Editorial

Ambiguities of sense and non-sense

“We cannot define truth in science until we move from fact to law. And within the body of laws in turn, what impresses us as truth is the orderly coherence of the pieces. They fit together like the characters in a great novel, or like the words in a poem. Indeed, we should keep that last analogy by us always. For science is language and, like a language, it defines its parts by the way they make up a meaning. Every word in the sentence has some uncertainty of definition, and yet the sentence defines its own meaning and that of its words conclusively. It is the eternal unity and coherence of science which gives it truth, and which make it a better system of prediction than any less orderly language.” (Bronowski 1953, page 70)

What are perceptions made of? What are the sensations of the senses? What, if anything, do sensations do? Are sensations of perception the basis of knowledge, or but icing on the cake of life? Such questions are questions of philosophy rather than of science, presumably because we don’t have a clue how to answer them! Although the study of perception is a recent science, how we perceive has been discussed by philosophers from the earliest recorded times and no doubt long before thoughts were captured by writing. But whatever is written has to be interpreted, with assumptions of various kinds, so it is hard to read through ancient eyes. This is especially so for us to see how abstract explanatory concepts appeared centuries ago—ideas unlinked by shared perception of the object world. Greek astronomy referring to objects that still exist and are still studied, such as the moon, the planets, and the sun and stars, is far easier to appreciate now than are past accounts of the nature of perception and sensation, which (paradoxically, as they are fundamental experience) are now perhaps essentially lost to our understanding.

The Greeks, like us, tried to give explanations of mind in terms of analogies drawn from objects of common experience. Some notable Greek philosophers—Pythagoras, Plato, and more geometrically Euclid—thought that visual perceptions are given by invisible rays shooting out of the eyes, like fingers, to explore and touch objects. This notion had the snag that near and very distant objects, such as stars, appear together as soon as the eyes are opened—though the finger-rays were supposed to shoot from the eyes at less than infinite speed. This theory did not at all suggest what perceptions are made of, though it was appreciated that (to take an ancient example) it would be circular to suppose that the sound of a bell is made of the sound of a bell. Other philosophers thought, very differently, that perceptions are surfaces of objects. This idea had the snag that, unlike touch, eyes can sense very distant objects; which suggested the curious notion, especially to Democritus, that, rather like ripples from stones dropped in a pond, objects radiate ‘shells’ or ‘husks’ spreading out as replicas of themselves, which enter our eyes so that we sense by sight distant objects quite directly. This kind of expanding-surfaces-of-objects notion was popular through the Middle Ages and it survived right up to this century as the ‘Sense Data’ of the Empiricist philosophers—right up indeed to the Cambridge philosopher C D Broad (1929) and the Oxford philosopher H H Price (1932). But this kind of ‘Naive Realism’ had a hard time accounting for the changing shapes of tilted coins as viewed from various positions, and the changes of size over distance, further objects appearing somewhat smaller in spite of the constancies of shape and size which (it is not always realized) were appreciated
by Descartes in the seventeenth century as effectively modifying perspective projections of objects to the eyes. The Greek philosophers did not appreciate perspective or have any knowledge of images in eyes.

The appeal of this Sense Data notion was that it based knowledge on conscious experience of objects. Also, it gave an answer to the curious question: "What are perceptions made of?" The answer given was simply that perceptions are surfaces of objects—and so are made of whatever objects are made of. But the difficulties of objects appearing smaller with increasing distance, and coins (their favourite objects) changing shape with changes of viewing position forced a fall-back position: that the Sense Data of experience are peculiar entities, half-matter half-mind, subsisting between physical reality and the observer. But with this step it was no longer clear what perceptions are made of, and neither was it at all clear how perceptions are related to the physical world of objects, as these Sense Data were neither within the observer nor in the world of objects. They were highly mysterious entities lying in a world of their own (and were perhaps lying illusions) between objects and us. So the directness of perception of the original notion, which promised certainty, was lost with these in-between, neither physical nor mental, Sense Data of the philosophers.

The other ancient account—that vision is given touch-like by probing rays from the eyes—promised direct knowledge but it gave no suggestion for a stuff of perception, of what perceptions might be made of. What it did do, though, was to suggest that perceptions are some kind of internal representations, which in many ways would be very different from the objects they represent. Thus the perceptual world of sensation was separated and accepted as very different from the world of matter. To us now—even though it seems absurd to ask what matter is made of—there may be a temptation to ask: "What are sensations?" "What is consciousness?" Perhaps because it is very hard to bring experiments to bear on such questions they appear deeply puzzling, or may simply be dismissed as nonsense.

The Empiricist philosophers of the eighteenth and nineteenth centuries thought of perceptions as made of sensations. But with the influence of recent physiology we are drawn to regarding physical neural activity, especially Action Potentials, as the brain's data for constructing perceptions (Perceptual Hypotheses) of the object world; and also for producing sensations, such as colours and shapes as experienced by the senses. So sensations are no longer seen either as what perceptions are made of, or as the data on which perceptions are based. Rather, they are seen now as produced somehow by physiological activity of the brain; or, perhaps better put, by cognitive processes carried out by its physiology. Sensations are no longer seen as raw data of perception, for now it is clear that sensations are cooked and flavoured by interpretations. Sensations, even pain, can change according to context. And as shown dramatically in phenomena of perceptual ambiguity, when the same sensory signals give alternative object-perceptions (which are important evidence against Realist theories and against sensations as raw uninterpreted data) seemingly simple sensations can change systematically according to what object is seen though the sensory data remain unchanged. A nice example of a sensation changing with apparent changes of an object's identity or shape was pointed out by the Austrian physicist Ernst Mach (1838–1916): change in seen brightness of a shadow on a bent card when it reverses perceptually in depth (Mach 1897). When the corner apparently sticks inwards, the shadow looks normal; but when apparently sticking out towards the observer, for most observers it looks much darker, though there is no change of luminance to the eye. This sensational difference may be attributed to Brightness Constancy, as shadows tend to be visually ignored, working 'Downwards' from the prevailing object perception; to change with the perception of the corner, though the stimulus to the eye and its signals to the brain remain unchanged.
We infer that the brightness sensation is given by the *interpretation* of neural signals, according to what kind of object (correctly or incorrectly) is seen. As the brightness sensation is changed by the perceptual flip (change of hypothesis of what is out there) sensations cannot be uninterpreted data of perception, as the Empiricist philosophers supposed them to be. So the philosophers were wrong.

Here a simple observation seems to have an immediate philosophical consequence. But—like any word or sentence or perception—this observation needs to be interpreted. So are we really sure of the significance of this wonderful phenomenon, that appealed so much to Mach and to us now? Here we have just made several assumptions: that perceptions quite indirectly represent the world of objects, and can be alternative hypotheses; that there are neural signals which have to be interpreted or ‘read’; that interpretation can be ‘Top-Down’ from stored knowledge; that knowledge of shadows can affect Brightness Constancy which we suppose exists, and so on. So it is evident that this beautiful observation-experiment is not raw data, from which conclusions necessarily follow. There might always be other interpretations, other ‘meanings’, of any phenomenon. In this sense all observations (and not only what we call ‘perceptual ambiguities’) are perceptually, and also conceptually, ambiguous.

For discussing these matters we need well chosen words. But there is especially confusing ambiguity of language, and no doubt of concepts for discussing perception, including ‘seeing’ as experience and ‘seeing’ as understanding. It is sometimes possible for both meanings of ‘see’ to be appropriate together, as when we see a joke in a cartoon—or when we see that the unit of force, a *Newton*, is about the weight of an apple! And, of course, the meaning of a word can change with context. A word’s meaning can flip-change with ambiguities of the meaning of the sentence in which it lies.

As most theorists of perception now hold that long experience of the world is necessary for seeing or recognizing objects we may accept that this ambiguity between ‘seeing’ via sensation and ‘seeing’ with the sense of knowledge lies deep within perception. Indeed the ambiguity is so deep it is almost impossible to express without using ambiguous words. Thus, if we describe it as a distinction between *sensation* and *sense* this is ambiguous, as ‘sensation’ and ‘sense’ each have these two meanings. Equally, ‘senseless’ can mean stupid (lacking knowledge or understanding) or it can mean lack of sensation (as in ‘knocked senseless’). Many alternative words or phrases that we might try are just as ambiguous: appears, appreciation, apprehension, aware, discern, conscious of, discriminate, impression, respond to, to view. They all have this same inbuilt ambiguity of ‘sensation’ and ‘sense’; or for that matter of Sense and Sensibility.

Conceptual and verbal ambiguities are important concerns of philosophers. Sensibly, the Oxford linguistic philosopher J L Austin (1962) used the unusual and so perhaps not contaminated word ‘sensibilia’ to refer to sensations. The distinguished American philosopher of mind, Daniel Dennett (a personal friend) calls pure sensations such as red and pain and so on ‘qualia’. This is now quite generally used in discussions of philosophy of mind, though seldom found in experimental papers on perception. In his essay “A Cure for the Common Code” (in *Brainstorms*, 1978, especially page 100) Dennett discusses the place of qualia in cognition and perception. Dennett (1978) and Jerry Fodor (1975) discuss these issues in connection with the brain’s task of representing objects and interpreting neural signals and data. These discussions are in philosophical rather than experimental terms, but they are important for the science of perception, and indeed science in general, for any observation or experimental finding is meaningless if not interpreted. Here human perception and science as means for gaining knowledge meet. Dennett illustrates the classical Empiricist position: “The empiricists would say that my [perceptual] hypothesis is that there is an apple out there, and my data are that I seem to see this red round patch.” But however sensational, in
the sense of amazing, science's data may be, they are never the sensations or qualia of our intimate experience. And what we see or hear or touch departs ever more widely from what we know, as science advances.

The term 'quale' as simple sensation is used by another distinguished American philosopher (also a friend) Paul Churchland, in his useful introductory book on philosophy of mind *Matter and Consciousness* (1984). Discussing the doctrine of Behaviourism—which of course tries to deny sensations, or qualia—Churchland writes of pain (page 24): "To have a pain, for example, seems to be not merely a matter of being inclined to moan, to wince, to take aspirin, and so on. Pains also have an intrinsic qualitative nature (a horrible one) that is revealed in introspection, and any theory of mind that ignores or denies such *qualia* is simply derelict in its duty." Later (page 75), Churchland describes the most generally held traditional view of perception and mind that:

"Our perception of the external world is always mediated by sensations or impressions of some kind, and the external world is thus known only indirectly and problematically. With introspection, however, our knowledge is immediate and direct. One does not introspectively apprehend a sensation by way of a sensation of that sensation, or apprehend an impression by way of an impression of that impression. As a result, one cannot be the victim of a false impression (of an impression), or a misleading sensation (of a sensation). Therefore, once one is considering the states of one's own mind, the distinction between appearance and reality disappears entirely. The mind is transparent to itself, and things in the mind are, necessarily, exactly what they 'seem' to be. It does not make any sense to say, for example, 'It seemed to me that I was in considerable pain, but I was mistaken.' Accordingly, one's candid introspective judgments about one's own mental states—or about one's own *sensations*, anyway—are incorrigible and infallible: it is logically impossible that they be mistaken. The mind knows itself first, in a unique way, and far better than it can ever know the external world."

It is interesting that although Paul Churchland was forced to use ambiguous words for what he was at pains to express most clearly—'sensations', 'apprehend', 'impression'—nevertheless, we do understand him. (And did you notice that my use of 'at pains' just above is similarly ambiguous?) Perhaps this passage from Paul Churchland's book is not difficult to understand even though, through no fault of his, each well-chosen key word is crucially ambiguous, because we tend to assume that this argument is sound and its conclusion true. It is doubly interesting then that Churchland goes on to deny its truth. As we should expect, these doubting arguments are harder to read. Dramatically, Paul Churchland disagrees with the commonly held notion that sensations are *certain*—that for example one cannot be mistaken that one is in pain. He holds that the meaning of words such as 'pain' are not limited by associations with an inner state, or *quale*, as empirical discovery from childhood of conditions in which *qualia* appear are important for their classification and naming. And they are not simple or unitary as there are many kinds of red, or pain, as we discover in various situations. Churchland suggests that, rather than being certain, self-knowledge is unlikely to be as reliable as perception of the external world, for as self-knowledge was less important for the evolution of the brain it was not so important for survival. This would be questioned by Nicholas Humphrey (1983) who suggests that self-knowledge is biologically important for appreciating by analogy from ourselves the intentions and needs of helpful friends and threatening enemies.

Another argument (Churchland, page 76) is that: "The distinction between appearance and reality must collapse in the case of sensations, since our apprehension of them is not mediated by anything that might misrepresent them". Dramatically, Churchland then denies the implied conclusion that the appearance and reality of *qualia* must be identical. He points out that misrepresentation by an intermediary is not the only way that errors can occur—for the sensation of pain may be produced by non-pain-inducing
stimuli, or may occur by suggestion, or with nothing to be corrigeble about as in a dream. But here, in trying to understand, I for one cannot escape the inherent ambiguity of the words that have to be used. Writing science is far easier in this regard and we are less bothered by ambiguities, as in science we normally have shared operationally defined experiments and basic assumptions or 'paradigms'. Then disagreements are meaningful, and remarkably enough are generally resolved across cultural and all other boundaries within a few years. Philosopher’s language as it struggles to avoid ambiguity can appear almost absurdly convoluted to scientists. But what is the issue here over sensation? Can these be questions for science? Perhaps it is philosophy’s job to find out! Certainly common-sense (which used to mean, especially to Descartes) the coming together of the senses in the brain, is not adequate for these questions.

Is it certainty of the presence of sensations that is in question—or is it causes or meaning or references of sensations that is being questioned? What have references—to an object or to anything else—got to do with whether there is a sensation of some kind? Or is the question-point rather; Could I name a sensation if it has no reference? Can there be pure sensations—and if so could they be identified or named? We may have sense without sensation; but can we have sensations (qualia) without some sense of what they mean?

The word ‘ quale’ is now used in an attempt to convey the notion of pure sensation—sensation apart from any references. The word itself is not new, though its philosophical sense (we are back to our ambiguity!) is changed from its original use. In Old English it could mean torment or torture. A quale-house was a house of torture, and a quale-sithe was death from pestilence. But more basically, it meant the quality of a thing. It was thus used in 1675 (by Croft in Naked Truth): ‘The quid, the quale, the quantum, and such-like quacksalving forms.’ This specifies the what, the quality, and the quantity of something. In his translation of Plato’s Republic, the classical scholar Benjamin Jowett (1875, 2nd edition, I, 270) gives; “When I do not know the ‘quid’ of anything how can I know the ‘quale’?” Here again ‘quale’ means the quality of an object, and it does not refer especially to sensation. Its meaning of pure sensation, without reference to objects or anything else, is a later invention of philosophers who are rightly beset by the ambiguity of words that are the tools and the materials of their trade. The deep problem is, surely, that words can be ambiguous because our notions are ambiguous—and we do not always know how to cure conceptual ambiguity. The philosopher’s solution is to cure conceptual ambiguities by seeking unambiguous words, or by imposing disambiguating definitions. But is it possible to find ‘pure’ words, or to define words to anchor thoughts or perceptions securely on facts to get our bearings without ambiguity?

If possible at all, this must surely depend on how terms are defined. If they are defined by reference to other words, we can hardly expect a secure anchorage to know our bearings in the world beyond language. If the definitions are by reference to shared facts we might expect anchorage, provided the accepted facts are not too theory-laden. This is the importance of operationally defined experiments and accepted methods and units of measurement: they might provide anchoring facts. Theory-laden facts slip conceptually when alternative theories are entertained. But what are the equivalent reference facts for sensations? As soon as references are suggested they seem irrelevant for testing whether a sensation, or quale, is present. Yet we do speak of illusions—departures from the quid (the what) or the quantum (the amount)—as phenomena of perception that we can investigate experimentally. Thus in experiments on distortion illusions we compare qualia with lengths or curvatures, or with existence of what we take to be quid and quanta of objects. The measurements always refer to such references with quid or quanta, and are never measured as pure sensations or qualia. So we arrive, and end, at the paradox of perception—is it also a paradox of physics?—that
we are only certain of what we cannot describe or measure or know as we know anything else, with or without illusion.

Paul Churchland's questioning of the certainty of sensations may be doubting their perceptual significance, and surely this is what usually concerns us about sensations. Very often we want and we need to know whether a pain is signalling damage requiring action—whether a baring of the teeth is a smile of welcome or a threat—whether apparently approaching lights are really those of a car on the wrong side of the road driving toward us. But is it only the source or significance of qualia that matter to us? This can hardly be so for we derive great pleasure from sounds of music, tastes of food, colours of paintings and flowers, and the blue of the sky. Perhaps, indeed, qualia are the source of all pleasures, including even thinking, for there are qualia associated with handling ideas. For example, it is a pleasure to write (if not to read) the editorials of Perception. And there are qualia of nostalgia, regret, and so on associated with memories. But do we have qualia in imagination? Can we call up in imagination full-fledged sensations of red, or pain? When I look at a red patch and shut my eyes, and try to call it up in memory, it is so much fainter it hardly deserves the term quale. Yet one can make a shot at matching colours by memory. Is this done by naming colours, or whatever? Probably not, for the names given to colours of paint and so on are not specific and they can seem inappropriate. This question of memory qualia has, surely, immediate experimental significance for us who study perception, for considerable time may elapse between observing or measuring phenomena. It would be interesting to know how uncertainty and perhaps systematic differences of matching qualia of immediate sensation with more or less distant memories of qualia change with lapsed time. Ideally we should know this to validate any observation in science or normal life. Yet, as we have said, we no longer think of qualia as the data of perception: the data are neural signals, such as action potentials in nerve fibres. And the data for memory no doubt are physical changes of the brain which we do not sense, and are not yet identified experimentally. As we are often unaware of perception, especially in familiar situations, and we act much of the time on the basis of memories we do not recall in consciousness, it is very hard to see what qualia do. If they serve to communicate our internal states or needs, isn't it odd that philosophers emphasize the essential privacy of sensation and yet try to make sensation the basis of objective knowledge? It is hard to make sense of sensation, as we are flip-books of ambiguities.

Richard L Gregory

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