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**E.G.BORING AND THE MIND-BRAIN IDENTITY THEORY**

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THE PHYSICAL DIMENSIONS OF CONSCIOUSNESS

Published some four years after his massive and authoritative *History of Experimental Psychology* (Boring 1929) Edwin Boring's much less successful second book, *The Physical Dimensions of Consciousness*, which appeared in 1933 is probably best known, if it is known at all, for the role played by its comparative failure as a book in the episode of neurotic depression which its author developed around this time and whose unsuccessful treatment by psycho-analysis is frankly recorded in his paper 'Was this analysis a success?' (Boring 1940/1963). As you will know if you have read this paper, Boring took the relative failure of his second book as compared with the success of the first as evidence in his own case of the progressive deterioration in the individual's creative and intellectual ability with advancing age (he was in his late forties at the time) which had recently been demonstrated partly by the technology of intelligence testing and more specifically by Lehman's (1935) study of creativity in science and literature. In fact the relative failure of what was to have been Boring's contribution to psychology's future rather than, as his other book had been, to the recording of its past, had nothing to do with any intellectual deterioration on his part. It had much more to do with the fact that *The Physical Dimensions of Consciousness* represented the albeit brilliant culmination of a research tradition which had been obsolescent, if not actually defunct, for some twenty years prior to the book's publication. I refer to the tradition which began in 1860 with the publication of Fechner's *Elemente der Psychophysik* and was continued by the so-called "Structural" or "Introspective Psychology" of Wundt and the self-appointed champion of Wundtian orthodoxy in the United States, Edward Bradford Titchener. Boring, it is well known, was a student of Titchener's and his most devoted disciple. As Boring makes clear in his original preface to the book, *The Physical*

*Dimensions of Consciousness* was conceived as an exposition of what he took to be "Titchener's way of meeting the challenge of Gestalt Psychology", an answer to that challenge which Titchener himself never wrote before his death in 1927.

Boring's argument in *The Physical Dimension of Consciousness* takes as its fundamental premise Titchener's principle that, as revealed by introspection, "all conscious content is sensory." (Boring 1962 p. vii). "Sensationalism", as this doctrine is called, is not and has not been a fashionable doctrine, either in philosophy or psychology, for a very long time. It has, I believe, a lot more to be said in its favour than is generally admitted. But it is not my purpose in this paper to defend sensationalism. Sensationalism is important for our present purposes only because it has to be assumed in order to make sense of Boring's project which was to give a description of consciousness as a multi-dimensional space in which the dimensions are the dimensions of sensory experience, classified according to the particular sensory modality involved.

According to Boring, sensation and hence consciousness has four basic dimensions:

- (1) quality,
- (2) intensity,
- (3) extensity, i.e., extension and patterning in space,
- (4) protensity, i.e., extension and patterning in time.

Of these the *quality* of a sensation differs radically according to the modality involved and each modality has a different set of qualitative sub-dimensions, hue, saturation and light/dark (the two latter not easily distinguished from intensity) in the case of vision, and the single qualitative dimension of pitch in the case of hearing. The situation is more complex in the case of the other modalities. In somaesthesia four distinct qualities are distinguished; pressure, pain, warmth and cold, but if we exclude the dimension of intensity these qualities do not readily resolve into the kind of continua implied by the concept of a dimension of variation. Henning's (1916) taste tetrahedron and smell prism suggest the possibility of dimensional continua in the case of those modalities, but without either the conviction or the resolution into three specifiable dimensions that is characteristic of the colour pyramid in the case of vision. Although this is not made explicit, it is an underlying assumption of Boring's synthesis that the position of every sensation on each of the relevant dimensions is specifiable in principle,

given certain assumptions about the repeatability of sensations from moment to moment, by means of the psychophysical methods originated by Weber (1834) and refined by Fechner (1860/1966).

#### THE MIND-BRAIN IDENTITY THEORY

Despite a valiant attempt to bring his account up to date by aligning it with the then new behaviourally orientated physiological psychology pioneered by Lashley, Boring's book represents the final chapter in a tradition of psychological research which had already run out of steam by the time it was written. It represents a culmination of what had gone before, rather than a promise for the future. There is, however, one important exception to that judgement. There is one respect in which *The Physical Dimensions of Consciousness* is the *fons et origo* of an intellectual movement which, though it has had little impact in psychology has profoundly influenced the development of the philosophy of mind in the latter half of the twentieth century. For in the first chapter of *The Physical Dimensions* Boring states for the very first time, the identity theory of the mind-brain or, as he and I prefer to say, the consciousness-brain process relation.

The notion that conscious experience as reported by the introspective subject just *is* the brain activity with which it is correlated, that what we have is, not two distinct and correlated processes, but one and the same process under two different descriptions, was not, of course, originated by Boring. Materialist monism, the doctrine that the functions otherwise attributed to the mind or soul are a product of some organ of the body, be it the brain, the heart or the liver, is at least as old as our earliest records of speculation on such matters. But Boring was undoubtedly the first to formulate this position in terms of the relation of identity. Identity, of course, is a relation which has long been of a special interest to philosophers and logicians. It is not, generally speaking, a relation with which psychologists have felt particularly at home. Even "identity crises" which are clearly a states of mind with obvious psychological manifestations have been seen as more the concern of a certain kind of philosopher than of the psychologist.

#### FEIGL

It is, therefore, not altogether surprising that it was a philosopher in the person of Herbert Feigl, a member of the original Vienna Circle who had migrated to the United States in

the nineteen thirties, who took up the idea of the mind-brain identity theory from Boring. Feigl first discussed the implications of the theory in a paper entitled 'The mind-body problem in the development of logical empiricism' which appeared in the *Revue Internationale de Philosophie* in 1950 and was reprinted in Feigl and Brodbeck's *Readings in the Philosophy of Science* in 1953. In this paper Feigl cites Boring as the originator of the identity theory; but although he indicates that his own sympathies lie with that position, he did not firmly commit himself to it until his better known paper 'The "mental" and the "physical"' which appeared in 1958 in the second volume of the *Minnesota Studies in the Philosophy of Science*. Even then Feigl's adherence to the identity theory did not last very long. He recanted in the postscript added to the original 1958 Essay when it was republished as a separate volume in 1967.

#### THE AUSTRALIAN CONNECTION

In 1959, the year following Feigl's 'The "mental" and the "physical"', another paper advocating the identity of mental processes and brain processes appeared in the *Philosophical Review*, J. J. C. Smart's paper 'Sensations and brain processes'. Smart, however, gave the credit for originating his version of the identity theory, not to Feigl, and hence indirectly to Boring, but to my own paper 'Is consciousness a brain process?' which appeared in the *British Journal of Psychology* in 1956. Smart, however, had been aware of its content since 1954 when, as Head of the Department of Philosophy at the University of Adelaide, he participated in the discussions at which the substance of the paper was hammered out.

In my paper I had put forward, to quote the abstract "the thesis that consciousness is a process in the brain ..... as a reasonable scientific hypothesis not to be dismissed on logical grounds alone." I had not, however, used the term 'identity' in this connection. Instead I described the 'is' in the sentence "consciousness is a process in the brain" as an "'is' of composition" which I contrasted with the 'is' of definition. In other words what I was maintaining was not that consciousness is *one and the same as* some process in the brain, but that consciousness *consists in or is entirely composed of* brain processes. Despite the fact that 'is composed of' is an asymmetrical relation, whereas 'is the same as' is a symmetrical relation, Smart chose to ignore this difference between my formulation and his own and went on to give his classical exposition of the doctrine of "contingent identity"

using Frege's (1892/1952) distinction between 'sense' (*Sinn*) and 'reference' (*Bedeutung*) which he illustrated by means of Frege's example of the Morning Star and the Evening Star, two descriptions which differ in sense, but which, as a matter of fact refer to one and the same object, the planet Venus.

#### BORING'S INFLUENCE ON 'IS CONSCIOUSNESS A BRAIN PROCESS?'

My own reluctance to speak of "identity" in this connection had been motivated by the fear that to do so would get me into philosophical and logical waters which were too deep for my limited competence in those areas as the mere psychologist that I then was. Consequently when I saw that two philosophers and logicians as distinguished as Feigl and Smart had no such qualms, I was happy to go along with them in adopting the formulation which, as we have seen, goes back to Boring.

This raises the interesting question as to how far I was influenced by Boring in developing my own version of what I later was happy to describe as the mind-brain identity theory. I had in fact read *The Physical Dimensions of Consciousness* while I was an undergraduate reading Philosophy and Psychology at Oxford in the late 1940's. I had been encouraged to do so by Brian Farrell, the then newly appointed Wilde Reader in Mental Philosophy who for a time acted as my tutor in psychology. But although I can remember being impressed by the grandeur of Boring's conception of consciousness as a multi-dimensional sensory space, I have no recollection of having noticed his brief exposition of the identity theory in the first chapter. It is significant that when I sailed for Australia in 1951 to take up my appointment as the first full time Lecturer in Psychology at the University of Adelaide, I did not find it necessary to include *The Physical Dimensions of Consciousness* in the reasonably extensive stock of books on Psychology which I took with me. Indeed I did not acquire my own copy of the book until 1965 when I visited Boring in his office in the William James Building at Harvard shortly before his death. On this occasion he presented me with a signed copy of the book which has since become a treasured possession.

My reason for not including *The Physical Dimensions of Consciousness* in my luggage when I sailed for Australia in 1951, apart from the fact that there probably wasn't a copy on the shelves at Blackwell's when I was stocking up, was that I could see no future for a theoretical position which was inescapably committed to the phenomenalist assumption that sensory qualities,

colour, pitch, warmth etc. (Galileo's secondary qualities) are properties, not of objects and phenomena in the environment, but of the sensory experiences which are produced by stimulation from those objects and phenomena. That was a view which I had already been persuaded to abandon by John Austin's 'Sense and Sensibilia' Lectures (Austin 1962) which I had attended as an undergraduate when they were first given in 1947.

Although I have no recollection of having noticed Boring's exposition of the identity theory in the first chapter of his book, since I must have read it, I cannot exclude the possibility or even the probability that I was unconsciously influenced by it when I first announced my intention to defend the thesis that consciousness is a process in the brain in my paper 'The concept of heed' which appeared in the *British Journal of Psychology*, General Section, in 1954. Certainly there are some remarkable similarities between these two expositions of what both of us agreed when we finally met in 1965 was essentially the same view.

#### THE IDENTITY THEORY AS A SCIENTIFIC HYPOTHESIS

One notable similarity is that Boring and I both approached the topic from a psychological perspective rather than, as Feigl and Smart were to do later, from the perspective of the philosophy of mind and the philosophy of science. This psychological perspective is what led both of us to present our respective theories as a scientific hypothesis which was going to stand or fall on the empirical evidence. Despite the widespread acceptance in contemporary philosophical circles that some variety of materialist monism must be true, philosophers have never been happy with the suggestion that materialism is an empirically decideable hypothesis. This is understandable when one considers that, according to the views then current, empirical issues are the province of the empirical sciences and not of philosophy. Philosophy, it was held, concerns itself only with issues which are decidable by a *priori* argument. Hence, the suggestion that the mind/body problem is empirically decideable threatens the philosopher's long standing claim to be the arbiter in matters of this kind. Not surprisingly, therefore, it was my contention that materialism is an empirically decideable scientific hypothesis which was the one part of the thesis as I formulated it in 'Is consciousness a brain process', with which Smart, who of course is a philosopher, expressed disagreement in his 1959 paper. Those of you who are familiar with that paper will remember his claim that any evidence supporting the identity theory would be equally consistent with epiphenomenalism and that, consequently, we need

to invoke Ockham's principle of parsimony (as Boring, incidentally, had also done) in order to establish a preference for the one theory over the other.

#### THE RESTRICTION TO THE IDENTITY THEORY TO CONSCIOUSNESS

Another feature which my version of the theory has in common with Boring's is that we both restrict its application to "consciousness" and use that term in the special technical sense in which it was used by Titchener. Titchener's concept of consciousness has four distinctive features:

1. Consciousness is a *process*, a process which springs into vivid life on waking in the morning, is dominated by sensory stimulation as long as the subject is awake and continues intermittently without that dominant contribution from sensory stimulation during sleep in the form of dreams;
2. Consciousness is *palpable* i.e., subject to introspective *observation* by the subject;
3. Consciousness is, though not always or exclusively sensory in its causes, is always sensory in quality;
4. Although the influence of meanings, concepts, or intentional states on consciousness is not denied, meanings, concepts and intentional states are not considered *part* of consciousness, since they are neither (a) processes, (b) palpable in the sense of being subject to observation and description, nor (c) sensory in quality.

Although he does not emphasise the point, it is clear from two things he does say that for Boring the scope of the identity theory is restricted, as it is for me, to consciousness in this sense. Thus one of the striking features of Boring's exposition which I shall discuss in more detail in a moment is his contention that:

"a perfect correlation is identity. Two events that always occur together at the same time and the same place without any spatial or temporal differentiation at all, are not two events but the same event." (Boring 1933, p.16).

The example he gives of this kind of perfect correlation is that

"between sensation A and neural process a" (*op. cit.*, p.14)

What he must have in mind here is the empirical discovery of a perfect correlation between two measures, one a measure of the occurrence of a particular *type* of sensation as described by the introspecting subject, the other an electrophysiological measure of the occurrence of a corresponding *type* of neural process. It is difficult if not impossible to envisage the empirical discovery of a similar perfect correlation between a particular neural state (a token, be it noted, not, in this case, a type) and a mental state reported by the subject such as a grasp of the concept 'prime minister', the belief that Margaret Thatcher is the current British Prime Minister, or the desire that that state of affairs should either long continue or cease to be the case.

#### THE BEHAVIOURIST THEORY OF MEANING AND INTENTIONAL STATES

More decisive evidence that for Boring meaning and intentional mental states lie outside the scope of the identity theory comes from his exposition and discussion of Titchener's context theory of meaning in Chapter 8 of *The Physical Dimensions of Consciousness*. He concludes this exposition with the following statement.

"Absurdly paradoxical as it may seem the context theory of meaning, fathered by Titchener, makes behaviorism, which Titchener excommunicated, the true cognitive psychology. Meaning is a response." (Boring *op. cit.*, p.223)

I should, perhaps, explain that Titchener's context theory of meaning holds that a sensation or mental image derives its meaning from the context in which it occurs. Titchener illustrates the point in his *Lectures on the Experimental Psychology of the Thought Processes* (Titchener 1909) with the example of his own visual image of

"a scene familiar to my childhood, - the flow of the incoming tide over a broad extent of sandy shore." (Titchener 1909 p.3)

This "mental vision", Titchener (1909 pp.16-17) reports, occurs in his thought with two different meanings depending on context. In one context "it recalls an afternoon's ramble". In another "it means the progress of science."

What Boring is now saying is that the context theory of meaning tells us how it comes about that a mental content has the meaning

that it does. What it does not tell us is what it *is* for the sensation or image to have one meaning rather than another. It is this gap in the theory which Boring is claiming that only behaviourism can fill. In this he is anticipating the account of what it means to understand the meaning of something as a matter of "knowing how to go on" which Wittgenstein (1953) develops in *Philosophical Investigations* I, 138-197. Had Boring *per impossibile* had the benefit in 1930 of reading Wittgenstein (1953) or Ryle (1949) he might have agreed that for something to mean something to someone is a matter of its evoking, not so much a response, as a disposition to respond in a variety of broadly specifiable ways both verbal and non-verbal depending on the context. He might then have agreed with the statement I made at the beginning of 'Is consciousness a brain process?' when I said

"In the case of cognitive concepts like 'knowing', 'believing', 'understanding', 'remembering', and volitional concepts like 'wanting' and 'intending', there can be little doubt, I think, that an analysis in terms of dispositions to behave is fundamentally sound. On the other hand, there would seem to be an intractable residue of concepts clustering around the notions of consciousness, experience, sensation, and mental imagery, where some sort of inner process story is unavoidable." (Place 1956, p.44)

Unfortunately when we met in 1965, I did not think to check this point with him. But, if I am right in thinking that this is the direction that the logic of Boring's position was moving him, he too would have seen no need to invoke the identity theory in the case of cognitive and volitional dispositions.

#### THE RESTRICTION OF THE IDENTITY THEORY TO "RAW FEELS" AND SENSATIONS

Although they did not use the technical concept of 'consciousness' in this connection, both Feigl and Smart followed Boring and myself in restricting the application of the identity theory to a limited aspect of the mind and in relying on some form of behaviourism to deal with rest. In Feigl's case it was the "raw feels" or, as philosophers now say, the "qualia" of experience which were to be identified with states of the brain. The expression "the raw feel of consciousness" was first used to my knowledge by E. C. Tolman in his 1932 book *Purposive Behavior in Animals and Men* to refer to an aspect of mental life with which, necessarily, his scientific behaviourist analysis could not deal. It follows that in borrowing Tolman's term for the aspect of the

mental which was to be identified with states of the brain, Feigl was implicitly conceding Tolman's claim that all other aspects of mentality, the vast majority, are susceptible to the behaviourist analysis.

Likewise Smart although he abandoned the term 'consciousness' took as the mental side of the identity one aspect of what Boring and I took that term to embrace, namely, sensations. The significance of this fact becomes apparent when it is realised that, prior to becoming an advocate of the identity theory, Smart was a Rylean/Wittgensteinian behaviourist. Having read *The Concept of Mind* he was well aware that in the chapter on 'Sensation and Observation' (Chapter VII) Ryle expresses dissatisfaction that in that chapter, and in contrast with the behaviourist line which he follows in the remainder of the book, he has, as he says,

"fallen in with the official story that perceiving involves having sensations" (Ryle, 1949 p.200).

Smart too, it would seem, saw the identity theory as plugging the *qualia* gap in an otherwise all-embracing behaviourism. Indeed it was not until Armstrong published his *A Materialist Theory of the Mind* in 1968 that this restriction of the identity theory to consciousness, raw feels or sensations, feelings and images was seriously challenged.

#### "PERFECT CORRELATION IS IDENTITY"

In conclusion I would like to say a few words about one aspect of Boring's contribution which is unique to him. This is his claim, already quoted, that "a perfect correlation is identity." As Feigl points out, Boring ends up (in a lengthy note at the end of Chapter I) by appealing, as Smart does, to Ockham's razor as the grounds for preferring the identity theory to other accounts of the mental process/brain process relation. However, in his earlier discussion in the text of the chapter, he addresses the issue which is ruled out of court by the philosophical advocates of the identity theory, namely the question: 'What evidence would convince us that two correlated sets of measurements referred to one and the same underlying process rather than two distinct, though correlated, processes?' Boring's answer to that question is that we would prefer the identity hypothesis in a case where the two sets of measurements were perfectly correlated. What I take him to have in mind is not a case where, in a tightly controlled experimental setting, a perfect correlation is observed between an independent and a dependent variable. That

would be a case of a causal relation between what Hume calls "distinct existences." The case that Boring has in mind, I take it, is one in which the two measures remain perfectly correlated, regardless of any change that occurs in the controlling variables.

I am now inclined to think that a perfect correlation of this kind between two measures, if sustained and always provided the two measures relate, as far as can be ascertained, to the same point in space, would constitute conclusive evidence that what was being measured was the same process in both cases. I did not myself consider this possibility when I discussed the issue of what would constitute evidence of the identity of the reference of two sets of observations in my response to Smart, entitled 'Materialism as a scientific hypothesis', which was published in *Philosophical Review* in 1960. There were I suspect two reasons for this omission. One factor was the influence of Hume's account of the causal relation in terms of constant conjunction which, as I now think, is grossly misleading as an account of causation, because it ignores the invariable multiplicity of causal factors in the individual case and, hence, the fact that constant conjunction or perfect correlation is only observed when all variables but one are held constant. The other factor which affected my judgement in this regard was taking as my example of a causal relation the case of the relation between the movement of the tides and the phases of the moon. Here, so it seemed, we have a perfect correlation which derives, not from identity between the referent of the two sets of measurements, but from a causal relation between two distinct existences, the movement of the moon around the rotating earth on the one hand and the large scale movement of the oceans on earth on the other. But despite their predictability, the correlation between the tides and the phases of the moon is not the kind of perfect correlation that I take Boring to have had in mind. For the gravitational pull of the moon and the relative position of the moon and the different parts of the earth's oceans are not the only variables which affect the motion of the tides. There is also the gravitational pull of the sun and its position relative to the different parts of the earth's oceans as the earth rotates and moves round the sun. Given the interaction between these two gravitational pulls and the rotation of the earth, the correlation between any one of them and the movement of the tides can never be the kind of perfect correlation envisaged by Boring, quite apart from the fact that in this case the two terms of the relation are widely separated in space.

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Addendum - not part of the original publication

EXCERPTS FROM

E. G. Boring *The Physical Dimensions of Consciousness*. New York: Century, 1933.

pp. 13-14

Thus, in this view, a sensation is a real *datum* or event to be fitted into a closed causal system by the method of experimental correlation. In the early stages of research this view looks like interactionism, because we find stimulation causing sensation or sensation causing movement. With an increase of our knowledge of psychophysiology the view would come to resemble psychophysical parallelism, because then we should know something about a continuous neural series of events from stimulation to motor response, and the sensation would seem to parallel some middle part of this series. At this stage of knowledge the parallelism is not precise, and the sensation and its process in the brain cannot be fully identified. We could still keep our prejudice in favor of dualism if we wished. Ultimately, however, the ideal of parallelism must defeat itself. If we were to find a perfect correlation between sensation *A* and neural process *a*, a precise correlation which we had reason to believe never failed, we should then identify *A* and *a*. If introspection yielded *A*, it would yield knowledge of the nervous system; and, conversely, the physiologist would, in knowing about *a*, know about sensation. We must remember that *A* and *a* are both inferred entities or events; that they are real, but not in experience nor in a world that exists independently of its being known; and that, if *A* always means *a*, and conversely, there is no choice but to identify the two.

p. 16 (Notes)

The concern of the text in theories of mind and body is purely negative. Interactionism, psychophysical parallelism, the double-aspect theory, the identity theory, all these views recognize a fundamental duality, two classes of events that interact, or are parallel with each other, or are different aspects of the same underlying *Ding an sich*, or are really identical although they seem to be different. There is no way of judging amongst these four views. Interactionism implies a break in the physical causal system and thus is reflected in most scientific thought. The other three views involve respectively the correlation of events, the correlation of aspects, and the identification of aspects. To the author a perfect correlation is identity. Two events that always occur together at the same time in the same place, without any temporal or spatial differentiation at all, are not two events but the same event. The mind-body correlations, as formulated at present, do not admit of consideration as spatial correlation, so they reduce to matters of simple correlation in time. The need for identification is no less urgent in this case.

Of course, as the text observes, these dualistic theories cannot be absolutely disproved. The point of view of the preceding paragraph is that the burden of proof is upon dualism, not upon monism. In the face of perfect correlation we identify, simply because we cannot differentiate. Thus red, being always red, is identified with itself, and all the symptoms of it are perfect correlates. If some one wishes to insist that red is a pair of perfect covariants, we cannot confound him. He is entitled to his view. But why should we assume two, when one is enough? If ever William of Occam's principle of parsimony was justified, it must be in this context. *Entia non sunt multiplicanda, praeter necessitatem.*