompanied by feelings of presence anymore; as Shorvon et al. already noted, '[their] perceptions do not awaken a feeling of reality [...]' (1946: 780).

DD suggests that the sensory and the affective aspects of perceptual phenomenology can be dissociated. In addition, subjective reports of patients support the thesis that affective phenomenology is necessary for the ordinary relational phenomenology to be instantiated. To the extent that the sensory aspect of their perceptual experiences is intact, patients can produce judgments about properties of objects with a high degree of confidence (e.g., 'This pigeon is grey (as opposed to red)'). In contrast, since the affective aspect of their perceptual experiences is deeply affected, they cannot produce judgments to the effect that they are acquainted with actual states of affairs (e.g., 'There is a real pigeon there in front of me (as opposed to a figment of my imagination)'), at least with a high degree of confidence.

Capgras syndrome

Patients with CS hold the belief that one of their relatives (e.g., their spouse) has been replaced by an impostor. The formation of this delusional belief results from the fact that the affective component that normally accompanies our perceptual experiences of familiar persons, namely the feeling of familiarity, is absent. In fact, some models propose the existence of two

information-processing pathways of face recognition (e.g., Bauer 1986).⁶ A first pathway (the ventral visuo-semantic stream) encodes semantic information about facial features in order to construct a visual image of face and constitutes the medium of overt recognition. A second pathway (the dorsal visuo-affective stream) processes the affective response to familiar faces and is responsible for both the feeling of familiarity and covert automatic recognition. Some data in favor of the dissociation between an overt and a covert mechanism of face recognition show that normal subjects produce larger automatic arousal, as measured by skin conductance responses, when they are shown familiar faces than when they are shown unfamiliar faces (e.g., Quayle et al. 1999). This automatic response to familiar faces has precisely been interpreted as a kind of covert recognition. Furthermore, patients with prosopagnosia produce larger skin conductance responses for familiar faces than for unfamiliar faces, while at the same time being unable to overtly recognize any of the (familiar or unfamiliar) presented faces (Bauer 1984). In the light of these results, it has been suggested that CS is the mirror image of prosopagnosia. More precisely, in CS the visuo-semantic stream would be intact while the visuo-affective stream would be impaired. This hypothesis is supported by empirical results showing that the skin conductance responses of Capgras patients are not larger for familiar faces than for unfamiliar faces (Ellis & Lewis 2001). Patients lack the affective reaction normally accompanying familiar faces; they do not experience familiarity. This abnormal and incongruous affective reaction constitutes the experiential basis from which the impostor delusion will be constructed.

Therefore, in CS, like in DD, the sensory phenomenology of subjects should motivate the presence of an affective phenomenology which is in fact absent. The person the subject is

⁶ The neuroanatomical validity of the original two-route model has been questioned and refined (see, e.g., Ellis & Lewis 2001). Nonetheless, the hypothesis of a dissociation between overt and covert recognition is much less controversial.

facing looks (perhaps exactly) like one of her relatives, but the subject lacks the feeling of familiarity associated with ordinary perception of a familiar person. The relative ‘looks right’ but ‘feels wrong’. Conversely, some studies with healthy people show that it is possible to have a feeling of familiarity for a stimulus that is not, however, semantically recognized (Young et al. 1985). These data suggest that the feeling of familiarity can be dissociated from conscious identification of the source of familiarity.

Feelings of presence and familiarity in SSDs: preliminary considerations

Assuming that the phenomenology of ordinary perception is dual, let us move to the question of whether SSDs generate the feelings characteristically involved in ordinary perception. In this and the following sections, I would like to focus on two kinds of feeling, having to do with presence and familiarity.

The case of presence

Trained users of SSDs, including congenitally blind people, often say that they have a sense of the presence of distal objects experienced with the help of the device. For instance, in the case of the TVSS, objects can seem to be really ‘out there’ in the world (see Bach-y-Rita 2004, O’Regan 2011: 137). It is natural to interpret the phrase ‘out there’, in this context, as indicating not merely that objects are experienced as having some location in objective space (i.e., the subjects’ experiences have spatial contents), but also that the subjects feel ‘en rapport’ with them, or have the feeling that the experienced objects are really there in front of them.

On this interpretation, the experiences of trained users of SSDs are very unlike those of derealized patients. Consider the following description by the French psychiatrist Jean-Étienne-Dominique Esquirol:

An abyss, they say, separates them from the external world, I hear, I see, I touch, say many lypemaniacs [i.e., depressed people, given that depression can lead to derealization], but I am not as I formerly was. Objects do not come to me, they do not identify themselves with my being; a thick cloud, a veil changes the hue and aspect of objects. (Esquirol 1838: 414)

As suggested above, derealized patients do not enjoy the relational phenomenology involved in ordinary perception. Thus, they do not have the feeling that the objects of their experiences are ‘out there’, in the relevant sense of that phrase.

The natural interpretation is plausible, but a theoretical worry must be answered before it can be fully endorsed. The worry is that the sense of presence reported by trained users of SSDs is not a genuine feeling. At least some subjects who have not been told that they are using a device which converts distal information into bodily experience fail to have a sense of presence of distal things (Auvray et al. 2005). This might suggest that the sense of presence in the *other* cases of using SSDs rests on an independent *judgment* of presence. The subjects eventually experience a spatial object which they independently know to be ‘out there’ in their immediate environment. Their judgments of presence are based on a background theory rather than a primitive feeling.

In contrast, genuine feelings of presence seem to be *belief-independent*, which means that we can coherently have the feeling that a perceived object is present and judge or believe that it is not actually present. Perhaps this is what happens in some cases of virtual reality: the subject has a convincing perceptual experience of an object which feels present, but she

independently knows that she is not facing anything real. The relational aspect of the phenomenology of one's experiences seems to be constituted at a level more fundamental than that of either belief or judgment.

As a consequence, the possibility has not yet been excluded that even a trained user of the TVSS or the vOICe has experiences which are in some respects *analogous* to the experiences of derealized patients. Such a user would be able to entertain new representational contents about distal objects, but she would not have the feeling that these objects are 'out there', or 'come to her'. In contrast to derealized patients, she need not be delusional, and may independently judge or believe that her experience is about external objects really there in front of her. Still, she would not enjoy the relational phenomenology involved in ordinary perception. If this is a genuine possibility, then even the expert use of SSDs is not sufficient to generate genuine, belief-independent feelings of presence.

The case of familiarity

On the face of it, the case of familiarity is less favourable than that of presence. Anecdotal evidence suggests that experiences enabled by SSDs seem to lack the 'affective tone' characteristic of ordinary perception. For instance, some users of the TVSS have reported that they do not have the emotions that they should or expect to have when 'perceiving' the face of a familiar person:

Thus, exploring the face of one's loved-one can be very disappointing, since the emotional messages that the long experience with vision has provided have not been perceived with our TVSS. (Bach-y-Rita 2002: 500)

Bach-y-Rita describes experiences enabled by the TVSS as lacking *qualia*, which presumably include affective states such as the feeling of familiarity. For instance:

Subjects trained with the tactile vision substitution system have noted the absence of *qualia*, which in a number of cases has been quite disturbing. Thus, well-trained subjects are deeply disappointed when they explore the face of a wife or girlfriend and discover that, although they can describe details, there is no emotional content to the image. (Bach-y-Rita 2002: 509)

It is very tempting to describe the experiences reported in these passages as being Capgras-like. Of course, the patients are not deluded about what they experience. They know that they are facing a familiar person. Otherwise, they would have different expectations, and would not be disappointed by their experiences. Still, their experiences lack the feeling of familiarity that normally accompanies the perception of a loved one, whatever sensory modality is involved.

In what follows, I shall contrast two views about the involvement of noetic feelings in the use of SSDs. According to the pessimistic view, feelings of presence and familiarity cannot be part of the phenomenology of using a device such as the TVSS or the vOICE. On a more optimistic view, there can indeed be significant overlap between the phenomenology of using SSDs and the phenomenology of ordinary perception, at least as far as feelings of presence and familiarity are concerned.

A pessimistic view

On the pessimistic view, SSDs cannot reproduce the feeling of presence and the feeling of familiarity involved in ordinary perception. The argument is that these feelings are generated

from low-level stimulus-driven processes which are simply lacking in the experiences enabled by SSDs. The complex cognitive architecture of ordinary perception cannot be reproduced by these devices, at least as we know them.

Consider the feeling of presence. Matthen (2005, 2010) argues that it is generated by the brain outside the visuo-semantic system, namely in the dorsal stream. More precisely, on his account, the feeling of presence is a conscious emanation of the largely unconscious workings of the visuo-motor system.⁷

Of course Matthen's account cannot be that the activity of the visuo-motor system is *necessary* for there being a feeling of presence. One can have a feeling of presence bound to non-visual (for instance auditory) contents. In both cases, though, the feeling of presence is caused by low-level stimulus-driven systems. On the pessimistic view, these systems, which operate in parallel with the systems in the ventral stream that produce the sensory contents of one's experience, are precisely lacking in SSDs. As a consequence, there are no analogues of belief-independent feelings of presence in the experiences enabled by these devices.⁸ In this respect, the case of sensory substitution is quite different from that of virtual reality, where the ordinary visuo-motor system can be exploited (indeed, fooled) and contribute to the feeling of being acquainted with a real world.

One might object to this diagnosis and insist that there is an analogue of the visuo-motor system in SSDs. Expert users of these devices can spontaneously reach to and grasp distal objects without having to think of their movements. One user of the TVSS is reported to have quickly stepped back when the experimenter increased the magnification on a zoom lens (Bach-

⁷ See Milner & Goodale (2006) for a classical formulation of the two-visual-systems hypothesis.

⁸ Note that I am not ascribing the pessimistic view to Matthen. I am just describing this view as a possible extension of Matthen's conception of the architecture of feelings of presence.

y-Rita 1972), reproducing the characteristic looming response caused by the visuo-motor system in ordinary perception.

The defender of the pessimistic view might object that the ‘quasi’ visuo-motor system realized by SSDs is very different from our biological visuo-motor system. Given the parallel architecture of the human visual system, the spatial ability to reach to and grasp objects is not grounded on the spatial contents of conscious experience. In contrast, the ability of expert users of the TVSS or the vOICE to reach to and grasp objects *must* be a post-perceptual ability, since it feeds from the conscious tactile or auditory contents provided by these devices. This architectural difference, so the defender of the pessimistic view argues, makes an important phenomenological difference.

It has also been suggested that the visuo-motor system contributes to the phenomenological distinction between the background and the foreground of visual space (a position that Block 2005 attributes to Sean Kelly). This in turn may underlie the feeling that visual space a part of larger space easily accessible through appropriate bodily movements. Again, it is doubtful that these phenomenological aspects can be involved in the experiences enabled by the TVSS or the vOICE, to the extent that peripheral vision does not seem to have any analogue in them.

Now consider the case of familiarity. One might justify the claim that the experiences enabled by SSDs are Capgras-like, in the sense that they lack the affective tone characteristic of the ordinary perception of familiar objects, by reference to the empirical hypothesis about CS described in Section 2 above. According to this hypothesis, Capgras patients have a deficit pertaining to their visuo-affective system, which links (through the dorsal stream) visual stimulations with relevant activity in the limbic system. As a consequence of this deficit, the visual perception of a familiar person does not generate the feeling of familiarity that should

normally be experienced. On this view, the feeling of familiarity is generated *in parallel* with the production by the visuo-semantic system of an experience with a specific sensory content. This is precisely what is lacking in SSDs. There is no analogue of the visuo-affective system in the TVSS or the vOICE. In other words, there is no analogue of a rapid, largely unconscious process of appraisal of visual stimulations.

The fact that feelings of presence and familiarity in ordinary perception can be generated by para-perceptual processes makes other experiences possible that do not seem available in SSDs. Feelings of presence and familiarity are usually bound to specific sensory contents. We feel the presence of a particular object, which may or may not seem familiar. These feelings, though, can also be experienced independently of their being manifestly bound to specific sensory contents. This is obvious enough in the case of familiarity. For instance, we can have a feeling of ‘déjà vu’ without knowing which aspect of the visual scene is in fact familiar (Brown 2003). It also appears that dorsal stream processes enable us to ‘sense’ the presence of something in the visual field even before we can actually visually identify it (Rensink 2004). These phenomena, which are part and parcel of the phenomenology of ordinary perception, can barely be reproduced in SSDs.

In a nutshell, the defender of the pessimistic view points out that the highly parallel neural architecture of human perception is responsible for phenomenological aspects of our ordinary experience, including affective aspects, which seem to be absent from the experiences enabled by currently available SSDs.

However, even if the phenomenology of using SSDs cannot indeed match all of the phenomenological subtleties of ordinary perception, at least as far as certain kinds of feeling are concerned, broader notions of presence and familiarity may be available to be reproduced

in SSDs. So a more optimistic view can eventually be envisaged, as I shall argue in the following sections.

A different sense of presence

Derealized patients seem to lack a feeling of presence but it is plausible that they have an intact visuo-motor system. They have peripheral vision, and are capable of visual sensing without seeing. As a consequence, they should share at least part of the phenomenology of ordinary perception. Still, something is missing, which concerns a different sense of presence.⁹

What clearly emerges from the reports of derealized patients is that they lack the feeling of being directly related to the perceived world as opposed to a mere picture-like representation. Interestingly, Matthen (2005) introduced the notion of felt presence by reference to a contrast between seeing an F face-to-face and seeing an F in a picture. The same visuo-recognitional abilities can be involved in both cases, but the presence of an F is felt only in the former case. Now if derealized patients have an intact visuo-motor system, their experience cannot be exactly like that of watching a picture or even a movie. They know, at least tacitly, that the laws of sensorimotor contingencies provided by their experience are not the same as the laws of sensorimotor contingencies provided by the experience of watching a movie. For instance, they are aware that unlike real visual perspectives, the perspective internal to an actual movie cannot be made to vary at will. In this respect, the phenomenology of their experience is closer to the

⁹ Of course one might argue that the visuo-motor system of derealized patients is intact but for some other reason does not generate the feeling of presence that it generates in normal perception. I find this line of argument implausible, given that other phenomenological aspects of ordinary perception due to the activity of the visuo-motor system (such as peripheral vision and automatic obstacle-avoidance behavior) seem to be preserved in derealization.

phenomenology of direct perception than to the phenomenology of perceiving things in (static or dynamic) representations.

There is nevertheless a shared component between the experience of derealized patients and the ordinary experience of watching a movie, which may explain why they are attracted by the movie or picture metaphor. The spectator typically does not self-ascribe any experience involving the visual perspective internal to the movie. For instance, I watch a scene in which a man is walking, but I am not inclined to say that I am visually related to the walking man. The only experience I am inclined to self-ascribe is that of seeing a screen which represents a walking man.

An important enabling condition of perception is that there should be an appropriate spatial relationship between the subject and the perceived object.¹⁰ Assuming that I, as an ordinary perceiver, have at least tacit knowledge of this enabling condition, I may refrain from self-ascribing the experience of seeing a walking man because it does not seem to me that I occupy the visual perspective internal to the movie. I do not feel spatially related to the man. In contrast, when I see a real man, it does seem to me that I occupy the visual perspective internal to my experience.

One might try to explain the relevant contrast as follows. The contents of perception are egocentric, in the sense that I *see* that I am spatially related to an object. For instance, I see a man walking toward *me*, or a tree to *my* left. The experience of seeing a scene in a movie is different. Unless I am fully immersed in the movie, it does not seem to me as if I am a constituent of the depicted scene. I do not see or seem to see that a man is walking toward *me*, or a tree to *my* left. However, this explanation is wanting. Several authors have argued that the

¹⁰ For a detailed discussion of this claim, see Cassam (2007). What counts as an appropriate spatial relationship depends on the sensory modality at stake.

contents of perception are *selfless*. The occupant of the perspective internal to our visual experiences need not, and perhaps cannot, be visually represented as such (Perry 1993, Campbell 1994, Brewer 1999, Dokic forthcoming). When egocentric terms like ‘left’, ‘right’, ‘up’, ‘down’, ‘in front’ and ‘behind’ are used to specify the contents of our perceptual experiences, they should be used *non-relationally*, as explained by Brewer in the following passage:¹¹

There is a primitive use of [sentences involving egocentric terms] in which this is effectively tied to the thinker himself, in his actual location at just that time, in such a way that he has no comprehension of what it would be for the object or place represented as standing in that ‘relation’ to him then to be differently spatially related to *something else at some other time*. So he is not really *thinking relationally* at all. Although it is *a*’s spatial relations *with him then* which determine its truth or falsity, his thought is more properly regimented as ‘*R'a*’: ‘*a* is to the right and a little in front’, say, as opposed to ‘*a* is to the right and a little in front of *me now*’. (Brewer 1999: 193)

Now if the contents of ordinary perception are selfless, we should be entitled to claim that the very same contents can be seen in a movie. For instance, both ordinary vision and the experience of watching a movie can involve the representation of a man walking *closer*, or a tree *to the left*, while the occupant of the relevant visual perspective is not represented.

One might object to this last claim on the grounds that only the visuo-motor system is able to assign relative egocentric coordinates to visible objects (see Matthen 2012). Assuming that this system is not fooled when the subject is knowingly watching a movie, the contents depicted by a movie cannot match the egocentric contents of ordinary perception. However,

¹¹ The point under discussion does not depend on the claim that the spatial contents of our experiences *must* be specified by means of egocentric terms (as Evans 1982, famously argued; see for instance p. 157). Perhaps one can hear a sound without knowing where it comes from in egocentric space. Still, our auditory experience has some perspective internal to it, which in the normal case is felt as our perspective.

this objection would miss the point of the claim, which is about the explicit contents of the relevant experiences, rather than the practical ability to locate objects in one's egocentric space. Even if Matthen is right and watching a movie does not involve the assignment of egocentric coordinates to depicted objects, we can see selfless egocentric directions in the movie. There is a difference between depicting a vase to the left of a cup, and depicting the former to the right of the latter. Perhaps our ability to see such a difference in a movie or in a photograph is somehow inherited from our visuo-motor ability to locate objects in real space, but it does not follow that actual egocentric coordinates in Matthen's sense are assigned to the depicted vase or cup.

If spatial perception is selfless, the content of my visual judgment that there is a tree to my left must be richer than the content of the grounding visual experience. It does not follow that my judgment involves an explicit identification of the origin of my visual frame of reference as myself. On the contrary, my judgment is normally immune to error through misidentification. If I do not know that there is a tree to my left on the basis of my visual experience, I do not know that there is a tree to someone else's left either.¹² However, the view under consideration does entail that my inclination to judge or believe that the tree is to my left is at least partly independent of the sensory contents of my experience.

My suggestion is that derealized patients do not feel that they occupy the perspective internal to their perceptual experiences and thus are at best weakly inclined to self-ascribe them. Of course, they do in fact occupy such a perspective. This is why they can use their visuo-motor system to reach to and grasp objects around them. However, they have difficulties in making

¹² The term 'immunity to error through misidentification' comes from Shoemaker (1968) but the phenomenon is discussed in Wittgenstein's *Blue Book*. Here I rely on a fairly standard, epistemological reading of the term. Succinctly, the epistemic ground of a judgment which is immune to error through misidentification must be such that 'in the event that the statement in question is somehow defeated, it cannot survive as a ground for the corresponding existential generalization' (Wright 1998: 19). The connection between a judgment being immune to error through misidentification relative to the first person and the fact that the explicit content of the epistemic ground does not involve the self is emphasized by Recanati (2012).

this fact explicit at the level of thought. The transition from the visual experience of a tree to the left to the judgment that there is a tree to their own left is not as obvious to them as it is to us. Even if they know that if they decided to initiate a movement, characteristic sensory changes would be experienced, they lack the motivation to *judge* that some of these changes concern their bodily self. The patients do not feel themselves *in* the world which their sensory experiences are about.

In the ordinary case of watching a movie, immersed subjects may temporarily feel themselves to be occupying the visual perspective internal to the movie, but most often subjects will feel themselves to be occupying the visual perspective internal to their visual experience of the screen itself. In contrast, derealized patients do not feel themselves to be occupying *any* experiential visual perspective.

On the present suggestion, the problem in DD does not lie in perception *per se*. Derealized patients do not suffer from an unusual form of perceptual illusion. Rather, it concerns post-perceptual stages, and more precisely the interface between perception and belief.

As a consequence, we should draw a distinction between two kinds of feeling of presence. One kind of feeling of presence is involved in both ordinary perception and DD, thanks to the operations of the visuo-motor system, but not in optic ataxia, which involves an impairment of this system. It is a low-level feeling, generated by stimulus-driven, para-perceptual processes in the dorsal stream. As the feeling of being able to move one's body around and use it to grasp objects, we might also call it the *feeling of bodily accessibility*. Objects can be felt to be accessible in this sense even for derealized patients, who seem to lack a full sense of embodiment or ownership of their body. Another kind of feeling of presence constitutes the relational phenomenology of ordinary perception but is missing in DD. It is a

high-level feeling, generated by post-perceptual processes, having to do with one's spontaneous self-ascriptions. As the feeling of being entitled to make judgments about one's experiential and spatial relation to the perceived world – what I shall call 'self-locating judgments' –, we might also call it the *feeling of acquaintance*.

Now if we accept that because of their serial architecture, present-form SSDs cannot involve low-level feelings of presence, the question remains as to whether they can involve high-level feelings of presence, namely feelings of acquaintance. In order to answer this question, we must enquire further into the mechanisms at stake in the generation of the latter kind of feeling in ordinary perception.

A fluency-based account

A widely accepted outcome of the psychological study of metacognition is that many noetic feelings have to do with the *fluency* of perceptual and/or cognitive processes. For instance, the feeling of knowing can be due to the fluency of processing the question itself or attempting to answer it (Koriat 2006), i.e., to the 'subjective ease' with which these mental operations are performed.¹³

The feeling of acquaintance (i.e., the kind of feeling of presence lacking in DD) might reflect processing fluency too. More precisely, if the view sketched in the previous section is on the right track, this feeling can be conceived as tracking the fluency of post-perceptual self-locating processes, or whatever sub-personal processes cause the subject's inclinations to make self-locating judgments such as 'This is a cube there in front of me' or 'I am actually seeing a cube rather than a representation of a cube'.

¹³ See for instance Wurtz et al. (2007), and Oppenheimer (2008).

On the fluency-based account of the feeling of acquaintance, the fact that derealized patients lack the inclinations to form self-locating judgments is not caused by the absence of the feeling of acquaintance. The explanation goes the other way around; patients do not feel acquainted with the perceived world because they lack the relevant cognitive inclinations. In other words, the feeling of acquaintance manifests a cognitive habit rather than a perceptual achievement. Derealized patients might lack such a habit or, more probably, the motivation to activate it.¹⁴

To the extent that they are tied to post-perceptual doxastic inclinations, feelings of acquaintance are in an important sense *cognitive* (in contrast to feelings of accessibility). They can still be said to be belief-independent to the extent that they can survive the rational formation of contrary judgments. For instance, the subject may feel inclined to judge that there is a cube in front of her, but refrain from actually forming this judgment because she independently knows that she is using a virtual reality device.¹⁵

In the case of SSDs, the real issue is thus whether the initial post-perceptual processes leading from sensory experience to self-locating judgments can be as fluent as in ordinary perception. If the subjective ease with which these processes are carried out matches the subjective ease with which they are carried out in ordinary perception, the same feeling of acquaintance will be generated.

Note that the mere fact that the subject forms self-locating judgments such as ‘There is a cube in front of me’ is not enough to generate the relevant feeling. An additional constraint is

¹⁴ In the case of DD, the absence of the relevant cognitive motivations seems to be caused by a mere brain dysfunction, which causes a general lack of motivation. This contrasts with the case of unconvincing virtual reality, where subjects fail to feel immersed in the presented world because of constitutive features of the setup (lack of interactivity, uncanny valley effects, etc.). See Casati & Pasquinelli (2005) for a discussion of realism in virtual reality which in some respects is congenial to the present account.

¹⁵ The extent to which feelings of acquaintance are belief-independent is a neat issue. Intuitively they are more liable to be cognitively penetrated than sensory contents. For further discussion about the belief-independence and cognitive penetrability of noetic feelings, see Dokic & Martin (forthcoming).

that these judgments should result from cognitive habits rather than explicit reasoning from independent background beliefs (for instance, about how a given SSD works). Only cognitive habits will be able to produce feelings of acquaintance independently of the judgments that the subject will eventually form all things considered. Indeed, the subject may either follow (as in ordinary perception) or resist (as in some cases of virtual reality) her felt inclinations to form self-locating judgments on the basis of her experience.

There is no reason why *in principle* trained users of SSDs cannot acquire the habit of forming self-locating judgments on the basis of their (tactile or auditory) experiences. Since the acquisition of such a habit should depend only on post-perceptual processes, the simple architecture of present-form SSDs should not be an obstacle. Even if the processes underlying the formation of spontaneous self-locating judgments may not be the same as in ordinary perception, the crucial point is that the subjects should be able to feel acquainted with the original spatial contents that they have learned to extract from their experiences.

The psychological literature on metacognition suggests that the feeling of familiarity too is a function of processing fluency. In general, familiar objects are easier to process, either perceptually or conceptually. This can generate the feeling that one knows these objects from previous experience. Now, lack of familiarity in SSDs might be explained by the complexity of the objects being processed. Human faces are clearly complex objects, which in ordinary perception are processed within a sub-module of the visual system (see, e.g., Farah 2000). In contrast, in SSDs they are processed just as any other simpler object, say a cube. This might explain why even expert users of these devices do not experience feelings of familiarity while processing familiar faces. Moreover, since high fluency typically generates a positive affect (i.e., it ‘feels good’; see Reber et al. 2004), the absence of *qualia* in the identification of familiar faces through the use of SSDs is not so surprising after all.

However, there might be a more general explanation of the apparent lack of feelings of familiarity in SSDs. There is an empirical model of feelings of familiarity according to which they are a function of both observed and expected processing fluency (Whittlesea & Williams 2001a, 2001b). Feelings of familiarity do not simply reflect fluency; they reflect the discrepancy between actual fluency and fluency as expected by the brain in the relevant context. We can now speculate that in SSDs, the expected fluency of processing simple objects such as a cube is generally higher than observed fluency. As a consequence, no feeling of familiarity should be experienced.¹⁶ The reason is simple: processing ‘visual’ information about a cube on the basis of conscious tactile experiences, as in the TVSS, is bound to be less fluent than either seeing or touching a cube ordinarily.

Conclusion

The general question tackled in this essay is whether trained users of SSDs can enjoy the same kind of phenomenology as that of ordinary perception. I have argued that since perceptual phenomenology is dual, i.e., has both sensory and affective dimensions, this question should be divided into two sub-issues. The foregoing discussion has focused on one sub-issue, which concerns the possible involvement of feelings of presence and familiarity in the perceptual or perceptual-like experiences enjoyed by trained users of SSDs. Some reasons to be optimistic in this respect have been adduced: the relevant experiences can in principle generate cognitive feelings of presence and, perhaps to a lesser extent, feelings of familiarity.

An important lemma of the discussion is that the generation of noetic feelings in SSDs (at least those having to do with presence and familiarity) may *not* depend on the fact that these

¹⁶ Of course here we have to suppose that processing fluency can be evaluated across sensory modalities, since a blind user of the TVSS, for instance, can expect fluency relative to the processing of a cube mainly on the basis of her previous tactile experience.

devices deliver genuine sensory contents. In principle noetic feelings can be bound to sensory contents, but also to contents produced by post-perceptual, cognitive habits. This is another illustration of the relative independence of the two dimensions – sensory and affective – of ordinary perceptual phenomenology.

In fact, for some purposes, the question of whether trained users of SSDs can have belief-independent noetic feelings may be more important, on the phenomenological level, than the question of whether they enjoy original and genuine sensory contents. Just as in virtual reality, the solution may not lie in increasing resolution or seeking sensory hyper-realism, but in other factors having to do with the implicit metacognitive monitoring of the perceptual and cognitive processes occurring in the use of SSDs.

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