Russell's later theory of perception

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I. CONSTRUCTION OF THE THEORY

THIS ESSAY IS primarily an account of Bertrand Russell's later theory of perception. Russell scholarship has tended to ignore his views on this topic, and on epistemology generally, as published in his works after *The Analysis of Mind* in 1921. This omission has lately begun to be corrected,[1] and this work is offered as a contribution to that end.

In *Human Knowledge*, Russell maintains that common sense divides the world of human experience into mental and physical objects and events. Mental events include emotions, feelings of pleasure and pain, sentiments, passions, desires, and volitions. All of these mental occurrences are capable of perception by the human subject to whom and in

[1] Perhaps the reasons for this omission may be found in Russell's bewildering changes of position from the Platonic realism of *The Problems of Philosophy* through the constructionism of *Our Knowledge of the External World* to the logical atomism of "The Philosophy of Logical Atomism". The reasons for these changes have lately been made clear by the publication of *Theory of Knowledge: The 1913 Manuscript*, ed. Elizabeth Ramsden Eames in collaboration with Kenneth Blackwell, Vol. 7 of *The Collected Papers of Bertrand Russell* (London and Boston: George Allen and Unwin, 1984). For works providing a remedy to the lack of attention paid to Russell's later epistemology, see A. J. Ayer, "The Causal Theory of Perception", *Aristotelian Society: Supplemental Volume*, 51 (1977): 105–25; Renford Bambrough, "Conflict and the Scope of Reason", *Ratio*, 20 (Dec. 1978): 77–91; Aaron Ben Zeev, "The Analytic, Synthetic and 'A Priori'", *Scientia*, 114 (Oct. 1979): 481–93; William Edward Morris, "Moore and Russell on Philosophy and Science", *Metaphilosophy*, 10 (April 1979): 111–38; and C. Mason Myers, "The Concept of Substance", *Southern Journal of Philosophy*, 15 (Winter 1977): 505–19.

whom they happen, and they are all classified as events in that person's life.[2]

Physical things and events are those occurrences which are believed by common sense to take place outside of the human subject, such as a noise or a flash of lightning. They also include inferences to what is not perceived, such as the centre of the earth and (at the time when Russell wrote) the dark side of the moon (pp. 224–5).

These common-sense notions are on the whole adequate as regards mental events but confused enough to require "radical alteration" as to the nature of physical objects and events. What is known without inference about such allegedly external events as "seeing the sun", for example, is that what is actually seen is a mental event in the perceiving human subject. Similarly, in the case of seeing tables and chairs, what is actually seen are percepts in the private visual space of the perceiver and what is felt consists of tactual sensations in the private tactual space of the perceiver (p. 225).

Inferences of this sort are unnoticed by common sense. They are only revealed by the examination of the relation of physics to common sense. Russell observes that physics starts out with the intention of justifying naïve realism but ends by elaborating a theory which holds that the perception of a table or chair, for instance, only resembles the physical table or chair in certain abstract structural respects (*ibid.*).

Physical objects and events must be assumed to cause the perceptions of human beings since otherwise there is no reason to accept science in general, and the refusal of this acceptance is probably irrational (p. 228). Positive grounds for the assumption that there are physical and mental events are based on a distinction between these two types of events which are clearer than that provided by common sense. A physical event is one which, if it is known to occur, is an event which is inferred and is not known to be mental. A mental event, on the other hand, is known otherwise than by inference (p. 229).

Given this distinction, the inference from the existence of a percept, such as a red colour patch or the hardness of a common-sensical table, to the existence of a physical object can be justified by appeal to four assumptions:

> ... [T]here are causal chains, each member of which is a complex structure ordered by the spatio-temporal relation of compresence (or of contiguity); that all the members of such a chain are similar in structure; that each member is connected with each other by a series of contiguous structures; and that when a

[2] *Human Knowledge: Its Scope and Limits* (New York: Simon and Schuster, 1948), p. 224.

number of such similar structures are found to be grouped about a center earlier in time than any of them, it is probable that they all have their causal origin in a complex event which is at the center and has a structure similar to the structure of observed events. (P. 228)

The notion that there is an isomorphism between the structure of perceived objects and that of physical objects (for example, that the roundness of the perceptual sun allows the perceiver to infer the roundness of the physical sun) has its origin in *The Analysis of Matter*. In that work, Russell says that his notion of similarity of structure was first developed in *Principia Mathematica* for application to classes, relations, and systems of relations. As applied to relations, two given relations, P and Q, are said to be similar in structure if there is a one-to-one relation between the terms of their fields such that if two terms have the relation P, their correlates have the relation Q, and vice versa. His example of this is the similarity of series. Two series are similar when, without change of order, their terms can be correlated. In *The Analysis of Matter*, the notion of similarity of structure is applied to empirical objects. Thus, a map is similar, if accurate, to the region it maps, and a phonograph record is similar to the music it records.[3]

In *Human Knowledge*, Russell points out that the importance of structure has made physics more like logic, and thus more abstract, than was formerly thought. His example is the physical theory of light. It had been previously assumed that the question of whether light consisted of wave phenomena or of "little packets" of energy—photons—was important. Since it turned out, however, that the equations were the same whether light consisted of waves or of particles and that the verifiable consequences in human experience were also the same, neither hypothesis could claim a greater accuracy in the description of the "real" nature of light. This stems from their indistinguishability in both structure and relation to experience. Russell concludes this point with the caution that, unlike logic, physics is limited in its ability to be assimilated to mathematics by its relation to perceptive experience (p. 256).

The phrase "perceptive experience" first appears in *An Inquiry into Meaning and Truth*, where it is introduced in order to counter the connotation of "perception" that the contents of perception are always veridical.[4] In *Human Knowledge*, however, these terms seem to be used

[3] *The Analysis of Matter* (London: Kegan Paul, Trench, Trubner & Co., Ltd., 1927), p. 249.

[4] *An Inquiry into Meaning and Truth* (London: George Allen and Unwin, 1940, 3rd impression, 1948), p. 121.

interchangeably. Russell's *caveat* thus should apply to both of them.

Throughout the history of the philosophy of perception, Russell thinks, theories of perception have been distinguishable into two types: empirical and idealist. In empirical theories, some continuous chain of causation has been held to lead from the object to the perceiver, "perceiving" being the last link in the causal chain. Idealist theories, on the other hand, are characterized by the view that when the perceiver is by chance in the neighbourhood of an object, a divine illumination causes his or her soul to undergo an experience which is similar to the object. In what it is fair to say is a masterpiece of understatement, Russell observes that each of these theories has its difficulties (*Human Knowledge*, pp. 195–6).

Plato is the originator of idealistic theories of perception, but their culmination is found in the writings of Leibniz. The monads of his theory never interact, but they all undergo parallel developments, so that there is a similarity between what happens to any two of them at any given instant. Russell's example of this is that when one person putatively observes the alleged movement of the arm of another, both persons erroneously conclude that there is a causal visual interaction. The deception involved in these simultaneous beliefs is, for Leibniz as interpreted by Russell, the best proof of the goodness of God. The twentieth-century residue of this "fantastic" theory is the belief that mind and matter are so disparate as to rule out any causal interaction (*Human Knowledge*, p. 196).

The difficulty with empirical theories of perception is that they generally include the belief that there corresponds to any given state of the brain a similar state of the mind and vice versa. As a corollary to this belief, it is held that given one of these states, the other could be inferred by the theorist sufficiently well versed in this correspondence. Now if the usual empiricist notion of causation as invariable sequence or concomitance is assumed, the correspondence between brain states and mind states tautologically involves causal interaction. The result of this train of thought is that theorists wrangle needlessly about whether to reduce mind to brain or vice versa (*ibid.*).

Russell's solution to this difficulty, based on his distinction between physical and mental events stated above, is that sometimes physical occurrences cause mental ones and sometimes the reverse is the case. For instance, a blow on the arm (a physical event) causes its victim to feel pain (a mental event), and a volition (a mental event) causes its originator to raise her or his arm (a physical event). In neither case is causation more or less problematic (pp. 196–7).

There is another difficulty with empirical theories of perception which

is far more important than the one the solution of which has just been outlined. Russell states it as follows:

> Every empiricist holds that our knowledge as to matters of fact is derived from perception, but if physics is true there must be so little resemblance between our percepts and their external causes that it is difficult to see how, from percepts, we can acquire a knowledge of external objects. The problem is further complicated by the fact that physics has been inferred from perception.... (P. 197)

This difficulty is solved on the basis of the four assumptions needed to infer the existence of physical objects from the existence of percepts, cited above. Before this solution can be understood adequately, however, it is necessary to examine what Russell means by the assertion that physics is, in the main, true, and what a percept is.

Every physical theory which stands the test of time undergoes three stages. In the first stage, the theory is a matter of controversy among specialists. In the second stage, the theory is adopted tentatively—but only tentatively—as the one which best fits the available evidence. In the third stage, theorists conclude that new evidence will in all likelihood modify rather than supplant the theory under consideration. Those physical theories which have reached the third stage are, though not certain, so probable that they may be used as premisses in the philosophy of perception (pp. 198–9). There are two working hypotheses from the seventeenth century and three twentieth-century modifications of physical theory in this third stage which Russell thinks apply to perception—or, at least, should be mentioned.

The first working hypothesis is that, in physics, causal laws need to take account only of matter and motion. Physics can safely ignore any qualities of particles, bits of matter, and study only their positions in space at various times. Qualitative differences in particles, if any, are held to be the subject-matter of chemistry. The atomic theory of the twentieth century has, Russell thinks, reduced chemistry to physics theoretically, since differences among elements (to supply Russell with an example here) can now be explained in terms of the number, velocity, and configuration of electrons orbiting around a nucleus rather than, say, the degree of solubility in water. Although he acknowledges that this reduction to physics cannot be extended from chemistry to biology with the same degree of probability, Russell accepts the first hypothesis as extended to both of these sciences (p. 199). I think that his acceptance of this hypothesis probably stems from its exemplification of Occam's Razor.

The second working hypothesis from the seventeenth century is what Russell calls the "independence of causes". In its most general form, this hypothesis states that when a body is subject to several forces, the result of their all acting at once for a given length of time approximates ever more closely to the result of the sum of each force acting alone for the same period of time as the period of time is decreased. The simpler of Russell's two examples of this is that of a person walking on the deck of a moving ship. If the person walks for a minute, he or she will reach the same point with respect to the water as if the person had first stood still for a minute while the ship moved and then the ship had remained stationary for a minute while the person walked. Quantum theory may be an exception to this hypothesis, but as Russell is not sure that it is, he is willing to adopt the hypothesis. The reason for this willingness is that, even if quantum theory is an exception, this hypothesis is still the basis for the mathematical methods of Newtonian physics which are still valid for the explanation of perceptible phenomena which common sense and Aristotle hold to be sublunar (p. 200).

This brings up the three twentieth-century modifications of physical theory. The first of these is that instead of the two Newtonian manifolds of space and time, physics now postulates the four-dimensional Einsteinian manifold of events. Secondly, causal laws no longer suffice to determine individual events but only statistical distributions. Third and finally, change is probably discontinuous.

These three modifications are not so troublesome to the theory of perception as they otherwise might be, Russell thinks, because the second and third only apply to microscopic occurrences, while physical events, such as speaking, associated with mental events are macroscopic by comparison. From this he concludes that if the human body is held to be determined wholly by physical laws, the determination of what a person will say as well as the other "large-scale" motions of the body are adequately explained by classical Newtonian physics (pp. 200–1). This conclusion, it is now clear, is in effect the reason behind his rationale in accepting the second working hypothesis from the seventeenth century.

In order to explain what he means by a percept, Russell recurs to common sense. A percept is what happens when common sense would indicate that a person sees something, hears something, or in general believes himself or herself to have become aware of something through the senses. Russell uses the example of seeing the sun.

Common sense tells us that the sun is always (during the daytime) in the sky, but it is only seen sometimes. When a person looks away or shuts his or her eyes or is otherwise occupied the sun is not seen, but the sun is seen sometimes. All of the occasions in which the sun is seen have certain

resemblances which allow the person in infancy to use the word "sun" on appropriate occasions. Some of the resemblances during right occasions of seeing the sun are in the person. For instance, one's eyes must be open and facing in the right direction. Other resemblances during right occasions, however, are held to be independent of the person. Such resemblances are the roundness, brightness, and heat of the sun. These resemblances are held by common sense to be properties of the object called the "sun", and whenever there is a relation between the occurrence of these qualities and the disposition of the human subject, common sense concludes that the human being "perceives" the physical sun (p. 203).

It is at this point that physical theory intrudes upon common sense, for physics claims that "brightness", for example, is not a property of the physical sun in the sense in which "brightness" is usually understood. Rather, according to physics, the sun is a source of light rays which produce certain effects upon eyes, nerves, and brains. When the light rays emitted from the sun do not encounter a living organism, brightness does not exist. Furthermore, according to physical theory, the physical sun inferred from the solar rays currently being experienced existed eight minutes previously, so that if the sun were extinguished, the perception of the sun by a person on the earth could persist for up to eight minutes after the fact. The sun as seen, therefore, cannot be identified with the sun as it is in itself, even though the sun as seen is the basis for inferring the existence of the physical sun (pp. 203–4).

In order to infer the existence of an object, such as the sun, from experiences of qualities, or percepts, in accordance with the four assumptions quoted above, Russell thinks it is necessary to locate percepts in the causal chains of physics. His example this time is "hearing a noise".

A percept such as hearing a noise has antecedents which travel in space-time from the physical source of the noise through the air to the ear, nerves, and brain of the hearer. The experience called "hearing the noise" is simultaneous with the arrival in the brain of a term of the series of these antecedents. Russell concludes from this that in order to fit the experience of hearing the noise into a physical causal chain, the experience must be connected with the same region of space-time as the cerebral term of the series of antecedents. This applies not only to hearing the noise but also to the noise as heard, and the only region of space-time in which there is a direct connection of this sort is the state of the hearer's brain at the time during which the cerebral term of the series of antecedents is present there. The same argument applies to all the senses equally (p. 204).

The point of this argument, Russell maintains, is that William James' attack on perceptual dualism—his denial that perception may be explained adequately as a relation between a perceiving subject and a perceived object—has not been taken far enough by those who claim to have taken it to heart. A truly rigorous adoption of James' position would require its adherents to hold not only that acts of perception are literally in the perceiver's brain but that the objects of perception are literally there also (p. 205).

II. DEFENCE AGAINST SOLIPSISM

Having established an invariable connection between the object of perception and the causal physical series of antecedents, Russell can use the four assumptions, based largely on the notion of structure, to infer the existence of physical objects from the existence of percepts. A problem arises here, though.

If mental events are events known otherwise than by inference, then percepts, such as seeing the sun and hearing a noise, must be mental events. On the other hand, if physical events are events known by inference and not known to be mental, then causation as an operation, since it is part of physical theory, must be physical. The problem is that Russell holds that both the experience of perceiving and the percept as experienced are mental events but that they can be located on the basis of causal theory in the human brain.

A close examination of what Russell thinks happens at the time of perception reveals that in the first place he never identifies the cerebral term of the causal series with either the experience of perceiving or the percept; he asserts merely that they occur simultaneously. It is this simultaneity which allows all the theoretical assumptions based on the notion of structure to be employed, and it is the employment of these assumptions which allows the existence of physical objects to be inferred. The example of seeing a flash of lightning illustrates this.

The physicist holds that a flash of lightning is an electrical discharge which generates electro-magnetic waves in all directions from its atmospheric source. When those waves reach a human eye connected with a human brain, they cause reactions of the sort studied by the physiologist. When this causal process reaches a human brain, the person whose brain it is "sees" the flash. If that person is ignorant of physics, he or she thinks that what takes place is a relation between that person and the flash called "perceiving" the flash. The person initiated into physics does not think this, but nevertheless believes that what is experienced in "seeing" this phenomenon yields a reliable basis for knowledge of the physical world (p. 206).

In the second place, since Russell's definitions of physical and mental events in *Human Knowledge* allow for physical causes to have mental effects and vice versa, as mentioned above in the example of motions of the arm, the distinction between what is mental and what is physical belongs properly to epistemology rather than to metaphysics. Thus, if placing the mental events of perception into causal series allows perception to be explained by physics, as Russell clearly thinks it does, the problem vanishes.

The waters, I think, are slightly muddied by the use of the terms of behaviouristic psychology to summarize the nature of percepts, but not so violently as to jeopardize his theory. He states:

> Percepts, considered causally, are between events in afferent nerves (stimulus) and events in efferent nerves (reaction); their location in causal chains is the same as that of certain events in the brain. Percepts as a source of knowledge of physical objects can only serve their purpose in so far as there are separable, more or less independent, causal chains in the physical world. This only happens approximately, and therefore the inference from percepts to physical objects cannot be precise. Science consists largely of devices for overcoming this initial lack of precision on the assumption that perception gives a first approximation to the truth. (P. 209)

The psychological and physiological terms used in this passage function only to locate and not to identify percepts. Also, the sentence asserting the necessity of separable and independent causal chains in the world for the inference of physical objects from percepts is an application of the second working hypothesis from the seventeenth century, but in reverse. If percepts are to yield knowledge of the physical world, it must be possible not only to add together discrete percepts occurring simultaneously, but also to isolate each one so occurring.

Russell's example of this is seeing sheets of paper, books, trees, walls, and clouds simultaneously. If the separateness of these percepts in one's visual field is to count as evidence for the separateness of the physical objects inferred from them, it must be assumed that each of these physical objects so inferred starts a relatively separate causal chain arriving at the eye of the perceiver without much interference from the rest, and the theory of light includes this assumption (p. 206). Russell could have added that the theory of physiology makes a corresponding assumption regarding the impulses which travel from the eye through the optic nerve to the brain.

The four assumptions, referred to above, which in *Human Knowledge* Russell thinks are necessary for the inference of the existence of physical objects from the existence of percepts, turn out to be the first four postulates assumed in adopting the scientific method. There is a fifth postulate, the postulate of analogy, which applies not directly to the nature of perception but rather is advanced to counter solipsism.

Analogy is a necessary postulate for knowledge of the qualitative character of the physical world; the other four postulates suffice for knowledge of its space-time structure. That this is the case is illustrated by a domestic example. A philosopher may pretend that he or she knows only the space-time structure of other human minds or the capacity of those other minds for beginning causal chains which end in sensations of one's own, but if once this philosopher becomes cross with his or her spouse, who could say that this philosopher regards that spouse as merely a spatio-temporal assemblage of which the logical properties are known but not a trace of the intrinsic character? Such scepticism, Russell observes wryly, is professional rather than sincere (p. 482).

The postulate of analogy states that whenever two events, or classes of events, A and B, can be observed, and there is reason to believe that A causes B, then, whenever A or B is observed in the absence of observation of the other, it is probable that the other event or class of events occurs even though unobserved (p. 493). The argument for this postulate is that from subjective observation one concludes that A, a thought or feeling for example, causes B, a bodily act such as an utterance. It is also thus known that whenever B occurs as an act of one's own body, A is its cause. When B is observed in a body not one's own, the observer notes that he or she herself is not experiencing A, but, since the observer believes that only A can cause B, he or she therefore infers that there exists an unobserved A which caused B. This is the ground for the inference that other persons' bodies are associated with minds which resemble one's own to the degree that observed bodily behaviour resembles one's own (p. 486).

There are other applications of the postulate of analogy besides the inference to other minds, however. One example of this is the connection of some kinds of visual appearance with the expectation of hardness.

A certain sort of tactile sensation exists which prompts the person experiencing it to label that which is touched "hard". The word "hard" itself, Russell maintains, is a causal word denoting that property of an object by virtue of which a definite kind of tactile sensation is experienced in the perceiver. The other four postulates allow the perceiver to infer that there is such a property possessed by bodies when they are causing the sensations in question. Those four postulates do not enable the perceiver to infer that bodies have this property when not being touched, however. Since, when a body is both seen and touched, hardness is

associated with a certain sort of visual appearance, the postulate of analogy allows the perceiver to infer that hardness is probably associated with such a visual appearance even when the perceiver is merely seeing but not touching that which is perceived (p. 494).

The inference to other minds, the counter to solipsism which is the primary reason for the postulate of analogy, is important to the philosophy of perception because of what solipsism entails. "I alone exist" is an inadequate way of stating the solipsistic thesis because, Russell asserts, the notion of the self is meaningless without the notion of others, and if others exist the thesis is false (p. 176).

One way of amending the solipsistic thesis would be to say, "Data are the whole universe." "Data" here would have to be defined by enumeration, and when the process of enumeration was finished, one of two assertions would have to be made. The first assertion is that there is nothing more, and the second assertion is that nothing more is known. These two assertions reveal the two kinds of solipsism.

The first kind is what Russell calls "dogmatic" solipsism. This kind asserts that there is nothing beyond data. No grounds whatever exist for this dogmatic form because it is as difficult to disprove as to prove existence, so Russell concentrates on the second form, the "sceptical" form, instead. The problem of the sceptical form of solipsism, stated in such a manner that no notion of the self is included, is the following:

> The propositions $p_1, p_2, \ldots p_n$ are known otherwise than by inference. Can this list be made such that from it other propositions, asserting matters of fact, can be inferred? (P. 176)

If this list contains only propositions asserting matters of fact, the answer is "no" and sceptical solipsism is true. On the other hand, if the list contains laws of any sort, but especially synthetic or natural laws, the answer is "yes" and sceptical solipsism is false (pp. 176–7).

Sceptical solipsistic theories come in degrees. In their least drastic form they allow not only immediate percepts but also mental states of the perceiver accepted by common sense or orthodox psychology, including those of which the perceiver is directly aware and those inferred by psychology. They include unnoticed events in the range of hearing, such as ticking clocks, and objects in the periphery of the field of vision (p. 177).

Russell's point in introducing the least drastic form of sceptical solipsistic theories is to point out that their admission of common-sensical and psychological inferences is illogical. The reason for this illogicality, he maintains, is that the principles needed to justify inferences from mental states of which one is directly aware to mental states of which one is not directly aware are identical to those needed to infer the existence of both physical objects and other minds. The consistent sceptical solipsist is therefore driven to a much more drastic form of his or her theory (pp. 177–8).

In the more drastic form of sceptical solipsism, the solipsist must say that the universe consists of an enumeration of items of which the perceiver is directly aware at the time of enumeration. This direct awareness must take the form of noticing these items, for those unnoticed items, such as a sleeping dog by the fireplace, would let in inferences which the rigour of this more drastic form precludes.

Memory also undergoes a severe modification in the more drastic form of sceptical solipsism. Since what is recollected at one moment differs from what is recollected at another, only what is remembered in the present may be allowed. The world of the thoroughgoing sceptical solipsist would thus be one of disjointed fragments changing from moment to moment. This change could not affect what exists now, since what exists now is all that can be known, but would change what is known to have existed in the past.

Even this alteration of what it means to remember objects and events is insufficient for the determined sceptical solipsist, however, for it is obvious that one can "remember" occurrences which never in fact happened. To avoid this possibility, remembered events should be banished from the solipsist's universe and only present percepts, including those purporting to be recollections, should be allowed.

What remains of solipsism, then, is what may be stated in the form "*A*, *B*, *C* ... occur." This form is similar to Descartes' *cogito* with the differences that these occurrences could not be called "thoughts", since to do so would allow inferences which on the theory are inadmissible, and, of course, that these occurrences are always experiences and never inferences (pp. 178–9).

Russell thus presents the sceptical solipsist with a dilemma. Either sceptical solipsism must be accepted in its most drastic form, or it must be admitted that in addition to experience there exists some principle or set of principles which allows the knower to infer events from other events with at least probability if not certainty. To accept the first alternative is not logically inconsistent, but the price of consistency is a discontinuous world. To accept the second alternative, as Russell does, requires that empiricism as a theory of knowledge must be modified. This modification must take the form of admitting some principle or set of principles which, when applied to perception, will yield knowledge of physical reality on the one hand, but which is not itself capable of being

inferred from perception on the other (pp. 179–80). Russell's five postulates of scientific inference constitute his working out of this modification in detail.

III. SUMMARY AND COMMENTARY

Russell's philosophy of perception in *Human Knowledge* now may be summarized. A mental event is an occurrence which is known otherwise than by inference. A physical object or event is one which is known by inference and which is not known to be mental. The distinction between mental and physical entities and processes thus belongs properly to epistemology rather than to metaphysics.

Percepts are those experiences of the human being (and, by inference, of other animals), such as seeing an object or hearing a noise, which are disclosed to the perceiver by the senses. Percepts are not known by inference and so are mental events.

Inference from percepts to physical objects and events is governed by the five postulates of scientific inference. The first four of these postulates are that there are causal chains (series), each member of which is ordered by compresence or contiguity in space-time; all the members of a given chain are similar in structure; each member of a given chain is connected with all the other members of the same chain by a series of contiguous structures (each term of a series is related to all other terms of the same series); and, when a number of such similar structures are grouped around a centre earlier in time than any of them, there is a probability that each and every structure so grouped is caused by a complex event at the centre of the cluster, this complex event having a structure similar to that of the observed events. The application of these four postulates to percepts yields the space-time structure of the physical world.

Analogy, the fifth postulate of scientific inference, asserts that when two kinds of observed events, A and B, occur, and A causes B, then the existence of either A or B may be inferred even if only one of them is observed. This postulate rules out solipsism and thus asserts that the space-time structure yielded by the first four postulates is public. All of the propositions describing space-time structure, considered collectively, constitute the body of knowledge which is science. The assertion by the postulate of analogy that space-time structure is public is therefore the assertion that science is public.

Perception is included in the description of space-time structure, and thus in scientific knowledge, because whenever percepts occur they do so simultaneously with cerebral terms of causal series, located in the brain of the perceiver. This simultaneity allows the first four postulates of scientific inference to apply to the process of perception and to space-time structure equally. Indeed, since they are governed by the same laws, the process of perception is itself located in space-time, specifically in the brain of the perceiver at the time of the simultaneous arrival of the cerebral term of a causal series and the occurrence of a percept.

Russell's philosophy of perception in *Human Knowledge* differs greatly from that contained in *The Problems of Philosophy*, *Our Knowledge of the External World*, *Mysticism and Logic*, and *The Analysis of Mind*. It may be considered the culmination of the philosophy of perception as discussed in *The Analysis of Matter* and *An Inquiry into Meaning and Truth*. To show this conclusively would require a book rather than an essay, but a few points may be mentioned in order to render this conclusion at least plausible.

In "The Relation of Sense-Data to Physics", first published in 1914 but reprinted as Chapter VIII of his 1918 work *Mysticism and Logic*, Russell states that physics is generally supposed to be an empirical science, the results of which should be calculable beforehand and verified subsequently by observation and experiment. But nothing is learned by physics in so far as it relies only on observation and experiment except immediate data of sense such as patches of colour, sounds, smells, tastes, tactile sensations, and spatio-temporal relations among these. The supposed contents of the world, ranging from sub-atomic particles through atoms and molecules to large-scale physical objects and events, are very different from sense-data.

These supposed physical objects and events can only be empirically verified by means of their correlation with sense-data. Empirical correlation can only occur when the *correlata* are constantly found together, but since only sense-data are ever found this correlation would seem to be impossible in physics.

There are two ways of avoiding this result. One way is to say that some principle or set of principles is known *a priori*, without the need of empirical verification. Such a process makes physics non-empirical, and so to be avoided. As has been shown above, Russell later came to believe that physics is not *totally* empirical but that empirical methods should be used whenever possible.

The second way is to define the objects of physics as functions of sense-data. This alternative, Russell thought in his earlier writings including *Mysticism and Logic*, must be possible since physics leads to human expectations, and such expectations can only apply to what is capable of being experienced. When waves of certain frequencies impinge on the eye, for instance, colours are seen, but since the waves are inferred from the colours rather than vice versa, physics cannot be validly

based on empirical data until the waves have been expressed as functions of colours and other sense-data.

Russell summarizes the problem of assuming that physics gives genuine knowledge of the external world and of simultaneously assuming that physics is empirical by pointing out that physics exhibits sense-data as functions of physical objects, but verification is only possible if physical objects can be exhibited as functions of sense-data. His programme for solving this problem is to solve the equations giving sense-data in terms of physical objects so that physical objects are, instead, yielded in terms of sense-data.[5] His method of solving these equations is that of construction. The maxim of constructionism is that, wherever possible, logical constructions should be substituted for inferred entities. In *The Problems of Philosophy*, *Our Knowledge of the External World*, and *Mysticism and Logic*, he applied this method to construct physical objects, physical space, and physical time from sense-data and functions of sense-data such as appearances, aspects, and perspectives.

Clearly, by the time *Human Knowledge* appeared in 1948, this programme had been abandoned. One of the chief reasons for this abandonment was Russell's adoption of neutral monism, enunciated most clearly by William James in his 1904 work, "Does 'Consciousness' Exist?".[6] In summarizing James' position in *Bertrand Russell's Theory of Knowledge*, Elizabeth Ramsden Eames says that James raised the question of the reality of entities placed in one pole or the other of the dualistic epistemological positions of inner and outer, subject and object, knower and known. These dualisms could be replaced with the view that there is one experience—the monism of neutral monism—which considered in one way is subjective and considered in another way is objective. This position is neutral because it is weighted neither towards idealism nor towards materialism. It thus avoids the metaphysical dualism between matter, or body, and mind and the epistemological dualism of subject and object (*ibid.*, p. 100).

Russell, in *The Analysis of Mind* in 1921, states that he accepts the view of neutral monism as regards sensations because what is seen or heard belongs equally to physics and psychology. Images, on the other hand, belong only to the mental world, while any occurrences which are unexperienced belong only to the physical world. There are, at least apparently, different sets of causal laws for physics and psychology. Gravitation, for example, is a law of physics, while the law of association

[5] *Mysticism and Logic* (New York: W. W. Norton, 1929), pp. 145–7.
[6] Elizabeth Ramsden Eames, *Bertrand Russell's Theory of Knowledge* (London: George Allen and Unwin, 1969), p. 101.

of ideas is a law of psychology. Sensations, being subject to both kinds of laws, are neutral.[7] It can be seen from this argument that Russell's neutral monism was not thoroughgoing (at least if James' radical empiricism is taken as a model), for sensations and images are not governed by the same law.

By the time of the appearance of *Human Knowledge*, this bifurcation of causal operations had dropped out of Russell's position. Russell mentions sensations and images in *Human Knowledge*, but they are analyzed from the point of view of physiology and psychology (pp. 36–42, 109–10). The result of this analysis is that "sensation" and "image" have been reduced to technical terms. What I mean by this is that hearing a noise and dreaming that a noise is heard are sensations and images respectively when they are studied in others by psychologists and physiologists. When these experiences occur in the individual considering them, however, sensations and images are cognitively important and are percepts. Percepts, then, are sensations and images as elements of epistemology rather than merely of psychology and physiology. Percepts, as thus distinguished from sensations and images, are explicable by the same set of causal laws as physics. The distinction between sensations and images in *The Analysis of Mind* thus loses its epistemological importance in *Human Knowledge*.

In replying to an article by W. T. Stace on his neutral monism, Russell responds to Stace's charge that Russell follows Locke in regarding secondary but not primary qualities as subjective. Russell denies the charge and claims instead that he regards both primary and secondary qualities as subjective in the sense that they cannot exist except in a region in which there is an organism with a brain and sense-organs. In spite of adhering to this sense of subjectivity, however, Russell maintains that both primary and secondary qualities are causally connected with what exists elsewhere, and it is through this causal connection that human percepts are linked to physical events. This reply was written in 1943 and published in 1944.[8] As shown above, this line of thought was elaborated in 1948 in *Human Knowledge*.

Phenomenalism is the view that the physical entities and events of physics and common sense have the same ontological status as the phenomena experienced by the senses, such as colour patches, sounds, and so on. It is possible for a realist to subscribe to the same view, but with the crucial difference that the phenomenalist regards the perceived

[7] *The Analysis of Mind* (London: George Allen and Unwin, 1921), pp. 25–6.
[8] "Reply to Criticisms", *The Philosophy of Bertrand Russell*, ed. Paul Arthur Schilpp (Evanston, Illinois: Northwestern University, 1944), pp. 679–741 (at 709).

object as not existing in the absence of perception, whereas the realist does not. A paradigm of phenomenalism is the philosophy of Berkeley.

It is still a lively topic of inquiry among commentators on Russell as to whether, in adopting neutral monism, he adopted phenomenalism as well. Russell himself denied that he ever adopted phenomenalism (*ibid.*, p. 718). Ronald E. Nusenoff, however, maintains that the Russell of *The Analysis of Mind* was a phenomenalist and challenges the interpretation of Eames on this point.[9]

Eames states that Russell did not adopt phenomenalism in *The Analysis of Mind* because, in that work, Russell accepted the results of physics, physiology, psychology, and their attendant causal explanations. Also, she adds, the rejection of the causal explanations of science would entail the collapse of Russell's distinction between sensations and images—a distinction central to the epistemology of *The Analysis of Mind* (n. 54, p. 134). Nusenoff argues that Eames' textual evidence, Russell's chapter in *The Analysis of Mind* on sensations and images, does not support her conclusion. Specifically, Nusenoff cites a distinction made by Russell where he claims that images have mnemic causes (causes attributable to the psychological law of the association of ideas and including memory) and physical causes, whereas sensations have only physical causes.[10] Nusenoff does not see why this distinction necessitates the existence of physical objects (p. 73). To justify this reluctance, he cites Russell's definition of causal laws in "Reply to Criticisms", where Russell maintains that causal laws are just "any principles which, if true, enable us to infer something about a certain region of space-time from something about some other region or regions.[11]

There are a few points to be noticed here. First of all, the inference from one region of space-time to another is an inference from a perceived to an unperceived region. Secondly, causal laws are *ex hypothesi* true. Third, the combination of these first two points yields the result that perception is not constitutive of the causal laws nor of the inferred physical object. Perception is necessary for knowledge of the existence of the inferred object, for the perceived object is the basis for inference to the inferred object, but not for the existence of the inferred object. Fourth, earlier in that chapter (and Eames' textual evidence is, after all, the entire chapter and not merely the passage cited by Nusenoff) Russell agrees with Stout that the causes of sensations are external to the experi-

[9] "Russell's External World: 1912–1921", *Russell*, nos. 29–32 (1978): 65–82 (at 73).
[10] *The Analysis of Mind*, pp. 150–1.
[11] "Reply to Criticisms", p. 701.

ence of the sentient being in whom they occur.[12] These considerations lead me to hazard the opinion that Eames' textual evidence is adequate and that Russell was correct in his assertion that he never adopted phenomenalism. Having said this, however, it must be admitted that Russell's earlier philosophy of perception was much closer to phenomenalism than his later account in *Human Knowledge*.

IV. EPILOGUE

Russell's epistemology is far too detailed and comprehensive to allow for a general account of it to be included in an essay on his philosophy of perception. It is nevertheless appropriate to close with his own statement of the beacon light which guided the development of his theory of perception through the years:

> [E]mpiricism as a theory of knowledge has proved inadequate, though less so than any other previous theory of knowledge. Indeed, such inadequacies as we have seemed to find in empiricism have been discovered by strict adherence to a doctrine by which empiricist philosophy has been inspired: that all human knowledge is uncertain, inexact, and partial. To this doctrine we have not found any limitation whatever. (*Human Knowledge*, p. 507)

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[12] *The Analysis of Mind*, p. 149.