



RESEARCH
ARTICLE

Directional Scopaeesthesia and Its Implications for Theories of Vision

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HIGHLIGHTS

A review of the evidence suggests that the potential ability to “detect stares from an unseen onlooker” is directional — often the person or animal being stared at responds by turning straight back at the source.

ABSTRACT

The sense of being stared at, or scopaeesthesia, is very common, and its existence is supported by experimental evidence. However, it contravenes the standard scientific assumption, dating back to Kepler’s discovery of retinal images in 1604, that vision involves only the inward movement of light – intromission – but not the outward movement of images or attention – extramission. From this point of view, scopaeesthesia is impossible. Yet, paradoxically, the conventional explanation of virtual images in mirrors is still based on Euclid’s (c. 300 BC) extramission theory, and most people implicitly believe in visual extramission, which could help provide a basis for scopaeesthesia. If scopaeesthesia depends only on the detection of another’s attention, it could conceivably be a scalar phenomenon, with a magnitude but not direction, analogous to telephone telepathy, in which people feel who is calling but do not know where they are. In this case, scopaeesthesia would tell us little about the nature of vision. But if scopaeesthesia is normally directional, enabling those stared at to detect the direction from which the look is coming, it would be more like a vector phenomenon, with both magnitude and direction and would provide evidence for visual extramission. Experimental tests of scopaeesthesia have so far been devoted to establishing its existence and have not looked at its directionality. Here, we examine the natural history of the phenomenon based on a collection of 960 case histories collected over 25 years involving both humans and non-human animals. This collection includes more than 80 interviews with surveillance officers, detectives, martial arts teachers, celebrity photographers, wildlife photographers, and hunters who have extensive experience of watching people or non-human animals. In 466 (49%) of the cases, directional effects were explicit, in that the person or animal looked at responded by turning and looking directly back at the looker rather than searching at random for the source of attention. In 186 (19%) of the cases directional effects were implicit. In most of the other cases, directional effects were not mentioned, usually because they were general statements lacking detail. In online surveys, including a survey of a group of skeptics, the great majority of respondents said they had experienced directional scopaeesthesia. We conclude that directionality is a normal feature of scopaeesthesia in real-life situations and suggest that this finding supports the idea that minds are extended beyond brains and that this extension involves some kind of visual extramission. We quote from more than 40 case histories and, in the online Supplementary Material make the entire collection of 960 cases available to those who would like to look at the data for themselves.

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KEYWORDS

Scopaeesthesia, staring detection, theories of vision, intromission, extramission, directional sensitivity, case histories, extended minds.



INTRODUCTION

Most people have experienced being looked at from behind, turning round to find someone looking at them. Most people have also had the converse experience – looking at someone else and finding them turn round and look back. This phenomenon is variously known as the sense of being stared at, stare detection, and, in scientific terminology, *scopaesthesia*, from the Greek *scopein*, to see, as in telescope, and *aesthesia*, feeling, as in synaesthesia (Carpenter, 2005). In surveys of adults in Europe and the United States, 77 – 90% said they had experienced it (Coover, 1913; Braud et al., 1993; Sheldrake, 1994). Likewise, most children said they had felt the looks of others. In studies carried out by Gerald Winer and his team of psychologists at Ohio State University, 94 percent of 11-12-year-old schoolchildren answered “yes” to the question, “Do you ever feel that someone is staring at you without actually seeing them look at you?” So did 89 percent of college students. In response to a question about the converse effect, “Do you think that other people can feel (without seeing) when someone is looking at them?” Ninety percent of the children and 88 percent of the college students answered “maybe” or “yes” (Cottrell et al., 1996).

Numerous experimental tests have given significant positive results that suggest that this is indeed a real phenomenon. In most of these tests, blindfolded subjects were looked at, or not looked at, in a randomized series of trials, and indicated whether they felt they were being looked at or not. On average they scored very significantly above the chance level; in other words, they showed an ability to detect whether they were being stared at from behind (Sheldrake, 2005a). This phenomenon also seems to work, although more weakly, through closed-circuit television (CCTV). When subjects were watched at random intervals through a CCTV monitor in a distant room, they were significantly more emotionally aroused during the staring than in the non-staring periods, as measured by the galvanic skin response (Schmidt et al., 2004).

None of this is possible from the point of view of the orthodox scientific theory of vision, according to which vision depends on light entering the eye and on changes in the retinas and the brain. The brain then produces three-dimensional images inside itself that are experienced as visual perceptions that seem to be in the external world, whereas, in fact, they are representations inside the brain. As Gray (2004) expressed this idea, the “real world” is “a virtual reality show constructed in consciousness by the brain and through which the unconscious brain navigates” (p. 110). The neuroscientist Anil Seth (2022) suggests that our brains produce “controlled

hallucinations” within themselves. Lehar (2004) makes this point particularly vividly with the example of looking at the sky. When you look at the sky, the sky you see is in your brain. Your skull is beyond the sky!

Thus, for the orthodox theory, the production of representations inside the brain cannot possibly affect a person or animal being looked at. Scopaesthesia is impossible, and therefore, any apparent evidence for it must be a result of superstition, error, chance coincidence, selective memory, experimental incompetence, faulty statistics or fraud. As Carpenter (2005) put it,

Nothing is better calculated to enrage a right-thinking scientist than popular belief in a phenomenon whose existence cannot quite be disproved but which, if true, must bring into question the most fundamental axioms on which the scientific description of the world is constructed. The existence of a sense that one is being looked at... is just such a belief.

Carpenter approvingly quoted the philosopher Bertrand Russell’s views on such beliefs: “The fact that an opinion has been widely held is no evidence whatever that it is not utterly absurd; indeed in view of the silliness of the vast majority of mankind, a widespread belief is more likely to be foolish than sensible.”

In a series of questionnaire studies of the feeling of being stared at, Winer and his colleagues found not only that most children and adults said they had experienced stare-detection themselves, but also that most of them believed in the extramission of visual images, together with the intromission of light (Winer & Cottrell, 1996). Winer and his team were shocked by this discovery and regarded it as revealing a failure of scientific education. They were particularly dismayed to find that most psychology students at their own university espoused “incorrect” extramission beliefs. They proposed that such unscientific beliefs should be “eradicated” by proper scientific education. For a short while, they were successful. In tests immediately after their re-education, most students gave the “correct” answer: vision occurs by intromission only. But, to the researchers’ disappointment, within a few months, they reverted to a belief in extramission as well (Winer & Cottrell, 2002).

For defenders of the intromission-only orthodoxy, it is frustrating that most people believe in the extramission of images even after they have been taught the intromission theory at school and in psychology courses at university (Winer et al., 2002). Even among university students and others who claimed not to believe in visual extramission, recent experimental tests revealed an implicit belief

that the eyes emit force-carrying beams (Guterstam et al., 2019).

In a series of ingenious experiments, Arvid Guterstam and his colleagues showed that participants attributed a gentle force to the gaze of a cartoon-like figure on a computer screen looking at a diagrammatic upright “paper” cylinder. The cylinder gradually tilted towards or away from the watching eyes. The angle at which participants thought it would collapse differed according to whether the cartoon-like figure was looking at it or not looking at it when diagrammatically blindfolded. In the “looking” condition, it was as if there were a force like a gentle breeze emanating from the eyes. When participants were told that the cylinder was made of concrete rather than paper, this effect disappeared; the imputed force was too weak to move something so heavy (Guterstam et al., 2019). Guterstam and Graziano (2020) shed further light on this implicit belief in visual extramission with a visual motion-adaptation procedure, which showed that “participants implicitly treated attention as though it were a flow moving invisibly through space from an agent to an object.” Guterstam et al. (2020) took this discovery yet further by using fMRI scans to show that brains process the gaze of others in areas concerned with visual motion “to encode gaze as implied motion.”

Guterstam and his colleagues hypothesized that this use of the visual motor system to track the directional gaze of others has evolved because of the importance of keeping track of others’ visual attention in complex social environments. They suggest that “basic theory-of-mind mechanisms have provided people with highly inaccurate intuitions and biases about the properties of the mind, leading to common myths and folk beliefs that have been intuitively compelling to humans across cultures and time periods” (Guterstam et al., 2019, p. 13165). They took it for granted that scopaesthesia did not exist, resting their case on skeptical dismissals of the phenomenon in 1898 and 1913, ignoring all further discussions and experimental investigations. Like Winer and his colleagues, they assumed that explicit or implicit beliefs in extramission represent a “fundamental misunderstanding” of the nature of vision (Winer & Cottrell, 2002). However, their speculation that these persistent and near-universal beliefs result from brain mechanisms that evolved in social contexts would make even better sense if directional extramission were real rather than illusory.

As Carpenter (2005) pointed out, the ability to detect stares does indeed bring into question fundamental scientific axioms, and in particular, one of the oldest pillars of scientific orthodoxy, namely the intromission theory of vision as established by Johannes Kepler in 1604 – the idea that vision depends only on light coming into the

eyes and that nothing goes out of the eyes.

This axiom is fundamental because it appeared to be the winner in a longstanding debate about the nature of vision that was going on 2,500 years ago in ancient Greece and continued in the Roman Empire and Arab worlds, then in medieval and renaissance Europe until the question seemed finally to have been settled by Kepler’s discovery of retinal images, small inverted images of the outside world produced on retinas through the optical effects of lenses. Kepler’s discovery was both foundational for modern science and also a culmination of medieval and renaissance science and technology. It built on the making of spectacle lenses from the thirteenth century onwards, the camera obscura, in which inverted images were projected onto the wall of a darkened room through a pinhole serving as a kind of lens; the development of perspective in the visual arts; and the discovery that the lens of the eye is lens-shaped, not spherical as previously believed (Lindberg, 1981).

Before Kepler’s triumph, there were three main theories about how we see (Figure 1A). First, the intromission theory, literally “sending in” emphasized the importance of images flowing into the eyes from the outside world. Second, the extramission, or “sending out”, theory stressed the active nature of vision and the outward projection of images from the eyes, as well as the inward movement of light; in effect this theory combined intromission and extramission; light flowed into the eyes and visual currents flowed outwards. Third, some theories focussed more on the medium through which vision took place than on the directions in which influences traveled, as in Aristotle’s philosophy of the “transparent”, which is not something that we see but something through which we see, the medium that links the observer to the visible object (Lindberg, 1981).

Despite the dominance of the intromission theory since the time of Kepler, vision itself remained unexplained, as Kepler himself acknowledged (Lindberg, 1981). Two small inverted two-dimensional images on the retinas did not explain how we see one image of things the right way up in three dimensions and full color, apparently outside ourselves. The problem is still unsolved today.

Intromission theories dealt with the movement of light into the eyes, and extramission theories dealt with how we actually see. Around 300 BC, the geometer Euclid emphasized that vision is active rather than passive. He gave the example of looking for a pin; at first, we do not see it, but then find it. What we see changes through looking and finding, even though the light entering the eyes remains the same (Zajonc, 1993). As part of the active process of vision, Euclid proposed that visual rays

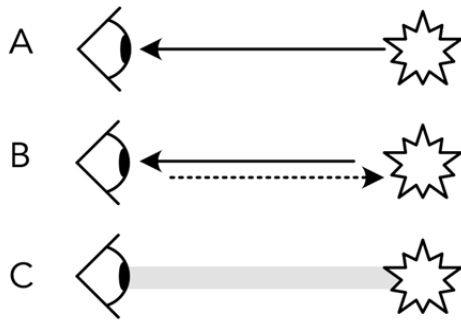


Figure 1. Diagrammatic representation of classical theories of vision. According to the intramission theory (A), images flow into the eye; on the combined intramission and extramission theory (B), light flows into the eyes from the object, and images flow out of the eyes in visual rays, which travel in straight lines, as represented by a dashed line; and the theory of the transparent (C) emphasizes the medium between the eyes and the object, linking together light and vision.

traveled outwards from the eyes in straight lines, projecting images. Usually, these images are projected to the places where objects actually are. Visual rays are like the opposite of rays of light, moving outwards, not inwards. However, unlike rays of light, visual rays are not reflected by mirrors. In the case of plane mirrors, the projections go straight through the surface, forming virtual images behind the mirror. Euclid’s ideas were developed further by Hero of Alexandria around 62 A.D. and by Claudius Ptolemy around 130 AD, who discussed the production of virtual images not only by plane, concave, and convex mirrors but also by refraction (Lindberg, 1981).

Isaac Newton endorsed the Euclidian interpretation of images in mirrors in the early eighteenth century (Fig. 2), and this theory is still taught in twenty-first-century schools with visual rays “produced” back behind the mirror by dotted lines to form virtual images (Fig. 3A).

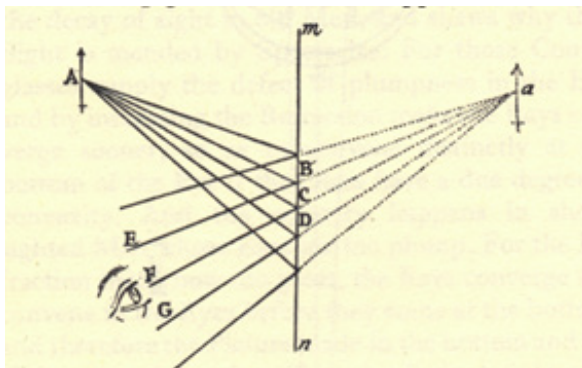


Figure 2. Newton’s depiction of a virtual image in a mirror (Newton, 1730, Fig. 9).

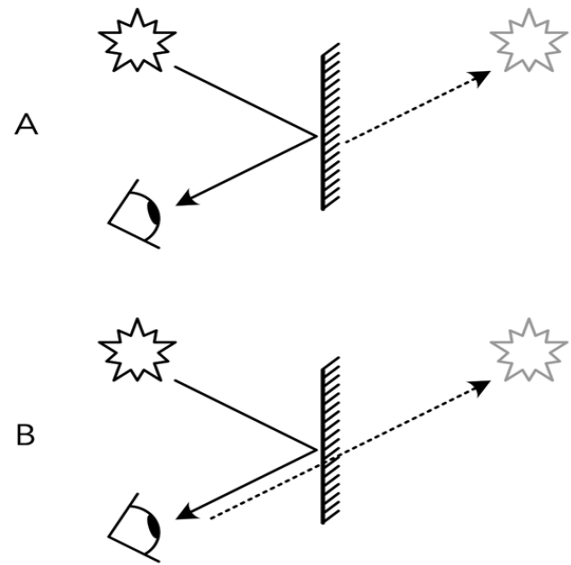


Figure 3. The Euclidian theory of images in mirrors involves both the movement of light into the eyes after reflection by the mirror and the extramission of visual rays, which produce virtual images located behind the mirror. In textbook diagrams, the extramitted visual rays appear only behind the mirror but are implicit between the eye and the mirror (A). The lower diagram (B) makes these visual rays explicit, showing the similarity to standard representations of extramission, as shown in Fig.1B.

Thus, paradoxically, the Euclidian theory of virtual images is still an essential part of orthodox science despite the denial of extramission. The scientific consensus asserts that vision works by intramission only, as explained by Kepler, yet the diagrams used in scientific textbooks to explain virtual images in mirrors assume some kind of extramission, although they try to minimize the outward moving visual rays by showing them only behind the mirror (Fig. 3A), rather than extending from the eye (Fig. 3B). There is a deep, confusing ambiguity passed on to generation after generation of students, who are taught both that intramission is the only correct theory of vision, and also that there is a kind of extramission of virtual images seen in mirrors. Orthodoxy is preserved by accepting the intramission-only theory as an unquestionable assumption – a dogma – and by avoiding thinking about the nature of virtual images.

Thus, there is a vast gulf between the experience of scopaesthesia by most adults and children and the denial of this experience within institutional science. Most people, including college students studying psychology, believe that vision involves extramission, despite being taught the scientifically “correct” intramission-only hy-

pothesis. Winer and his colleagues have shown that it is difficult, if not impossible, to eradicate what they called a “fundamental misunderstanding” about the nature of vision. Guterstam and his colleagues have shown that the attribution of a power to the gaze occurs automatically through brain systems and is implicit even in those who accept the “correct” theory of vision. One reason for the strength of these explicit or implicit beliefs may be that they are correct, not incorrect, and are continually reinforced by personal experiences.

To detect that someone is looking at you from behind implies that an influence is coming from the person looking. How is this detected? The most obvious possibility is that you are somehow sensitive to an outward movement of visual attention from the looker, which exerts a kind of force or virtual force. If the person looked at feels an outward flow of visual attention from the looker, this feeling is likely to be directional. The person may turn round and look straight at the person staring.

There is, however, an alternative theoretical possibility. Scopaesthesia could involve an awareness of being the object of someone’s attention but without a sense of where the looker is. This could be compared to a scalar phenomenon, like temperature, with magnitude but not direction. Some psi phenomena may be of the scalar type, like telephone telepathy, where people feel who is ringing (Sheldrake & Smart, 2003) but do not identify the direction of the caller. The same is true of telepathy in connection with emails and text messages (Sheldrake, 2014). By analogy, scopaesthesia might conceivably involve no more than an uneasiness or sense of danger, which might then be followed by searching in all directions to try and find the looker by trial and error. By contrast, if scopaesthesia depends on some kind of extramission, which is by its very nature directional, then scopaesthesia itself would be directional, a vector rather than a scalar phenomenon, with both magnitude and direction. In this case, people should be able to detect from which direction the gaze is coming more or less immediately.

Here, in order to distinguish between these two possibilities, we examine the natural history of scopaesthesia. Is it usually directional or not? Can people feel not only when they are being stared at but the direction from which the gaze is coming? The experimental tests of scopaesthesia referred to above were not designed to answer this question, but rather to find out whether scopaesthesia occurs, irrespective of directionality. Hence, in the absence of relevant experimental data, at present, our best guide is natural history, which is, in any case, a good starting point for any new field of inquiry. Insofar as scientific inquiry is empirical, then people’s experiences are not irrelevant; they are highly relevant. The word

“empirical” literally means “based on experience”. If we hear just a few accounts, we might be tempted to dismiss them as mere anecdotes. But when large numbers of reports of personal experiences, submitted independently by people all over the world, show common patterns, anecdotes become data. At the very least, they show that there are repeatable patterns of experience, whatever people’s interpretations of their experience.

In this study, we looked at 960 case histories that we collected over more than 25 years. They concern both humans and non-human animals. In addition to the reports that people sent us about their own experiences, we also interviewed more than 20 detectives and surveillance officers who watched other people as part of their job and more than 40 celebrity and wildlife photographers who took photographs covertly. These professionals had many opportunities to observe the effects of watching humans or animals. In addition, we interviewed martial arts teachers who trained their students to become more sensitive to looks from behind and, in particular, to detect their direction. We also interviewed hunters, including deer stalkers, who had much experience of predator-prey relationships from the point of view of the predator. Finally, we conducted online surveys about directional scopaesthesia through social media, including a survey of a group of skeptics. We conclude by discussing some of the implications of directional sensitivity for theories of vision.

In this paper, we consider only cases of direct looking, as opposed to the more complex situations of looking at others through mirrors or CCTV, which we plan to discuss in a future publication. We also omit a discussion of cases in which sleeping people and animals were woken by being stared at. Again, we plan to discuss these cases in a future publication. Thus, we here confine ourselves to cases of direct looking at people or animals who were awake.

METHODS

Collection of Case Histories

Since 1996, we have built up computerized databases in which we collect accounts of people’s experiences that suggest the existence of unexplained human and animal abilities using the Filemaker Pro platform. By February 2023, our unexplained human abilities database contained 6,433 cases classified into 117 different categories, 15 of which concern various aspects of scopaesthesia. Our animal database contains 5,599 cases classified into 72 categories, 3 of which concern scopaesthesia.

Most of the accounts in our databases were submitted in response to requests for information in R.S.’s lectures, media appearances, and in a book that included

a section on the extended mind and the sense of being stared at (Sheldrake, 1994). We received many more accounts following the publication of another book by R.S., *The Sense of Being Stared At* (Sheldrake, 2003; second edition, 2013). Both these books were translated into a range of languages, and through interviews in the U.K., U.S., Canada, France, Germany, Switzerland, and other countries, R.S. had opportunities to appeal for information internationally. More recently, R.S. has appealed for information through his website and social media. Accounts submitted in foreign languages were translated by native speakers of those languages before they were added to our databases, which were and still are maintained by P.S. We and our colleague Jane Turney also interviewed people who watch other people or animals professionally, including detectives, surveillance officers, security guards, celebrity photographers, wildlife photographers, and hunters. We also interviewed teachers of martial arts who trained their students to become more sensitive to stares from behind.

The accounts we quote in this paper are only a small sample drawn from our collections, selected after reading through 960 reports concerning scopaesthesia in people and animals. These selections were made in order to provide representative examples. Anyone interested can examine the full collection, available as Supplementary Material online.

Our collections of case histories are not random samples and do not give us a measure of frequencies in the general population. But they do give direct insights into lived experiences, which fall into several categories, as discussed in this paper. Our interviews provide information from people with much experience of looking at other people and non-human animals.

Skeptics might argue that some of these stories were not truthful accounts of people's experiences and might have been made up. This is possible, but we think it unlikely, both because people would have had little incentive to do this, and also because we received numerous similar accounts from many different parts of the world spread over 25 years. At the very least, our collection of cases shows that stories about the detection of staring fall into a limited number of categories and have repetitive features.

Surveys Through Social Media

We conducted online polls through Instagram, YouTube, Twitter, and Facebook in order to find out how widespread experiences of directional scopaesthesia are. We carried out these surveys in May and June 2021 through R.S.'s social media and also with the help of

Deepak Chopra through his Instagram and Facebook media and Chris French's Twitter account. R.S.'s social media followers are mainly in the U.K. and U.S. Deepak Chopra is a popular author based in the U.S. and best known for his writings and lectures on meditation and holistic medicine. Chris French was a professor of anomalistic psychology at Goldsmiths College, London University, a former editor of the U.K. *Skeptic* magazine, and a well-known leader of the skeptic movement in the U.K.; most of his Twitter followers were skeptics. The details of the questions we asked are given below.

RESULTS

Experiences of Detecting Stares

On our database, there are 960 reports of stare-detection in which the looker was looking directly at a person or animal (as opposed to looking through a mirror or CCTV). Most direct-looking cases, 73%, involve human-to-human experiences; some cases (13%) describe scopaesthesia in non-human animals and some (14%) concern humans who detected when they were being looked at by animals (Table 1). The reports about animals describe experiences both with companion animals like dogs and cats and also with a wide range of wild animals, including birds, mammals, reptiles, fish, octopuses, and spiders. Scopaesthesia and the ability to induce it seem widespread among non-human animals. Humans share with many other species their sensitivity to looks and also their ability to affect others by looking.

As well as the accounts that people submitted to us in response to requests for information, our database also includes interviews with nine martial arts practitioners, 24 surveillance officers and detectives, ten celebrity photographers, 32 wildlife photographers and hunters, and nine gamekeepers, zookeepers, and birdwatchers.

It is illuminating to read some or all of this collection or even merely to dip into it. Now, together with the publication of this paper, we are putting our entire scopaesthesia database online as Supplementary Material, arranged in the general categories shown in Table 1. Anyone interested can explore this anonymized database for themselves,

Here, our focus is the question of whether scopaesthesia is usually directional or non-directional. As discussed above, if scopaesthesia is inherently directional, it would have profound implications for theories of vision. It would support the idea that influences move outwards from the eyes in vision, as well as light moving into the eyes. It would go against the theoretical possibility that scopaesthesia is a directionless feeling, followed by a ran-

dom search to find the source of the gaze.

In 49% of these reports, our informants explicitly mentioned directional effects, where the person or animal looked at responded by looking straight back at the looker rather than scanning at random. In 19%, directional effects were implicit, and in 31%, they were not mentioned (Table 1). Thus, if we take together the explicit and implicit accounts, a majority, 68%, indicated that scopaesthesia was directional.

In this analysis, we omit cases of scopaesthesia through mirrors and CCTV and also omit another kind of scopaesthesia, in which sleeping people and animals are woken by being stared at. We plan to discuss these cases in further publications.

The reports on our database are classified into passive and active categories and also into separate categories for people and animals. Thus, we have categories for the feeling of being looked at by a person or by an animal, in which the report came from the person looked at. Then, we have categories for the effects of looking at a person or animal, in which the report came from the person who was looking. In all these categories, there are explicitly directional cases, implicitly directional cases, and cases where no directional effect was mentioned. The numbers of cases in each category are shown in Table 1.

In the next section, we give examples of explicit descriptions of directional responses, which are part of the largest category of “explicitly directional”. These are the most informative cases. We then look at “implicitly directional”, “not mentioned”, and “delayed directional” cases.

2. Explicit Examples of Directional Scopaesthesia

In the explicitly directional category, there are 466 cases in our collection, 49% of the total. The explicitly directional cases were strongly represented in all four sub-categories, namely looking at a person or animal or being looked at by a person or animal. Here, we give examples of explicitly directional scopaesthesia of all four kinds, starting with person-person cases.

We first consider cases where the starers and the people stared at were at the same level. Then we give examples of cases in which they were at different levels, as when someone looked down at another person from an upstairs window; the person stared at had not only to look around but to look up: three-dimensional scopaesthesia. In 2.3, we discuss cases in which people or animals were looked at through binoculars, telescopes, or cameras, where their image had been magnified through lenses. In section 2.4, we look at experiences with non-human animals, both when the animals were looked at by people and when people were looked at by animals.

2.1 The Starers and The People Stared at Were at the Same Level

Reports From Lookers

Many examples occurred when people were in cars, looking out of windows. This is from a young man in the United States:

From my passenger seat, I was staring at this girl walking on the sidewalk. The street was crowded, there were also cars ahead and behind us, and out of the blue, she turned around and looked me directly in the eyes. Before you ask, no, the win-

Table 1. The Classification of Direct-Looking Cases, Showing How Many in Each Category Involved Explicitly and Implicitly Directional Responses to Being Stared at, and Those in Which Directional Effects Were Not Mentioned or Delayed.

Situation	Explicitly Directional	Implicitly Directional	Delayed Directional	Not Mentioned	Total
Looked at by person	163	60	1	61	285
Looked at by animal	82	23	5	23	133
Looking at person	169	84	2	161	416
Looking at animal	52	19	1	54	126
Total	466	186	9	299	960
Percent of total	49	19	1	31	100

dows were not down and we were not playing loud music which would make us noticeable.

This woman made a practice of looking at people when commuting to work by bus in London:

I used to be bored, so I would stare at the people in front. More times than I can mention, the objects of my staring would suddenly turn right round in their seats, as if I had spoken to them, and stare back at me with an expression of challenging inquiry.

From a man about an experience in a church:

There was a strikingly beautiful girl with long reddish hair, two pews ahead of me and about two persons to the left. I had never seen her before. For about 10 seconds, I had been staring at the back of her head, admiring her beautiful hair, when she quickly whipped her head around about 150 degrees and stared straight at me, looking me in the eye crossly, as though to say: "Stop staring at me!"

From a man who worked in a company in Massachusetts. His work required government security clearance, and he worked in a locked room:

Entrance to this room was gained by ringing a bell and showing your face at the small window in the door. A colleague of mine sat opposite this door with his back to it. I began, just for fun, to stare at the back of his head. Instead of ringing the bell when I wanted to come in. At first, it would take 10 or 15 seconds to penetrate his concentration and get him to turn around and buzz me in. After doing this several times a day for a week or two, I was able to reduce his response time to about two seconds. He was disquieted by this, and eventually, I stopped and resumed using the bell again.

Reports From People Looked At

From an Iraqi-British man in London:

It can happen through glass. Today, for example, I was in a glass meeting room at work, and my head turned to look behind me, and about 10 meters away, someone was looking at me. Sometimes, I turn to look in that direction when I feel

the stare, and on other times, my head turns almost violently on its own like a reflex.

This woman was at a large store with her young son:

I realized that he was hiding from me. I also knew that he would be watching to see where I would go. I stood still and thought about him and got a definite feeling of being watched. I turned round and looked directly at him.

This woman was at a rock concert in a large outdoor amphitheater with her teenage daughters seated in the center near the front:

I was really enjoying the show, and I was sort of bopping along with my head. In the midst of this free-spirited enjoyment, I felt my head and eyes suddenly dart to the extreme right of the stage. My eyes met the eyes of the bass player, who was staring right at me. I broke into an embarrassed smile, feeling foolish, and he responded with a huge smile and laugh. I must have looked awfully funny, I guess.

From a man in the United States:

My sense of being stared at is highly developed, probably due to my father "testing" me when I was a boy. In our house in Miami, we had a large, six-bladed fan in the kitchen window, which cooled the house in the summer. When I was in the kitchen with my back to the door, my father would walk up behind me and say nothing, and the fan made it impossible to hear his approach. I could feel him looking at me, which prompted me to turn around and face him. He never commented on this, but his facial expression of pleased surprise made me quite certain that he was doing it on purpose to see if I could detect his gaze. He was interested in such "taboo" phenomena.

2.2 Looks from Above

Some of the most striking examples of directional scopaesthesia occurred when the person who was staring was at a higher level, looking down. Responses involved both looking around and looking up.

Reports From Lookers

A young man serving in the U.S. Navy, when on land,

was looking out of a third-floor window:

I saw a friend walking away from the building. I decided to stare at the back of his head to see if he would notice. It took about ten seconds, and he turned around and looked straight up at me, and then I waved to him to sort of smooth over the weirdness.

From another young man:

On the garden rooftop of a four-story building, I looked down into a courtyard, where people were walking from building to building. When I looked down at a woman I recognized and liked, she immediately looked up in my direction.

This woman was attending a crowded ceremony in which her husband was participating, seated in one of the galleries surrounding the auditorium:

I searched for my husband below, and when I saw him, stared at him, "willing him", if you like, to look up, as I knew he was nervous and didn't know where the one friendly face in the sea of the audience was. Within a few seconds, he did look up and directly at me, though there was no reason for him to guess where I would be.

This woman was on the upper deck of a London bus:

I was on a bus and was lost in my own thoughts, and I was actually looking at somebody without intent out of the upper level, and he suddenly looked up at me and stared straight at me, and it really shocked me.

Reports From People Looked At

From a German woman in Stuttgart:

In my area, apartment blocks are five to six stories high. When I walked along the street, I usually kept my glances to the ground in order to avoid stepping into dog excrement, but sometimes I happened to look up and met the eyes of a person looking at me from one of the upper floors. This happened so often that I was surprised since this cannot be explained from seeing something in the corners of my vision and I exactly met the eyes of the person right away. This happened when I was about 20-30 years old. Today (I am

36), this does not happen so much.

From an English woman traveling in the passenger seat of her family van:

We were at a busy T junction waiting to pull out. I felt compelled to look high up and backwards over my left shoulder. My eyes met those of a man in an attic window. Our eyes were locked in "battle" with each other, so I looked away. The strange thing was only the top of his head and eyes were visible about the windowsill, and he was also at the corner of the window, which was closed. He must have been either kneeling or crouching.

From a retired police officer in Britain:

For about a third of my duty days, I was on night duty patrolling empty streets in the small hours. On many dozens or hundreds of occasions, I became aware that someone was looking at me. It came as a sort of tickling sensation around the back of the neck. On almost every occasion, I would look up and find someone watching me from a window or some such. I am not the imaginative type, I have no other unexplained experiences in all my duty life except this.

2.3 Looking Through Binoculars, Telescopes, or Cameras.

Scopaesthesia seems to occur when a person is observed through telescopes, binoculars, or cameras, even at great distances.

A woman who lived on the south coast of England told us that she liked looking out of a window through powerful binoculars at sailors on yachts. They were far away and could not have seen her with the naked eye; but often, she said, the sailors would turn and look straight towards her and seem uneasy. She was sure they were feeling her looking.

This sensitivity can manifest itself more dramatically in literally life-threatening situations. In 1995, a sniper in the US Marine Corps serving in Bosnia was assigned to shoot "known terrorists". While he was aiming through the telescopic sight of his rifle,

Within one second prior to actual termination, a target would somehow seem to make eye contact with me. I am convinced that these people

somehow sensed my presence at distances up to one mile. They did so with uncanny accuracy, in effect to stare down my own scope.

Long-lens celebrity photographers often look at people at a distance through telescopic lenses. We interviewed some of the leading practitioners in Britain to ask if they had noticed whether their subjects seemed aware of their focusing on them. The general consensus was that some people seem unaware of being watched, while others have an uncanny ability to know when they are about to be photographed, such as the late Princess Diana, who, over the years, seemed to become increasingly sensitive. One photographer commented:

She was possibly the most extreme example of somebody being constantly aware that there was a possibility of being photographed. Because she was so against being photographed, she honed that awareness down to such a fine degree that it was almost impossible to catch her unawares. She claimed that she had a sixth sense and said she could smell a photographer a mile away.

One long-lens photographer who worked for the *Sun*, the most popular tabloid newspaper in Britain at the time, said that he was amazed by how many times people whose picture he was taking would “turn around and look right down the lens,” even if they were looking in the opposite direction to start with. He did not think they could see him or detect his movements. “I am talking about taking pictures at distances of up to half a mile away in situations where it is quite impossible for people to see me, although I can see them.”

The ability of people to detect when they are being stared at through telescopic lenses suggests that telescopes might not only focus light into the eye of the observer but also focus the looker’s attention onto the person observed. Although the magnified image is a virtual image, it is located in the same direction as the person being watched, rather than in a different place and direction, as with virtual images seen in mirrors or with images on the screens of CCTV monitors.

2.4 Experiences With Non-Human Animals.

Many people described experiences with non-human animals, mainly dogs and cats, but also with wild animals, that suggest the animals can feel when they are being watched and respond directionally. Conversely, some people have experienced being looked at by animals and turned to look at them directly in the eyes.

Reports From Lookers

Many people have noticed that their pets respond directionally to their looks. Here is a typical example:

My cat was working on her scratching post, and I was watching her, then suddenly she turned and looked right at me, instant eye contact, as if she knew exactly from where she was being watched.

The reports were not confined to familiar animals, like people’s own pets. This account, from a woman in Surrey, England, concerns other people’s cats:

I work from home in my conservatory, looking out into the garden. The garden is on a well-known cat run, as many cats use the same route each day. When I catch sight of them and look directly at them, they usually freeze and look straight at me. I hasten to add that sometimes they are walking away from me and would not be able to see me, so it is not a matter of sensing me move. This happens too often to be coincidence.

Some of the reports concern birds, both wild and domesticated. This Australian woman’s family kept chickens when she was a child:

I used sometimes to delight in fixing my gaze on any one of the chickens through a nail hole in their iron fence. I would see it pause its wandering, scratching or feeding, look ill at ease, then fix its gaze on the nail hole.

We interviewed more than 30 wildlife photographers, many of whom concealed themselves within hides (called “blinds” in the U.S.) from which they watched and photographed animals. Most were convinced that animals often detected when they were being watched; they became fearful or wary, and sometimes, they looked straight at the hidden camera through which they were being observed. One British photographer said that on several occasions when photographing eagles, they “stared right down the barrel of the camera lens” at him. Another photographer was watching some pools of water from a hide in the evening when “a fox came down to drink, and suddenly lifted his head up and looked back at the hide.”

Reports From People Looked At

Some wildlife photographers spend a lot of time outdoors and have found that they can locate animals by re-

sponding to their looks.

If I am walking through a valley and I am intent on the ground ahead of me, I will suddenly look up to the cliffs, and at the exact spot I look, there will be a goat staring down at me. It happens fairly frequently. You can go around looking for certain animals and birds, and you do not see anything for quite a while, and you suddenly look in a particular direction, and there it is.

Similarly, another photographer was returning after a long day walking in the hills in Scotland:

I had no further intention of doing any photography as the light was getting low. As I walked, something made me look up to my left, and about half a mile away on the skyline, there were three or four deer looking at me. It wasn't that I was scanning the skyline and noticed them. It was a case of looking up and looking straight at them.

This Canadian woman was in a remote part of British Columbia:

I was standing by myself looking into a river, watching several hundred chinook salmon spawning in a long, shallow stretch of river. This was in a fly-in-only wilderness area with no roads or other people around. I then turned to continue my hike up the trail. For that mysterious reason, people have, I turned around and looked behind me before starting to walk. About thirty feet behind me, standing tall while sitting on its haunches, was a large, light-colored wolf. It was watching me watching the salmon. It had a bemused smile on its face. Very peaceful and friendly looking. A kind smile. I turned and walked up the trail. Because of the expression on the wolf's face, I was unafraid of it, and indeed, it caused me no harm.

In Australia, this woman liked walking in the forest and looking for koalas. She found it tiring to look for them in the trees, but developed an easier method of finding them:

In my walks through the forest, I had the feeling of being watched. I used to go out looking for koalas, but over time, I realized that I didn't need to look for them. I just had to focus on myself, and the moment I felt watched, I would know where

to look, and the animal would be there.

Thus, both animals and humans seem to respond to being watched in similar ways, and the effect is usually directional.

3. Implicitly Directional Cases

In this category, most of the descriptions were less detailed than in the explicitly directional cases but nevertheless implied a directional effect, as in the following examples:

I have caught people looking at me lots of times, particularly when working in foreign countries with repressive regimes. As a journalist, you will be followed and watched, and I have caught people looking at me over newspapers or in hotel foyers. I would say this was due to a sixth sense sometimes. Sometimes, I get a tingle in the back of my neck.

The ability to tell when you are being stared at is something I teach in my tai chi classes. You have to exercise and practice so that this awareness is growing and growing, so you can feel what is going on all around you, at the back and sides of you.

I went to my children's school. It was an open day, and the headmaster asked me to walk around taking pictures of people, so I chose a big, long telephoto lens. Even though I was right across the other side of the school garden, if I had it trained on someone, they knew.

On several occasions, whilst out walking with my Alsatian bitch I felt I was being told to stop. When I looked back, she had stopped to urinate and was staring at me most intently, her expression plainly saying, "wait for me."

In classifying cases as showing an implicitly directional response, we erred on the side of caution because many of these cases were on the borderline of being explicitly directional but simply lacking in detail.

4. Directionality Not Mentioned

Most cases in which directional effects were not mentioned were general statements, such as the following.

I frequently am aware of being observed both by surveillance cameras or just other people.

Throughout my life, I have often experienced this phenomenon and have also observed it in pets. I can usually tell when someone is staring at me, and can often cause others to react to my staring at them.

My brother is an ex-US marine. He says they were taught in boot camp to never look directly at an enemy soldier when sneaking up for attack but to use their peripheral vision.

The fact that most of the accounts in this category did not mention directional responses seems more owing to a lack of detail than a lack of directionality. However, in a few cases, directional responses were not possible because the looker was hidden, as in this distressing experience of a woman in Missouri, U.S.:

I lived in an apartment complex with outside parking on a large lot. I returned home late one night and parked my car about 20-30 feet from the front door. As soon as I stepped out of my car, I felt someone was not only watching me but watching me with great hostility. The feeling was sudden and strong. It was as if a switch had been turned on as soon as I got out of the car. The parking lot was full of parked cars, but there was apparently no one else around. I dismissed the feeling as over-imagination and walked briskly to the front door. I even stopped to get my mail. As I was opening my mailbox, with my back to the front door, I heard the front door open suddenly, and someone step into the room very quickly. I turned and saw a man standing naked, holding his folded clothes in front of his face. I quickly opened the hallway door and, practically ran to my apartment and then called the police.

There were also a few cases where a person responded to being stared at not by looking at the person watching them but by paying attention to the part of the body that was being looked at. Here is a British example:

I am a man without a sexual partner, and when I notice an attractive woman, I look at her. This seems to be a largely automatic process. I look first at her face, then my gaze drops to her breasts, and then quickly moves away. Amazingly often, without looking at me, the woman

instantly gazes down at her breasts, perhaps to check that she is properly dressed. This mysterious "sense" could perhaps tell that sexual interest is present, which would explain how she knows not to return the look.

This disabled elderly woman described herself as a "people watcher":

I spend time watching people as they go by, passing the time by experimenting with their receptivity to being watched and mentally touched somewhere on their bodies. It never fails to amaze me that if I stare at a certain part of their bodies, mentally touching them, the majority of people will unconsciously touch, pat, swipe, or pat that part of their body without really being aware of doing it. Like they were actually touched on that body part and are checking it out on a subliminal level. They often sort of quickly look around them as well, checking unconsciously on their surroundings to be sure no one is close to them.

Probably in most situations, scopaesthesia occurs when people's heads, neck, or back are being looked at. Perhaps when other parts of the body are being observed, it draws the person's attention to that region first, and this may or may not be followed by a directional response. In the case of the "people watcher", such directional responses were unusual and somewhat delayed:

Once in a great while, I find someone who will actually slap at the area I am looking at and look around them, then turn to look straight into my eyes with an accusing attitude, which is surprising because it's rare to have someone find me out. I just smile and look them right in their eyes.

We also received several reports from or about nude models in life drawing classes, who have had much more experience of being looked at than most other people. In the very nature of their work, they have to sit still and cannot look at the people drawing them when those people are behind them. This is from a woman artist:

I find that many models are particularly sensitive to having their hands and feet drawn. This occurs whether or not they are facing you (the artist) while they are posing. With some models, their hands or feet respond in these instances when I am concentrating on them as if they have been

tickled.

In summary, the great majority of the cases in which a directional effect was not mentioned were generalized accounts with little detail. Only a few cases explicitly mentioned responses that were non-directional. Some were in situations where the looker was invisible, as in the case of the seemingly deserted car park at night. Others occurred when parts of the body other than the head, neck, or back were looked at. In these cases, the watched person's attention seemed to go first to the part of the body being looked at, and only sometimes was this followed by a directional response, looking at the looker.

5. Delayed Directional Responses

In our collection of cases, there are only nine that concern delayed directional responses (Table 2). One type of delayed directional response occurred when the looker concentrated on parts of the body other than the head, neck, or back, as described immediately above. Here are some other cases:

As I sat on a train reading my paper, I had a steadily growing feeling of being stared at. It got so strong that I had to turn round to view the other passengers to find out who it was, but there were not many people in the carriage, and none appeared to be looking at me. I carried on trying to read my paper, but the feeling got more and more intense until eventually I had to stop the pretense of reading feeling literally "hot round the collar," and folded my paper up. As I did so, I happened to glance across the carriage to the floor below the table of the seats alongside me to find a delightful little French Bulldog sitting on the floor there, staring intently at me, willing me to talk to him.

When I was in Death Valley with my son, we both felt as if we were being watched, something was making us uneasy. We scanned the rock face above and eventually saw a huge white bird of prey sheltering in a shady cranny, staring out at us, forcing us to go away. He succeeded because we left his territory, acknowledging his dominance!

I was snorkeling on a reef in Hawaii, and I was alone. I went quite a distance from shore when I had a very distinct sense of being stared at. I picked up my head to look around but saw no

one. I went back to swimming when I had the same sense again, I picked up my head again, but there was no one there. I then looked down at the reef and saw a small octopus looking up at me, tucked into a rock. I am convinced that I was sensing the octopus' stare.

This story was told to us by the late Dame Miriam Rothschild, an eminent naturalist:

In the war, I went out at dusk to shoot a pheasant for dinner. There was snow on the ground, and I went into thick cover to wait among the bushes for birds coming in to roost. There was an open space ahead of me, and I began to feel I was being watched. I began looking across the open space and then cautiously to right and left there was no one to be seen, but the feeling grew. I told myself I was just being hysterical. Then suddenly, I looked up, and there was a barn owl about three feet above me, sitting on a branch and staring at me!

However, cases in which directional response were not immediate were rare, making up only 1% of all cases. In several cases, like those above, the delay occurred because the respondents assumed that they were being stared at by other humans rather than by non-human animals. In other cases, the watching person or animal was camouflaged or partially concealed, necessitating a search rather than instant identification.

6. Online Surveys

Social media offer simple methods for conducting surveys. They do not provide random samples but enable rough estimates to be made of the prevalence in a specific group of people interested in these phenomena. We carried out such surveys through R.S.'s own social media (Facebook, Instagram, and YouTube) and asked Deepak Chopra to do similar surveys; his media have far larger numbers of followers. It could be argued that R.S. and Chopra's followers are likely to be biased in favor of the existence of scopaesthesia, so we asked Prof. Chris French to carry out a similar survey among his Twitter followers, most of whom are skeptics. His followers might, therefore, be expected to be biased against the existence of scopaesthesia or at least to view it skeptically.

In these surveys, respondents were asked two questions:

1. Have you ever had the experience of turning around to find someone is staring at you?

2. If so, was the effect directional? Did you look straight at the person watching you?

Chris French prefaced these questions by a brief statement as follows: “ I have agreed to a request from Rupert Sheldrake to help him collect data on the common experience of the sense of being stared at (however that might be explained).”

The results of the Instagram and Twitter surveys are shown in Table 2. A large majority of respondents said they had experienced scopaesthesia. Of those who had experienced this effect and responded to the second question, 83-92 percent said they had experienced it directionally.

Similar surveys among R.S.’s Facebook followers gave similar results, with 97% of respondents answering “yes” to question 2. Unfortunately, the Facebook report did not reveal the actual number of respondents, but from the “engagement” metric, this is likely to have been about 300.

In addition, we carried out a survey through R.S.’s YouTube channel. The YouTube protocol permits only one question and two answers, so the format was somewhat different. The question was: “If you’ve ever felt like you were being watched and discovered you were, did you:

1. Search until you found someone looking at you?

2. Turn and immediately make eye contact?

Respondents could vote “yes” to only one of these questions, and out of 852 respondents, 758 (89%) answered “yes” to question 2, again indicating that a large majority had experienced directional scopaesthesia.

In summary, although these online polls are non-random samples of the wider population and are not as precise as some other survey methods, they indicate that most people have responded directionally to being stared at.

DISCUSSION

Our collection of first-hand accounts of scopaesthesia shows that reactions are usually directional both in

humans and non-human animals. We have quoted only a few of the many cases in our collection; anyone interested in reading more is welcome to do so. The entire collection discussed in this paper is available online as Supplementary Material.

Consistent with the case histories, in online surveys, most of the respondents said they detected the direction from which looks were coming. Those who doubt these findings can easily carry out their own surveys, formally or informally. We predict that most of their respondents will say they have experienced directional scopaesthesia.

Insofar as it is directional, scopaesthesia is more than a sense of being at the center of someone’s attention, a scalar phenomenon, as it were. Most people and animals do not seem to have a generalized feeling of being stared at and then search in all directions to find out where the looker is. Cases of delayed directional scopaesthesia make up only 1% of our collection, and some of those depended on a false expectation that the starrer was human rather than a non-human animal, and in others, the starrer was hidden. Most directional responses were more or less immediate.

Another argument against a purely attentional hypothesis of scopaesthesia comes from exploring the parallel with attention through listening. Can people detect non-visual attention in a similar way to detecting visual attention? Is there a “sense of being listened to” comparable to the sense of being stared at? If attention is the key factor, then auditory attention might have similar effects to visual attention. With our colleague Tom Stedall, we investigated this question experimentally. We carried out tests with telephones to investigate whether people could tell when they were being listened to by a partner or not listened to in a randomized series of trials. The results were no better than chance, giving no indication that people could feel when they were being listened to (Sheldrake, Stedall, & Smart, 2023). Moreover, there are very few stories on our database concerning being listened to compared with being looked at, only about 1% of the number concerning scopaesthesia. In addition, interviews with private investigators and surveillance officers

Table 2. Results of Online Surveys Conducted in May and June 2020 with Rupert Sheldrake and Deepak Chopra’s Instagram (I.G.) Followers and Chris French’s Twitter (Tw) Followers. Questions 1 and 2 Are As Described In The Text.

Survey by:	Question 1: Stare detection		Question 2: Directional effect	
	Respondents	Answer “yes” %	Respondents	Answer “yes” %
Sheldrake (IG)	107	97	104	92
Chopra (IG)	2,367	93	1,929	83
French (Tw)	86	76	33	85

revealed that none had noticed people being aware of being listened to when their phones were tapped; by contrast, they said that many people were sensitive to being watched. Thus, scopaesthesia depends not so much on being the center of an unseen person's attention in general but specifically on visual attention, which is, by its nature, directional.

The directional nature of scopaesthesia distinguishes it from telepathy, which is generally non-directional. Moreover, telepathy typically takes place between bonded members of social groups rather than with strangers, whereas scopaesthesia often occurs with strangers and with unfamiliar animals, both wild and domesticated (Sheldrake, 2003).

Scopaesthesia has two directional aspects. First, the looker's attention is directed toward the person looked at. Second, the person looked detects the direction from which the look is coming and usually looks back. In both cases, this directionality is coupled to light. For the looker, there is a close linkage between the incoming light, which is focused onto the retinas, and the outgoing direction of attention. Physics already describes the electromagnetic field of light and the focussing of this light by lenses onto retinas and also describes the outward movement of attention in relation to virtual images that arise when looking through with mirrors and lenses. Such outward-moving influences are also implicit in most people's understanding of vision, even if they explicitly deny the possibility of extramission, as Guterstam and his colleagues so ingeniously demonstrated (Guterstam et al., 2019, 2020; Guterstam & Graziano, 2020).

The simplest and most traditional interpretation of directional scopaesthesia is in terms of the extramission of visual or mental projections in the opposite direction to the incoming light, as, indeed, most people implicitly assume. Although many scientists and materialist philosophers believe that visual images are confined to the inside of the head as "representations", "virtual reality displays" or "controlled hallucinations", a growing number of theorists argue that vision does indeed involve the projection of images into the external world: minds are extended beyond bodies. When I look at a tree, my image of the tree is in the outer world where the tree seems to be, not inside my brain. Recent proponents of extended minds include Sheldrake (1994), Clark and Chalmers (1998), Velmans (2008), Thompson & Stapleton (2009), Noë (2009) and Manzotti (2018). This approach can also be described as "active externalism" or "extended cognition" (Clark & Chalmers, 1998) or as "enactivism" (Thompson & Stapleton, 2009). The theory of "direct perception" of J.J. Gibson also locates visual experiences in the external world rather than inside the brain (Gibson, 1979).

However, some extended mind theorists explicitly deny that visual projections flow out through the eyes. Velmans, for example (2008, his Fig. 6.3), pictures the externalized images as coming out of the top of the head. Other extended mind theorists seem to think of extended minds as entirely non-physical, with no possible external effects. They are, therefore, undetectable experimentally. This idea has the philosophical advantage and scientific disadvantage of being irrefutable. But if minds reach out beyond brains and in some way touch what is being looked at, scopaesthesia could provide empirical evidence that minds are indeed extended and open the possibility of further experimental explorations of how extended minds work (Gomez-Marin & Sheldrake, 2023).

Within institutional science, scopaesthesia is taboo because it does not agree with the doctrine that vision takes place by intromission only, nor with the materialist assumption that minds are confined to brains. "Minds are what brains do" (Minsky, 1986). Materialists habitually classify scopaesthesia as "paranormal", meaning beyond the normal. By contrast, most people think of stare-detection as normal and take it for granted. It is certainly normal in the sense that it is common. Scopaesthesia is only paranormal if normality is defined in terms of theoretical assumptions rather than empirical reality.

How can we conceive of visual extramission when it has been scientifically denied (except in the case of virtual images produced through mirrors and lenses) for so long?

One possibility is in terms of the outward projection of perceptual fields, closely coupled to the electromagnetic field of light entering the eye (Sheldrake, 2005b). As Clarke (2005) summarized this suggestion, "The perceptual field links the starrer and the staree into a single physical system that is itself possessed of consciousness. The conscious aspect, when focussed down onto the starrer, becomes the perception of staring; and when focussed down onto the staree becomes the perception of being stared at" (p. 79). However, Clarke, one of the few physicists to think about this problem, preferred an alternative possibility in which there is a dual aspect to the electromagnetic field itself, which could be both physical and conscious:

If consciousness is one of the aspects of such a combined system, then the object (or rather, aspects of it) will be part of this consciousness, *associated with the place of the object*, and it will be joined with a self-consciousness of the subject. These together will constitute the conscious perception of the object without the need for any projection or any further field... My own theory (Clarke, 2004) considers the perceiver and the

perceived to be entangled systems.

However, as Clarke added, in current understandings of quantum entanglement, information cannot normally be conveyed between entangled systems without the existence of a parallel non-quantum channel of information flow. Nevertheless, some theoretical physicists argue that a non-local transfer of information – as opposed to signals traveling at or below the speed of light – is indeed possible between entangled systems (Walleczek & Grössing, 2016). If so, the entanglement of the perceiver and the perceived could help to explain the directionality of scopaesthesia.

Perhaps we come back to a new version of Aristotle's transparent as the basis of vision. The transparent unifies light and conscious visual perception and, in contemporary terms, could be thought of as a combined electromagnetic-visual field. Light and vision are closely coupled and flow in opposite directions through the electromagnetic-visual field, which at the same time unifies them. Directional connections through this field may underlie scopaesthesia.

Of course, diagrams with rays and arrows, with the light going into an eye or visual rays going out of it, are a gross oversimplification. Our visual field is not only the focus of our vision mediated through the foveas near the center of our retinas, rich in cones as opposed to rods that predominate over the rest of the retina and mediate peripheral vision. The perceptual field that we project outwards when we see is not confined to the focus of our attention but includes the entire visual field, most of which is peripheral. But for scopaesthesia, the focus of foveal attention seems to be of fundamental importance. Hunters in diverse cultures are taught to look at their potential quarry with peripheral vision rather than focusing their direct visual attention on it to avoid alerting the animal to their presence. Wildlife photographers do the same (Sheldrake, 2003). So, although the kinds of images shown in Fig. 1 are crude and vastly oversimplified, there is indeed a focus of attention in a particular direction through the ambient light.

Our case collection clearly shows that scopaesthesia is not confined to humans; 259 out of 960 cases (26%) concerned animals looking at humans or human looking at animals. Most were directional, as they were in human-to-human cases. It may well be that scopaesthesia is widespread among animal species and perhaps even among invertebrates. Can flies detect when jumping spiders are looking at them? No one knows because there have been practically no investigations of scopaesthesia in the realm of animal behaviour. One of the few naturalists who paid attention to this phenomenon was the American William Long. For example, when he was ob-

serving foxes in the wild, he was impressed by the way that vixens maintained discipline among their cubs without uttering a sound:

For hours at a stretch, the cubs romp lustily in the afternoon sunshine.... The old vixen, who lies apart where she can overlook the play and the neighborhood, seems to have the family under control at every instant, though never a word is uttered. Now and then, when a cub's capers lead him too far from the den, the vixen lifts up her head to look at him intently; and somehow that look.... stops the cub as if she had sent a cry or a messenger after him. If that happened once, you might overlook it as a matter of mere chance; but it happens again and again, and always in the same challenging way. The eager cub suddenly checks himself, turns as if he had heard a command, catches the vixen's look, and back he comes like a trained dog to the whistle (Long, 1919, pp. 91-2).

Eyes evolved in the Cambrian period, about 540-530 million years ago, in which there was also a rapid evolution of many new forms of animal life, often called the "Cambrian explosion" (Gould, 1989). There may have been a causal relation between eyes and this burst of creative evolution because vision enabled new forms of predation to develop, along with new evolutionary responses to predation (Parker, 2003). Scopaesthesia could possibly have evolved as long ago as the Cambrian in the context of predator-prey relationships. Potential prey that were able to detect the stare of a predator may have tended to survive better than those that were insensitive (Sheldrake, 2003). From the outset, animal vision may have involved both the intromission of light and the projection of visual fields. The ability to detect directional visual projections could be evolutionarily ancient and very widespread.

IMPLICATIONS AND APPLICATIONS

Directional scopaesthesia means that people and animals detect not only that they are being stared at but also the direction from which the look is coming. This has major implications for theories of vision because it implies a directional influence flowing out of the eyes in the opposite direction to the light moving in. The conventional assumption is that vision depends only on intromission (sending in) of light followed by the construction of representations inside the brain, whereas directional scopaesthesia implies that there is also an extramission (sending out) of visual images in the opposite direction

to the incoming light; in visual perception, minds are extended beyond brains. This re-opens an ancient debate on the nature of vision in human and non-human animals.

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SUPPLEMENTARY DATA

The full collection of scopaesthesia cases, as classified in Table 1, is available online here: <https://www.sheldrake.org/research/sense-of-being-stared-at/directional-scopaesthesia-data>.

AUTHOR CONTRIBUTIONS

RS, Orcid 0000-0001-8814-4014: conceptualization, investigation, writing, review, and editing. P.S.: Data curation and analysis.

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