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The Non-Visual Detection of Staring

Response to Commentators

I am grateful to all who have commented on my papers in this issue of *JCS*. This discussion has helped clarify terminology; it has pointed towards improved experimental methods and statistics; it has illuminated the nature of 'normal' theories of vision and the alternatives; and it has suggested directions for further research.

I: Terminology

Several people found the 'sense of being stared at' too vague. Susan Blackmore pointed out that it could include the uncontroversial ability of animals to see when others' gazes are directed towards them. As other respondents realized, the 'sense of being stared at' was intended to mean an ability to detect looks from behind, outside the range of vision. But Blackmore is right to insist that this distinction is made explicit. A phrase such as 'non-visual' should be added to the 'sense of being stared at'.

William Braud questioned whether the word 'sense' is appropriate. In many cases, he pointed out, the detection of staring may indeed be accompanied by a feeling, and also by physiological changes, justifying the term 'sense'; but in other cases it may involve behavioural reactions, such as turning around, without any conscious awareness of being stared at. Also, he suggested, there might be a form of 'direct knowing' rather than sensing. He argued that 'staring detection' is a more accurate term. I agree.

Anthony Atkinson also questioned the use of the term 'sense' on the grounds that such a sense would be very primitive if it conveyed only one message, namely 'someone is staring at me'. But although most tests carried out so far have concentrated on yes/no responses, there may well be more to this ability. People often claim to detect the direction from which a stare is coming; some people seem able to detect which part of their body is being stared at; and different emotions or intentions associated with a stare may have different effects, according to people's reports of their experiences (Sheldrake, 2003). I discuss in

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Section V experiments to test people's ability to discriminate between stares directed at different parts of the body.

Ian Baker favoured the term 'remote staring detection', but while this is appropriate for CCTV tests, it does not apply to the detection of staring at fairly close range, as in direct looking tests.

'Non-visual staring detection' seems the most neutral and inclusive phrase, although it is rather clumsy. A new scientific term is needed, and Roger Carpenter's proposal of *scopaesthesia* (in American spelling, scopesthesia) seems the best candidate. Scopaesthesia's roots are the Greek verb *skopein*, to look at, as in microscope and telescope, and *aesthesis*, sensation, as in anaesthesia (no sensation) and kinaesthesia (sensation of movement). The pronunciation of 'scop' should be with a short o, as in 'shop'.

If scopaesthesia only implied feeling or sensation, it might run foul of Braud's objection to the term 'sense', but in scientific terminology aesthesia implies both sensation and detection. For example, in the *Penguin Dictionary of Biology*, 'kinaesthetic' is defined as 'detecting movement'. I will henceforth use the word scopaesthesia to mean non-visual staring detection.

II: Data and Statistics

The meta-analysis by Dean Radin revealed more clearly and more quantitatively than my own review of the data that the direct staring experiments show a highly significant effect, unlikely to be explicable in terms of subliminal cues. Some respondents suggested that the effects could be due to the selective reporting of positive outcomes, but Radin quantified this possible file-drawer effect and showed that to negate the overall positive results, there would have to be 1,417 to 7,729 missing studies with null or negative effects, involving 800,000 to 3,000,000 missing trials. This seems implausible.

Carpenter claimed that 'it is difficult for an unbiased enquirer not to conclude that scopaesthesia is an illusion,' but to arrive at this conclusion he made a seemingly arbitrary selection of just five publications, and then took a majority vote which came out three to two against. His five selected studies excluded my own, but included Coover's (1913) with subjects and lookers in close proximity, and with data that showed a positive effect when analysed by the sign method (my paper 1, Figure 3). He classified Coover's as a negative study, as he did the study by Colwell *et al*. (2000) in which the first experiment showed highly significant positive results (my paper 1, Figure 4).

Jean Burns adopted an attitude of extreme caution, casting doubt on the CCTV studies on the grounds that in some of them 'the methods used to measure the EDA in these experiments were not completely up to date with current psychophysiological methods'. In the direct looking trials, she drew attention to possible problems with different randomisation methods and possible 'matching biases' in the subjects' responses. She made it sound as if all possible experimental designs could be problematic: 'At present there is no agreement as to what randomisation procedures should be used.'

Atkinson questioned the very possibility of a staring signal on two grounds. One was that a staring signal cannot be measured independently of a subjective report. But this argument would surely rule out much normal research in psychology, including research on pain. His second objection was that such a signal is 'far outside the realms of current scientific knowledge'. This is a generic argument for conservatism, but has nothing to do with question of whether such a signal exists. But despite these reservations, Atkinson helpfully pointed out how the data for the staring trials could be analysed using signal detection theory, by comparing the overall hit rate and the overall false alarm rate. He showed that the discriminability index (d') observed in staring trials was small compared with some unrelated observations from research in psychology. But the observations he referred to were made with selected subjects, whereas in practically all these staring trials, unselected samples were tested. If scopaesthesia is real, d' should be higher if sensitive subjects were selected for these tests. This is testable.

Surprisingly, Atkinson then argued that the data could have arisen from a response bias if some subjects suffered from 'delusional ideation and schizotypy personality style'. But if subjects were biased in favour of saying they were being stared at, they would have scored more than 50% in looking trials and correspondingly less than 50% in not-looking trials, with an overall hit rate of 50%, in the absence of any genuine staring detection. This is not what happened.

Stefan Schmidt wrote that I claimed that my own material 'is a conclusive proof for the existence of the "sense of being stared at"'. But I never made this claim. He then set out to cast doubt on the conclusiveness of this proof. I agree with Schmidt that more evidence is needed, and I agree that the best procedure would be to identify high scoring subjects in preliminary tests and then test them under more rigorous conditions that exclude all possible sensory cues.

As I discussed in my first paper in this issue, Schmidt and I differ in our interpretation of the pattern of data in looking and not-looking trials (my paper 1, Figures 1,3 and 4). But we agree that this question could be investigated empirically, as discussed in Section V.

III: The Intromission Paradigm

The commentary of Blackmore and the remarks of Christof Koch, quoted in the Editor's introduction, claim that 'normal' or 'scientific' theories of vision must by definition be intromission theories. Carpenter refers to this approach as 'axiomatic'. The intromission theory is one of the most venerable theories in science, dating back to the early seventeenth century. Various quantum mechanical approaches at first sight seem to open up the possibility of two-way processes in vision, but Christopher Clarke argued that these are not real alternatives.

Even Max Velmans' perceptual projection theory is 'normal' or 'scientific' in the sense that he claims that perceptual projection is non-physical, and therefore does not violate the intromission theory in a literal sense, even if it violates it in spirit.

Most commentaries also made it clear that if scopaesthesia is real then it would be incompatible with these normal theories. As Carpenter put it, 'If incontrovertible evidence could be found that scopesthesia actually existed, then that would indeed rule out a number of "scientific" theories of consciousness.' Although 'right-minded scientists', to use Carpenter's phrase, might wish for convincing disproof of scopaesthesia, the CSICOP Fellows who investigated it failed to come up with such disproof. Some of the results from their laboratories were positive, like those of Blackmore's student Jonathan James, whose work Blackmore did not mention.

Some committed sceptics deny the reality of non-visual staring detection as a matter of principle, but others, including Christopher French, regard it as an open question requiring further research, as do most other commentators in this issue of *JCS*.

IV: Alternative Hypotheses

If scopaesthesia really exists, how might it be explained? Ralph Ellis suggested that it might depend on a direct body sense that is not mediated through conventional kinds of perception. As he put it, 'The body is affected by its overall interrelations with the environment; so, if we sense how our bodies have changed from one moment to the next, we may be able to guess somewhat as to what kind of environmental changes have occurred to make our bodies feel different.' Ellis did not suggest how this might work in situations where normal sensory cues were eliminated in laboratory tests, and his idea of a body sense is so general that it could include a field-mediated effect not unlike my own proposal. So it is not clear whether the body-sense hypothesis is an alternative to a field theory of scopaesthesia, or just another way of talking about it.

Braud emphasised the importance of attention and intention in staring detection, and I agree with this emphasis. He also pointed out that for the remote staring effect, a non-local effect of attention and intention appears to be involved. But he did not explain how attention and intention are capable of acting at a distance.

As Velmans pointed out, perceptual projection is an effect that requires an explanation, and projection requires some 'vehicle' or 'ground'. Steven Lehar (2003) and Jeffrey Gray (2004) proposed that the entire 3-D phenomenal world is a form of 'virtual reality' located inside the brain, but these internal virtual reality projections also require some vehicle or ground. Both Lehar and Velmans proposed a holographic-type projection process. This is in effect a field model, although neither Lehar nor Velmans regard it literally as an electromagnetic field, as in a real hologram. So the ground of the projection remains obscure. If, as Velmans maintains, the projection process is non-physical, it seems impossible to conceive how it could be related to physical processes in the brain or to the electromagnetic field of light.

Lehar thinks it is more 'scientific' to locate perceptual projection inside the brain, even though this leads to the seemingly absurd conclusion that when we look at the sky our skulls must be beyond the sky we perceive. By contrast,

Velmans locates the projection outside the head, just as it seems to be. But he is anxious not to imply that the projection occurs through the eyes, as in old-style extramission theories. In his diagram of a man looking at a cat, the phenomenal projection arises from the head (see p. 111 above, Figure 1). But surely the perceptual projection hypothesis would work best if the projection did in fact occur through the eyes. Subjectively, we experience looking at the world through our eyes rather than through the tops of our heads.

Clarke pointed out that a new way of interpreting the standard theory of vision might be unexpectedly helpful: 'On the conventional view of vision, the perceiver and object of perception are already linked together by an electromagnetic interaction (usually construed as one way), so that they are no longer self contained systems but need to be considered as a whole.' He suggested adopting a dual-aspect view of this system so that consciousness is associated with the activity of the brain and the electromagnetic field. Then part of this consciousness would be associated with the place of the object, which is of course outside the brain.

This is a striking suggestion. But a dual aspect of the electromagnetic field does not seem enough to explain the phenomena. First, in phenomena of reflection and refraction, the virtual images are not an aspect of the electromagnetic field, but split off from it into virtual space. And second, consciousness is not necessarily linked to the electromagnetic field, but selectively linked to it. Light is falling on my body from all sides, reflected from all the objects around me. I can potentially move my eyes and direct my attention towards any of these objects; only when I do so would the electromagnetic field have the dual aspect proposed by Clarke. If I turn my head and my attention sweeps through my surroundings, then this beam of attention gives a dual aspect to different parts of the electromagnetic field as my attention moves. Even without moving my eyes, attention is selective. For example, when I look at a reflection in a window, I can either concentrate on the reflection, or I can look through the window at what lies beyond. The same electromagnetic field connects my eyes to what I am seeing in both cases, but what I see depends on my attention. Perceptions are not simply an aspect of the light entering my eyes, but involve the formation of hypotheses, to use Gregory's term (1998), as illustrated by alternative interpretations of ambiguous drawings.

As everyone agrees, visual perception depends on complex patterns of activity in various regions of the brain. These enable aspects of the retinal images to be abstracted, analysed, recognised, remembered and interpreted. I propose that perceptual fields depend on this brain activity and are closely coupled to the electromagnetic field as focused on the retinas. But, as Clarke argued, to be of any explanatory value such a field would need to be more than a re-description of the phenomenon itself, a rephrasing of the laws of optics 'in reverse'. But this rephrasing not as trivial as Clarke implied.

First, visual projections take place in straight lines in three-dimensional space. Normally, this straight-line projection means that the projected image coincides with the object seen, but as a result of reflection and refraction, as Euclid

showed, visual projections produce virtual images. Perceptual fields are closely coupled to the light entering the eyes and forming images on the retinas, but these fields are separable from electromagnetic fields. They are not just a way of talking about what we already know, if all we know are the electromagnetic fields of light and the activity of the brain.

The importance of virtual images is not confined to the human realm, as a result of the technology of mirrors and lenses, but inevitably goes back to the very origins of eyes. Image-forming eyes probably first appeared more than 540 million years ago, in the Cambrian, Their appearance was associated with the 'Cambrian explosion', a rapid evolution of many new forms of animal life (Parker, 2003). All these early forms of animal life were aquatic, and reflection must have been an intrinsic feature of their visual world. Any underwater animal looking obliquely upwards experiences virtual images as a result of the total internal reflection of light by the surface of the water. Virtual images must have been part of visual experience from the beginning.

Second, the laws of optics in reverse mean that just as the focussing of light on the retina involves a reduction from three dimensions to two, the projection of the perceptual field involves an expansion from two dimensions to three. This expansion into a third dimension is a necessary feature of any 'virtual reality' theory of perception. Both Lehar and Velmans use the analogy of holograms to emphasize this dimensional transition, as does Pribram (1991).

These features of perceptual fields have implications for the understanding of morphic fields in general. First, these fields can be coupled to patterns of activity in electromagnetic fields, but are also separable from them. Second, they can project virtual images in three dimensions on the basis of patterns of electromagnetic activity. Both these features help in conceiving of the way in which morphic fields interact with the patterns of electromagnetic activity not only through the eyes but elsewhere in the in the brain.

The coupling of morphic fields to patterns of electromagnetic activity and their ability to project from two dimensions to three may be important features of morphic fields in many other situations, as in the organization of cellular development by the morphic fields of morphogenesis. The virtual forms projected within and around developing cells on the basis of patterns of electromagnetic activity around membranes and inside cells may play an essential role in shaping morphogenetic processes. Even single-celled organisms, such as radiolaria and diatoms, can form complex, highly organized structures. Just switching on the right genes and making the right proteins at the right times cannot explain the complex forms of such organisms without many other influences coming into play, including the organizing activities of microtubules, which may themselves be patterned by morphogenetic fields (Sheldrake, 1988).

In his far-ranging discussion, David Fontana showed that the idea of mind fields opens up possible connections with meditational experiences and with aspects of Buddhist philosophy.

V: Further Research

The discussion in this issue has highlighted that the most important task for further research is to establish whether scopaesthesia is real or not. Probably the best approach would be to find high-scoring looker-subject pairs by testing large numbers of people, and then test these people further under suitably rigorous conditions.

Marilyn Schlitz showed how this discussion can be seen within the context of a longstanding parapsychology-sceptic debate, which she has personally engaged in with Richard Wiseman. They carried out joint experiments on staring detection that gave results that confirmed both their initial positions. Their experimental design maximized experimenter effects, and the experimenters themselves acted as starers. This approach has resulted in a stalemate.

Automated procedures, described below, potentially enable anyone to take part in this research. Independent tests by people who are not committed to belief or disbelief in non-visual staring detection seem more likely to lead to an evidence-based consensus.

Control tests

Several commentators raised the possibility that the seemingly positive results in direct staring tests were a result of patterns in the randomizations combined with response biases or guessing strategies. Probably the best way to find out if these possible effects are important is to do control tests in which there is no staring at all. Possible artefacts should show up in the absence of a real effect. One method would be to deceive subjects into thinking that they are taking part in a regular experiment in which they are being looked at in staring trials, when in fact they are not. But this approach is ethically questionable.

Instead, I suggest doing control tests in which the subject is asked to guess in each trial whether the instructions are 'looking' or 'not looking', even though no staring takes place. The other participant sits with his or her back to the subject. The subject is given feedback as to whether the guesses are right or wrong. Artefacts that arise from any particular system of randomization, or from matching biases in the responses, or from implicit learning of possible randomization patterns should lead to hit rates above chance.

I have carried out some preliminary control tests using this procedure, working with subjects whose hit rates were significantly above chance in standard tests. In a total of 580 control trials, the average hit rate was 49%; by the sign method, the score was 12+ 15– and 1=. These results were not significantly different from chance.

An additional advantage of carrying out such controls is that they enable other psi hypotheses to be tested. The hit rates could conceivably be above chance levels if the subject picked up the instructions by telepathy, or by clairvoyance, or by precognition of the feedback. Precognition can be eliminated by omitting feedback. Telepathy can be ruled out in automated tests in which no other person

is involved; the computer signals the beginning of each trial, and the subject records the guesses directly onto the computer.

Comparison of direct looking and CCTV tests

Research on staring detection has proceeded on two parallel tracks, direct looking with guessing, and CCTV trials with the measurement of electrodermal activity (EDA). As several commentators pointed out, the physiological measurement is likely to be more sensitive, and it would be interesting to know how subjects respond physiologically in the direct looking trials, and also to find out how well their EDA correlates with their guesses.

It is now possible to carry out remote staring trials online, with the subjects viewed through web cams and streaming video. The subjects' responses can be measured physiologically, and they can also enter their guesses directly onto the computer.

The sensitivity of different parts of the body

In standard looking trials, the starers focussed on the backs of the subjects' necks. These trials do not investigate whether subjects can tell which parts of their bodies are being stared at.

Nelson and Schwartz (2005) recently described a staring detection test in which the starer either focussed on the back of the subject's head or on the small of the back. The subject had to guess which area was being looked at. The average hit rate was 57%, significantly above the chance level of 50%. In standard yes/no staring detection trials, the same subjects' hit rate was 55%, similar to the hit rates in many other yes/no trials.

Can other researchers replicate this finding? If so, it opens a way to investigate the scopaesthetic sensitivity of different regions of the body, which would be easiest to study in pre-selected sensitive subjects. Can a sensitive subject distinguish between stares at the upper and lower back? What is the minimum distance that can be discriminated? Which regions of the body are most sensitive? The pattern of sensitivity could be mapped experimentally.

The natural history of scopaesthesia

As Ian Baker pointed out, surveillance through CCTV is now a common part of everyday life, and in that sense it is 'ecological'. However, almost no research has been done on people's sensitivity to this form of observation, and it would be good to find out more about it with the help of surveillance professionals and people who are unusually sensitive to being observed.

Fontana raised 'a whole raft of questions' about the way in which staring detection might work, and made the interesting suggestion that a combination of self-reports and autonomic reactions might help answer some of these questions. Martial arts practitioners might be good subjects for investigations of this kind.

Automated test procedures

The computerized 'eyes in the back of the head' test in the NeMo Centre in Amsterdam was set up in 1995, and more than 18,000 subject-looker pairs have taken part, as described in my first paper in this issue of *JCS*. Several other researchers, including Colwell *et al.* (2000) and Lobach and Bierman (2004), have also developed automated test procedures. The most sophisticated is that of Radin (2004), where the subjects, who are blindfolded, signal their guesses by pushing buttons on a 'gamepad' peripheral, normally used for playing video games.

I have already described my own online test (my paper 1). As Schmidt found, one technical question was whether or not participants should be able to change previous guesses. If they could, people might cheat by changing their guesses after they had received feedback. In order to block this possibility, participants were unable to alter the previous answer by pressing the 'Back' button. But then people who had made an honest mistake and wanted to correct it, like Schmidt, pushed the system into untested waters. Obviously this technical problem needs solving.

In an improved, second-generation online system, the computer would instruct the looker what to do, and at the same time, by means of a sound signal, alert both looker and subject that the test was beginning. There would still be a 'basic' option, where the subject tells the looker his or her guess, and the looker enters this into the computer. But there would also be a 'remote' option, in which the subject would have a mobile (cell) phone connected, through a dedicated telephone number, to the test website. The instructions to the subject, the signal for the beginning of each trial, and the guess would be communicated through the mobile phone. This system would enable staring trials to be conducted through windows, one-way mirrors, binoculars or CCTV, and also through web cams on the Internet. A recent technological advance allows EDA electrodes to be connected to mobile phones, so physiological measurements could also be carried out remotely.

Such an online system would enable any pair of people to test themselves. It would also enable college instructors and schoolteachers to set this test as an assignment to their classes, and to select sensitive subjects for further tests under more rigorous conditions.

If scopaesthesia turns out not to exist, the sceptical case will be strengthened, Blackmore's and Koch's dismissive attitude will be vindicated, and the conventional intromission paradigm will be reinforced. Research will then be needed to find out why the illusion of non-visual staring detection is so pervasive all over the world. But if non-visual staring detection does indeed occur, then a debate about possible explanations will be inevitable.

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