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C. D. Broad (1887–1971)

JAMES VAN CLEVE

Charlie Dunbar Broad was a leading contributor to analytic philosophy of the twenti-
eth century, known not so much for any startlingly original doctrines he propounded
as for his formidable powers of distinction, analysis, and argument. Born in London,
he was educated at Dulwich College and Cambridge. He entered Cambridge in 1905,
first studying physics and chemistry in the natural science tripos and then switching
to philosophy in the moral science tripos. The influence of Russell and Moore at
Cambridge was then very strong and shows itself in Broad's work (see RUSSELL and
MOORE). He published his dissertation as *Perception, Physics, and Reality* in 1914. For a
period of years beginning in 1911 he served as G. F. Stout's assistant in St. Andrews,
and in 1920 he was appointed professor at the University of Bristol, where he gave the
course of lectures in philosophy for natural science students that became *Scientific
Thought*. In 1922 he delivered the Tarner Lectures, subsequently published as *The Mind
and Its Place in Nature*, and was invited to succeed McTaggart as lecturer at Cambridge.
After McTaggart's death in 1925, he oversaw the publication of the second volume of
McTaggart's *The Nature of Existence*, which served as the stimulus for writing his own
monumental *Examination of McTaggart's Philosophy*. (This is the book of choice for any
metaphysician who is sentenced to exile on a desert island.) From 1933 until his retire-
ment in 1953 he was Knightbridge Professor of Moral Philosophy at Cambridge. His
other books include *Five Types of Ethical Theory* (1930) and two collections of papers,
Ethics and the History of Philosophy (1952) and *Religion, Philosophy, and Psychical
Research* (1953). After his death his student Casimir Lewy published his courses of
lectures on Leibniz and Kant.

The scope of Broad's interests was vast. Selected for attention in this article are four
main topics: his conception of "critical philosophy," his writings on sensa and percep-
tion, his philosophy of time, and his views on the relation of mind to matter.

Not covered here are Broad's important contributions to the following areas: induc-
tive logic (he sought to identify and justify some principle about the world that, if true,
would make induction legitimate); determinism and freedom (he argued that the notion
of "obligability" or moral responsibility is incompatible both with determinism and with
indeterminism, making it a problematic concept); the relevance of psychic research to
philosophy (he assessed the evidence for paranormal phenomena and identified meta-
physical principles that would have to be given up if the reality of such phenomena

became established); and ethics. His *Five Types of Ethical Theory*, a study of the ethical systems of Spinoza, Butler, Hume, Kant, and Sidgwick, was a widely used text; he also wrote influential papers in metaethics, clarifying the status of non-naturalist intuitionism of the sort espoused by Moore, naturalist theories of the "moral sense" variety, and non-cognitivist or "interjectional" theories.

Critical versus speculative philosophy

In a discussion of the nature and value of philosophy in the introduction to *Scientific Thought*, Broad distinguished two branches of his subject, critical philosophy and speculative philosophy. The first task of critical philosophy is "to take the concepts that we daily use in common life and science, to analyse them, and thus to determine their precise meanings and their mutual relations." Concepts ripe for such analysis include the concepts of substance, cause, place, date, duty, and self. The second task of critical philosophy is to test the beliefs that we constantly assume in everyday life and science, "resolutely and honestly exposing them to every objection that one can think of oneself or find in the writings of others." Beliefs subject to such critical scrutiny include the beliefs that we live in a world of objects that are independent of our knowledge of them and that every event has a cause. We may emerge from critical philosophy with verbally the same beliefs we started with, but the process will have "enabled us to replace a vague belief by a clear and analysed one, and a merely instinctive belief by one that has passed through the fire of criticism." He then went on to characterize speculative philosophy as follows:

> Its object is to take over the results of the various sciences, to add to them the results of the religious and ethical experiences of mankind, and then to reflect upon the whole. The hope is that, by this means, we may be able to reach some general conclusions as to the nature of the Universe, and as to our position and prospects in it.

Broad noted that speculative philosophy is less certain in its results than critical philosophy, and that it must be augmented by critical philosophy if it is to be of any value. He engaged in both varieties of philosophy himself, but his strong suit was critical philosophy. I think it is fair to say that many analytic philosophers would cite Broad's definition of critical philosophy as an excellent description of what they do and Broad himself as an outstanding practitioner of it.

Sense-data and perception

Broad was one of the leading exponents of a sense-datum theory of perception. The term "sense-datum" was introduced by Russell and Moore; Broad himself almost invariably preferred the term "sensum." Though sometimes used broadly to cover the sensuous aspect of experience in general (however it may be analyzed), the terms "sense datum" and "sensum" have for Broad and other philosophers of his era a narrower and more precise meaning. The notion of a sensum has application only if one adopts an act–object analysis of sensory experience. To see what this means, consider the various types of sensory experience arranged in an order, starting with those

of sight, passing through those of hearing, taste, and smell, and ending with bodily sensations like headache. At the beginning of the series, Broad claimed, it seems plausible to analyze a sensation of red into two components, an act of sensing and a red object. At the other end of the series, it does not seem plausible to analyze a sensation of headache into an act of sensing and a "headachy" object. Having a headache is not sensing some*thing* – it is sensing some*how*. In the middle of the series (with taste and smell), it may not be obvious whether one can distinguish act and object. Some philosophers have assimilated the entire series to one or the other end of it, advocating either an act–object analysis across the board (H. H. Price) or an objectless "way of sensing" analysis across the board (Thomas Reid). Broad saw no reason to treat the entire series uniformly; he took bodily sensations to be objectless, but espoused an act–object analysis at least for sight, hearing, and touch. "It seems to me much more certain that, in a sensation of red, I *can* distinguish the red patch and the act of sensing it, than that, in a sensation of headache, I *cannot* distinguish a headachy object, and an act of sensing it" (1923: 256). The red patch that figures as the object-component in the sensation of red is the sort of thing Broad meant by a sensum.

That is not to say that when I am seeing a ripe tomato, the tomato is a sensum. Even if my experience of a tomato were a total hallucination and there were no red physical objects in my environment, there would still be something red that I am sensing, and that something is a sensum. Thus sensa are not automatically to be identified with physical objects or even parts of them; their relation to physical things is a more complex affair to be discussed further below.

The theory of sensa may be expounded further by noting some of the familiar facts it is meant to explain. When viewing a penny or a coffee cup tilted away from my line of sight, I may be certain that I am having the experience expressed by "This looks elliptical to me," even though I know that in fact the penny or the cup is not elliptical but round. This much is supposed to be a fact on which all parties agree. The sensum theory analyzes the situation as involving "the actual existence of an elliptical object, which stands in a certain cognitive relation to me on the one hand, and in another relation, yet to be determined, to the round penny" (1923: 237–8). This elliptical object is a sensum. Broad pithily conveyed the guiding motivation for positing it as follows: "If, in fact, nothing elliptical is before my mind, it is very hard to understand why the penny should seem *elliptical* rather than of any other shape" (p. 240).

Generalizing from what Broad says about the penny, we may put the essential core of the sensum theory as follows: whenever any object x appears to a subject S to have a property F, it does so because S is directly aware of an item y (a sensum) that really does have the property F. The item y is the sensum, and its relation to x cannot in general be identity (since if x appears F without being F, y is F and x is not). (Certain restrictions are to be understood as attaching to this formulation; "appears F" is used phenomenally, not comparatively, and the variable F ranges over color, shape, and distance.) It is generally held that sensa themselves, unlike physical objects, never appear to have any property F without really having it. This is implicit in the reason for positing sensa in the first place: if sensa could appear to have properties they do not really have, we would have to posit a second tier of sensa to be the bearers of the properties apparently possessed by sensa in the first tier.

What about the converse assumption, that sensa have *only* the properties they appear to have? Broad denied this, holding that sensa may be more variegated or determinate than they appear to be. This enabled him to avoid the objection that sensa would be indeterminate in their properties. If a sensum appears to be many-speckled without appearing to be exactly *n*-speckled for some *n*, Broad does not have to say that the sensum has speckles without having any definite number of them.

Many writers assume that visual sensa must have only two dimensions – that they are extended in length and breadth, but altogether lacking in depth. Broad argued to the contrary that visual sense data are as fully voluminous or three-dimensional as any objects in physical space. Many writers assume that sensa are mental entities. This, too, Broad denied. According to him, they are neither mental nor physical, but have a leg in each realm (1925: 184). For example, they are like physical objects in having spatial qualities like extension and shape, but like mental things in being private to observers and sense modalities. Their privacy, however, does not mean that sensa are existentially mind-dependent; like Russell, Broad accepted it as a real possibility that there can be unsensed sensibilia.

Sense-data have been out of vogue for nearly fifty years. Opposition to them has stemmed from two main motives. First, they are hard to accommodate within a purely physicalist view of the universe: if the experience of red, whether veridical or not, involves a literally red object, it is hard to see with what brain entities or processes this red object could be identified. Second, sensa make difficulties for direct realist accounts of perception: they are often thought to constitute a "veil" between perceivers and the physical world, cutting us off not only from direct perception of physical things but knowledge of them as well.

What, then, are the alternatives to admitting sensa? A radical alternative is to deny (with Daniel Dennett and others) that there is a sensuous element in experience at all, in which case there would be nothing for the sensum theory to analyze. Broad would have dismissed this suggestion as a flagrant denial of the facts. He did, however, recognize two alternative analyses of the facts in addition to the sensum theory: the multiple relation theory and the multiple inherence theory. The first of these alternatives is mentioned, though not discussed, in *Scientific Thought*; both are discussed in *The Mind and Its Place in Nature*.

One way to understand the differences among the three theories is to see what each would say about the phenomenon of perceptual relativity: the fact that the same object can appear to have different properties to different observers or from different viewpoints, as when water feels hot to one hand and cold to another, or a mountain looks blue from a distance and green close up. It would be contradictory, of course, to say that the same mountain is both green and blue, period. But there are three ways to state the facts of perceptual relativity without contradiction. First, we can say that the incompatible colors inhere in different subjects. This is what the sensum theory says: I sense one batch of sensa (blue ones) when I am viewing the mountain from afar and another batch of sensa (green ones) when I am standing on the summit. Second, we can say that the mountain looks blue as I approach it on the highway, that it looks green when I get there, and that on at least one of these occasions it looks to have a color that nothing in the situation actually has. This is what Broad called the "multiple relation theory of appearing"; it holds that appearing *F* is an unanalyzable relation between an

object, a property, and a mind, not involving the existence of any entity that really is *F*. Third, we can say that the mountain *is* blue *from here* and that it *is* green *from there*, avoiding contradiction by expanding the number of places in the relation of inherence. This is the multiple inherence theory, in which we give up the ordinary view that the inherence of a color in a thing is a two-term relation between the color and the thing; rather, it is a three-term relation between a color, a thing, and a place or a viewpoint. Colors do not inhere in objects simply, but only in objects (or "regions of pervasion") from places (or "regions of projection").

The multiple relation theory has the counterintuitive consequence that objects "can have qualities which are different from and inconsistent with those which they seem on careful inspection to have" (1925: 160). The multiple inherence theory involves a puzzling new form of inherence; in addition, it has the puzzling consequence that the colors of objects are "causally adventitious" to them, in the sense that the immediate causal determinants of the color pervading a region lie not in that region but in some other region, a "region of projection" containing a suitably functioning brain. Broad did not think either of these theories was decisively refutable, but he found the sensum theory preferable on the whole.

A further possibility is worth mentioning. One may accept the verbal formula Broad uses in characterizing the multiple relation theory – "an object can appear *F* without anything's being *F*" – without taking the relation of appearing *F* as unanalyzable. That, in effect, is what Roderick Chisholm does, analyzing "*x* appears *F* to *S*" as "*x* causes *S* to sense *F*-ly." He abandons the act–object analysis of sensing in favor of an adverbial approach, according to which to have a sensation of red is simply to sense in a certain way. He then analyzes the relation of an object's looking red to *S* as a matter of the object's causing *S* to sense redly.

It remains to say something about Broad's views on the relation of sensing to perceiving and of sensa to physical objects. When I perceive something, I do not merely sense a sensum; I also believe in an object (e.g. a bell or a candle) to which the sensum is related. Broad devoted considerable attention to analyzing this belief and its object. He worked out elaborate answers to questions like these: how do physical objects cause sensa, and how are the places, dates, durations, shapes, and sizes of physical objects to be defined or known in terms of the corresponding features of sensa? The corresponding features of sensa that go by the same name are sometimes literally the same and sometimes not. Sensa and physical objects both have shape in the same sense, but they do not have location in the same sense. Sensa are literally located only in their own spaces (e.g. a sensum of color may be in the center of one's visual field). They may also be assigned locations in physical space, but only in a "Pickwickian" sense. Roughly, to say that a visual sensum *s* is "in" physical place *p* means this: if I turn my head to bring *s* into the center of my visual field and then follow my nose, I will bring myself closer and closer to *p*, obtaining along the way a series of sensa like *s* but becoming larger and brighter until I eventually advance beyond *p* and the *s*-like sensa disappear.

Broad was never a phenomenalist, one who believes that physical objects are composed (or logically constructed) entirely of sensa. He believed that physical objects are heterogeneous composites, containing as literal parts atoms or whatever tinier particles are recognized by the best science of the day and containing as Pickwickian parts sensa belonging to the various sense realms. He also espoused something like the

traditional distinction between primary and secondary qualities, maintaining that shapes inhere literally both in the scientific constituents of physical objects and in sensa, while colors inhere in sensa alone. His main reason for denying that colors inhere in physical objects was that we need to refer to the shapes of physical objects to explain why we sense sensa of various shapes, but do not need to assign colors to physical objects in order to explain why we sense colored sensa.

Philosophy of time

Broad had a good deal to say about the nature of space and time, including interpretations in *Scientific Thought* of Einstein's Special and General Theories of Relativity, which were then fairly new on the scene. I focus here on his more purely metaphysical views about time, as presented both in *Scientific Thought* and *Examination of McTaggart's Philosophy.*

Some philosophers hold that only the present is real; others hold that past, present, and future are all equally real. In *ST*, Broad advanced a theory intermediate between these two, accepting the reality of the present and the past, but holding that "the future is simply nothing at all" (1923: 66). The time series is like a growing line, and it possesses a direction because "fresh slices of existence" are always being added to the forward end of it. He drew from this the conclusion that judgments ostensibly about future events are neither true nor false at the times when they are made, since there is nothing then in existence to make them true or false (p. 73).

Broad distinguished two aspects of time or of temporal facts, which he called the "extensive" (or static) and the "transitory" (or dynamic) aspects. The distinction is closely related to McTaggart's distinction between the A series and the B series. Call the relations of being earlier than, later than, and simultaneous with "B relations"; call the characteristics of pastness, presentness, and futurity "A-characteristics." An A series is then any series of events or moments whose members have A-characteristics, and a B series any series whose members are related by B-relations. McTaggart noted that truths involving the B-relations are permanent, while truths involving the A-characteristics are transitory. An event that is earlier than another event is always earlier than it, but an event that is future will not always be future: it will become less and less remotely future, then it will become present, and finally it will become more and more past.

A great divide in philosophies of time separates those who acknowledge the transitory aspect of time and those who reject it. Russell and many others deny it, affirming that temporal facts are exhausted by those involving the B-relations. Broad upheld it, agreeing with McTaggart that the transitory aspect of time is essential to it. He did not, however, believe that events become present in the way that may be suggested by McTaggart's language, that is, the events are already strung out and become present as the palings of a fence become illuminated by the passage of a spotlight. Becoming is not analogous to qualitative change, in which a subject that already exists acquires a new property; rather, to become present is just to "become," in an absolute sense. Broad's adherence to the transitory aspect of time is reflected instead in his insistence on the indispensability of tense, for tensed statements are precisely those that may change truth value with the passage of time.

The indispensability of tense – the thesis that tensed verbs cannot be done away with in the analysis of temporal discourse – is perhaps Broad's most important thesis in his later philosophy of time. He opposed both Russell's analysis of tense in terms of tenseless copulas and B-relations and McTaggart's analysis of tense in terms of tenseless copulas and A-characteristics. According to Russell, an utterance of the sentence-type "it is now raining" means that an occurrence of rain is simultaneous with that very utterance; in analogous fashion, an utterance of "it has rained" or "it will rain" would mean that an occurrence of rain is earlier or later than that very utterance. Broad expressed doubt about whether the kind of self-reference involved here is really possible and about whether tenseless verbs are anything but a philosopher's fiction. His main objection, however, was simply that Russell's analysis leaves out the transitory aspect of temporal facts. If an occurrence of rain is (tenselessly) simultaneous with a certain utterance, it is always simultaneous with that utterance, making any utterance of "it is now raining" true eternally if it is true at all.

McTaggart's presupposition that tense is eliminable is an essential part of his notorious argument for the the unreality of time, an argument that Broad subjected to penetrating analysis. McTaggart, unlike Russell, believed that there could not be time without an A-series: a series of events or moments exemplifying the characteristics of past, present, and future. His case against the reality of time was that the A-series involves a contradiction: the A-characteristics are mutually incompatible, yet each item in any A-series must have them all. To this the obvious objection is that each event has all of the A-characteristics only successively, and there is no contradiction in that. An event that is now present is not *now* past and future; rather, it *has been* future and *will be* past. But McTaggart anticipated this objection, and replied that our attempt to remove the contradiction only raises it anew. When we say that *S* has been (will be, is now) *P*, we are saying that *S* is *P* at a moment of past (future, present) time. Thus to say that an event has been future, is now present, and will be past implies that there is an A-series of moments. And this, McTaggart alleged, brings back a contradiction just like the original one: every moment, like every event, is past, present, and future.

But why did McTaggart think there was a contradiction to begin with in saying that an event is future, present, and past, a contradiction that remains even if we add the qualification "successively"? To say that an event is successively future, present, and past is to say (if it is now present) that it was future and will be past. According to Broad, it is at this point in the argument that McTaggart's assumption that tense is eliminable plays a crucial role. Broad articulated the assumption as follows: what is meant by a sentence with a tensed verb or copula must be completely and more accurately expressible by a sentence in which there is no tensed verb or copula, but only temporal predicates and tenseless verbs or copulas. To highlight the fact that the more accurate expression must be free of tense, let us use "be" as a tenseless copula. Then McTaggart's claim is (e.g.) that "*e* was future" means "for some moment *m*, *e* be future at *m* & *m* be past." Well, if m *be* past, it is timelessly or sempiternally past. And that contradicts the assumption, inherent in belief in the A-series, that every moment is sometimes future and sometimes present. Thus Broad concludes:

> [T]he source of McTaggart's regress is that, if you take the "is" in "t is present" to be timeless, you will have to admit that t is also past and future in the same timeless sense of "is".

> Now this is impossible, for it is obvious that t can have these predicates only in succession. If, to avoid, this, you say that the "is" in "t is present" means "is now", you have not got rid of temporal copulas. Therefore, if you are committed at all costs to getting rid of them, you will not be able to rest at this stage. (1933: 314–15)

So Broad insisted on the ineliminability of tense. Russell's attempt to eliminate tense in favor of the B-relations ignores the transitory aspect of time, and McTaggart's way of getting rid of it makes the transitory aspect contradictory. The moral Broad drew is that if we wish to do justice to the transitory aspect of time, we must take tense seriously.

Broad also discussed at length the ontological categories of thing and process. One of the differences is that things endure literally through time, whereas a process persists only in virtue of having distinct parts or phases that exist at various moments within the interval. If I say "This is the same chair I sat in yesterday," I mean that literally the same object I sat in yesterday is here now, but if I say "I am still hearing the same buzzing noise," I mean only that I am hearing later phases of a process whose earlier phases I heard before. Those who believe in the dynamic aspect of time commonly hold that identity through time is a matter of thing-like endurance, while those who embrace a static concept of time typically hold that identity through time is really a matter of process-like persistence. Confounding expectations on this score, Broad combined his belief in the transitory aspect of time with the view that things are dispensable in ontology in favor of logical constructions out of processes. As he sometimes bluntly put it, a thing is just a long and boring event.

Mind and matter

In the concluding chapter of *Mind and Its Place in Nature*, Broad undertook to classify the various possible metaphysical theories on the relation of mind to matter, to sum up their strong and weak points, and to decide between them. His scheme of classification yielded seventeen types of possible theory, which he thought could be narrowed down to three or four best options and one that was most reasonable overall. I now give a somewhat simplified description of Broad's scheme and of his own favored alternative, which he called "emergent materialism."

Suppose the X-properties of anything follow with logical or metaphysical necessity from some selection of its Y-properties (or the Y-properties of its parts). This could happen because the X-properties are identical with the Y-properties or are analyzable in terms of them. In this case, X-properties are *reducible* to Y-properties.

Suppose the X-properties of a thing are not reducible to the Y-properties of its parts or the relations among them, but do follow with nomological necessity from these Y-properties and relations. In this case, X-properties are *emergent* from the Y-properties.

With these preliminary notions granted, we can define Broad's notion of a "differentiating attribute" (or for short, simply an attribute): an attribute is a highly general property that is instantiated in the universe without being either reducible to or emergent from properties of any other type.

Broad analyzed materiality as the conjunction of extension, publicity, persistence, and existential independence from observing minds. He analyzed mentality as a

hierarchy of properties ranging from bare sentience up through the higher cognitive (both intuitive and discursive) and affective capacities.

We can now arrive at most of the positions in Broad's scheme by asking the following questions about each of materiality and mentality: Is it instantiated in the universe or not? If so, is it reducible, emergent, or neither? And if it is reducible or emergent, with respect to what other properties is it emergent or reducible?

If materiality and mentality are both instantiated in the universe, but neither is reducible to or emergent from anything else, that makes both of them attributes in Broad's sense, giving us the position he called "dualism." He subdivided this according to whether materiality and mentality can or cannot inhere in the same substance. If the answer is yes, we have dualism of compatibles, the position of Spinoza; if it is no, we have dualism of incompatibles, the position of Descartes.

If materiality is an attribute but mentality is not, we have the family of theories Broad called "materialist." This subdivides according to the three ways in which mentality might fail to be an attribute. If mentality is not instantiated in the universe at all, we have pure materialism (or what would nowadays be called eliminative materialism). If mentality is reducible to something else (determinates of materiality, presumably), we have reductive materialism. Broad discussed two chief varieties of this, "molar behaviorism," according to which having a mental state just means behaving in certain ways, and "molecular behaviorism," according to which mental processes are to be identified with processes in the brain and nervous system. Finally, if mentality is emergent, we have emergent materialism, according to which mental properties emerge as novel properties of material systems that achieve a certain degree of complexity.

If mentality is an attribute but materiality is not, we get the family of theories Broad called mentalist. As with materialism, there are three possible varieties: pure mentalism, reductive mentalism, and emergent mentalism. The actual mentalists Broad mentions – for example Berkeley, Leibniz, and McTaggart – are all of the pure variety. It might be thought that phenomenalism affords an example of reductive mentalism, but most phenomenalists turn out to be either pure mentalists (because they hold that nothing in the universe exemplifies *all* the traits requisite for materiality) or neutralists (because they reduce matter to properties of "neutral" sense data in the manner to be described next).

Finally, if neither materiality nor mentality qualifies as an attribute, we get the family of theories Broad classified as neutralist. Somewhat extravagantly, neutralism admits of nine subdivisions. Broad singled out two forms of neutralism as especially worthy of attention. First, there is the view of Samuel Alexander in *Space, Time, and Deity* that mind and matter both emerge from purely spatiotemporal attributes. Second, there is the view of Russell in *The Analysis of Mind* that materiality is not strictly instantiated at all (even though its various requisites are separately instantiated) and that mentality is either reducible to or emergent from properties of sense data that are themselves neither mental nor physical.

Broad went on to argue that many of the seventeen types of theory can be quite definitely ruled out. Pure materialism and the three varieties of neutralism that say mentality is not instantiated can be eliminated immediately, he claimed, for mentality at least *seems* to be instantiated, and if there are seemings, there are events that instantiate mentality. He believed that both varieties of reductive materialism could also be

ruled out. Against molar behaviorism, he pointed out that many of the mental states we observe within ourselves are not identical with their associated patterns of behavior, and he also raised the doubt whether every mental state even has a pattern of behavior coextensive with it. Against molecular behaviorism, he raised the objection that neural processes have properties (e.g. taking place swiftly or slowly) that do not apply to having a sensation of red.

It remains to say something about the position Broad judged most reasonable on the whole, namely, emergent materialism. Because it implies that mental properties are not reducible to physical properties, this is a form of what is sometimes called property dualism, even though not a form of dualism in Broad's own sense (which requires that mentality be an attribute). The idea is that mental properties begin to be displayed when matter reaches a certain level of complexity. They are dependent on matter for their instantiation and are wholly determined, causally or nomically speaking, by material configurations. However, the mental properties of an organism "*could* not, even in theory, be deduced from the most complete knowledge of the behavior of its components, taken separately or in other combinations, and of their proportions and arrangements in this whole" (1925: 59). In this respect, Broad believed mental properties to be like the properties of chemical compounds and unlike the properties of clocks. Someone who had never seen a clock before could predict its behavior from the laws of physics together with knowledge of the clock's parts and how they are put together. By contrast, someone who had never examined common salt before could not predict its properties from the laws of physics together with complete knowledge of the properties of sodium and chlorine (taken separately and in other combinations) and how they are put together in the new compound.

There are, of course, psychophysical laws relating mental properties to the physical properties of their bearers. But Broad believed these laws to be ultimate "trans-ordinal" laws: laws not deducible from laws already known to hold at the lower level, but discoverable instead only after we have become acquainted with objects and properties at the higher level. He conceded that the properties of chemical compounds, which he used as examples of emergent properties, might turn out with the growth of our physical knowledge or mathematical competence not to be emergent after all. But he thought that the traditional secondary qualities (whether conceived of naively as intrinsic properties of external things or in more sophisticated fashion as appearances to perceivers) were inherently emergent and that the laws connecting their instantiation with properties of microphysics would necessarily be of the trans-ordinal type. Not even a mathematical archangel with microscopical powers of perception, Broad ventured to assert, would be able to predict that ammonia smells acrid or that the sky looks blue.

Bibliography

Works by Broad

1914: *Perception, Physics, and Reality*, Cambridge: Cambridge University Press.
1923: *Scientific Thought*, London: Kegan Paul, Trench, Trubner & Co.
1925: *The Mind and Its Place in Nature*, London: Kegan Paul, Trench, Trubner & Co.
1930: *Five Types of Ethical Theory*, London: Kegan Paul, Trench, Trubner & Co.

1933: *Examination of McTaggart's Philosophy*, vol. I, Cambridge: Cambridge University Press.
1938: *Examination of McTaggart's Philosophy*, vol. II, Cambridge: Cambridge University Press.
1952a: *Ethics and the History of Philosophy*, London: Routledge and Kegan Paul.
1952b: *Religion, Philosophy, and Psychical Research*, London: Routledge and Kegan Paul.
1975: *Leibniz: An Introduction*, ed. C. Lewy, Cambridge: Cambridge University Press.
1978: *Kant: An Introduction*, ed. C. Lewy, Cambridge: Cambridge University Press.

Works by other authors

McLaughlin, Brian (1992) "The Rise and Fall of British Emergentism," in *Emergence or Reduction?*, ed. A. Beckerman, H. Flohr, and J. Kim, Berlin: De Gruyter.
Schilpp, P. A. (ed.) (1959) "The Philosophy of C. D. Broad," vol. X in *The Library of Living Philosophers*, New York: Tudor. (This volume contains Broad's autobiography, critical essays on Broad's philosophy by twenty-one authors, Broad's responses to them, and a complete bibliography of his writings.)