Mnemic Phenomena.

History, Physiology, and Perception in Russell's *Analysis of Mind*

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In Lecture IV of *Analysis of Mind*, Russell argues for a version of the Semon-Hering theory: that organisms inherit prior responses to stimuli. This theory was developed by Richard Semon and Ewald Hering to account for a range of psychological and physiological phenomena. The view was central to the dispute between Hering and Hermann von Helmholtz, in a debate usually conceived as between empiricism (Helmholtz) and nativism (Hering). The true stakes of the debate, though, was about the influence of an organism's history on its present experience. Helmholtz argued that organisms must learn from their environment starting with a comparatively blank slate, while Semon and Hering argued for inherited instinctual responses coded in an organism's ancestral history: in other words, for an early version of the law that 'ontogeny recapitulates phylogeny'. This unlikely background informs several perplexing aspects of Russell's account of perception in Lecture VII.

1. Introduction

The 'mnemic theory' of Richard Semon is embedded deeply in Russell's analysis of perception in *The Analysis of Mind*, and references to Semon are found throughout the book.

1. How far did Russell go in taking Semon's ideas on board?
2. What questions and themes in Russell's book did Semon's mnemic theory influence? Which puzzles did Semon help Russell solve?

We will focus on Russell's account of perception.

2. Lecture VII: The Definition of Perception

[Quote] [W]e may define a "perception" of an object as the appearance of the object from a place where there is a brain (or, in lower animals, some suitable nervous structure), with sense-organs and nerves forming part of the intervening medium. Such appearances of objects are distinguished from appearances in other places by certain peculiarities, namely:

(1) They give rise to mnemic phenomena;

(2) They are themselves affected by mnemic phenomena. (Lecture VII)

[Quote] According to the view that I am suggesting, a physical object or piece of matter is the collection of all those correlated particulars[1] which would be regarded by common sense as its effects or appearances in different places. On the other hand, all the happenings in a given place represent what common sense would regard as the appearances of a number of different objects as viewed from that place. All the happenings in one place may be regarded as the view of the world from that place. I shall call the view of the world from a given place a "perspective." (Lecture V)

[Quote] In Lecture V we found reason to think that the ultimate constituents of the world do not have the characteristics of either mind or matter as ordinarily understood: they are not solid persistent objects moving through space, nor are they fragments of "consciousness." But we found two ways of grouping particulars, one into "things" or "pieces of matter," the other into series of "perspectives," each series being what may be called a "biography." (Lecture VII)

[Hatfield Quote] In his intermediate position, Russell held that the things immediately present to mind as physical objects are sense-data [...]. By “sense-data”, he now meant “momentary particulars” [...] which possess properties such as shape and color. These particulars are modeled on perceptual experience, in that they are like perspective images of what we ourselves might call “ordinary objects” (which Russell now considered to be constructions from these particulars) seen from a particular point of view. Sense-data are momentary particulars because they exist as sensory data only while we are perceiving them. They have the properties immediately experienced in perception, such as phenomenally characterized color and shape, as opposed to the properties posited by physics, such as sub-visible, rapidly moving waves, or sub-visible structures of particles. As now theorized by Russell, these sense-data are not themselves perceptions; they are not themselves sensations or awarenesses, but are the objects of perception. They are not mental. Nor are these sense-data “third things” lying between subject and object; rather; they are instances of what Russell now terms "physical" things themselves. (Hatfield 2002, 207-8)

3. Simultaneous Perception and Experience

We are at all times during our waking life receiving a variety of impressions, which are aspects of a variety of things. We have to consider what binds together two simultaneous sensations in one person, or, more generally, any two occurrences which form part of one experience. We might say, adhering to the standpoint of physics, that two aspects of different things belong to the same perspective when they are in the same place. But this would not really help us, since a "place" has not yet been defined. Can we define what is meant by saying that two aspects are "in the same place," without introducing anything beyond the laws of perspective and dynamics? (Lecture VII)

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[1] For Russell’s 1914 view of sense-data and ‘particulars’, see Gary Hatfield, “Sense-Data and the Philosophy of Mind” (*Principia* 6(2), 2002).

[Quote] When we see one man and hear another speaking at the same time, what we see and what we hear have a relation which we can perceive, which makes the two together form, in some sense, one experience. It is when this relation exists that two occurrences become associated. Semon's "engram" is formed by all that we experience at one time. He speaks of two parts of this total as having the relation of "Nebeneinander" (M. 118; M.E. 33 ff.), which is reminiscent of Herbart's "Zusammen" [...] the relation may be called simply "simultaneity." (VII)

[Quote] It is not only by time-relations that the parts of one biography are collected together in the case of living beings. In this case there are the mnemic phenomena which constitute the unity of one “experience,” and transform mere occurrences into “experiences.” I have already dwelt upon the importance of mnemic phenomena for psychology, and shall not enlarge upon them now, beyond observing that they are what transforms a biography (in our technical sense) into a life. It is they that give the continuity of a “person” or a “mind.” (Lecture VII)

4. The Mnemic Theory

In 1926, C.J. Patten published *The Memory Factor in Biology: A Sketch of the Unity of Life*. Patten summarizes the mnemic theory, and his claims in the book, as follows:

[Quote] that Memory is indeed the Mainspring of Organic Evolution, and also that it is the source and potentiality which unifies both consciously and unconsciously the Psychic side of all living organisms; that vital activities, morphological as well as physiological, are in truth Psychic manifestations; that even the simplest vital activities are quite purposive; that Memory is rhythmic in character; that the processes at work in the evolution both of the Individual and of the Race furnish evidence of being an unbroken chain of Memory Processes, and are, in the main, due to Habit Formation; and lastly, that Memory Processes, when analysed mainly in regard to their physical basis, cast a strong beam of light upon the advocacy of Somatic Inheritance. (Patten 1926, xii).

The view is opposed to a ‘dualism’ or ‘idealism’ that splits organismal phenomena into “psychic” and “vital” processes. It is also opposed to the representational, inferential view of Helmholtz.

4.1 Ewald Hering (1834-1918)

Hering was an influential physiologist. “In 1865, [he] succeeded Carl Ludwig as professor of physiology at the Josephinum, a military medical school in Vienna that was separate from the university, and in 1869 succeeded Jan Purkinje as professor of physiology in Prague” (Bosmia et al. 2016, 1561).

On May 30, 1870, Hering gave an address, “Memory as a General Function of Organised Matter”, before the Imperial Academy of Sciences in Vienna.

[Quote] A chick which creeps out of its shell at once runs about... Think how extraordinarily complicated are the motions and sensations of such acts! Only consider the difficulty involved in the equipoising of its body in running, and it will be conceded that the supposition of an innate reproductive faculty alone, can serve as an explanation… The chick is not only endowed with an inborn skill over its motions, but possesses, also, a strongly developed perceptive faculty. Without hesitation it picks up the grains which are thrown to it… Such a feeble irritation as the rays produce which proceed from a grain and fall upon the retina of the chicken form the occasion of the reproduction of a complicated series of sensations, perceptions, and motions, which in this individual have never as yet been combined, and which, nevertheless, from the beginning were adjusted with accuracy and precision, as if the animal itself had practised them thousands of times (Hering 1870/1897, 21-2).

4.2 Richard Semon

[Quote] Richard Wolfgang Semon (1859 –1918) was an evolutionary zoologist who, despite leading a troubled life, proposed several prescient theories on memory (Schacter et al., 1978; Schacter, 2001). Semon received an MD (1886) and a PhD (Zoology, 1883) from the University of Jena working with Ernst Haeckel (who coined the phrase "ontogeny recapitulates phylogeny"). After completing his doctoral thesis (examining ontogeny of starfish and sea snails), he rose to the level of Associate Professor at Jena. By several accounts, Semon was an accomplished zoologist; a species of lizard, the green-blooded skink, Prasinohaema semoni, bears his name [...] In the tradition of one of his own scientific heroes, Charles Darwin, Semon led a biological expedition to Australia (where his team discovered 207 new species). However, a scandalous affair with the wife of a colleague (Maria Krehl, who was then married to Ludolph Krehl, an eminent professor at Jena) abruptly interrupted Semon's career. Semon resigned his position. He and Maria moved to Munich and were married. Semon became a Privatgelehrter (private scholar) without university affiliation. Because of this change in circumstance, Semon switched fields and began theorizing about memory. (Josselyn, Köhler, & Frankland 2017, 4648)

[Quote] Semon published two monographs on memory: *Die Mneme*, 1904 [translated into English as *The Mneme* in 1921] and *Die Mnemischen Empfindungen*, 1909 [*Mnemonic psychology* (Semon, 1923)]. Perhaps inspired by Haeckel, in addition to introducing a conceptual framework of memory, *Die Mneme* also proposed a broader unifying theory highlighting the similarities between memory and inheritance. (Josselyn, Köhler, and Frankland 2017, 4648)

4.3 Lecture IV: Influence of Past History on Present Occurrences in Living Organisms

[Quote] In this lecture we shall be concerned with a very general characteristic which broadly, though not absolutely, distinguishes the behaviour of living organisms from that of dead matter. The characteristic in question is this: The response of an organism to a given stimulus is very often dependent upon the past history of the organism, and not merely upon the stimulus and the HITHERTO DISCOVERABLE present state of the organism. (IV)

The process of encoding responses to stimuli so that they can be retrieved later is described by Richard Semon in *Die Mneme*. Russell summarizes the idea of an engram as follows:

[Quote] When an organism, either animal or plant, is subjected to a stimulus, producing in it some state of excitement, the removal of the stimulus allows it to return to a condition of equilibrium. But the new state of equilibrium is different from the old, as may be seen by the changed capacity for reaction. [...] We define the "engraphic effect" of a stimulus as the effect in making a difference between the primary and secondary indifference-states, and this difference itself we define as the "engram" due to the stimulus. "Mnemic phenomena" are defined as those due to engrams; in animals, they are specially associated with the nervous system, but not exclusively, even in man. (Lecture IV)

An engram is not a logical inference from sensibilia or from facts, as Helmholtz (or possibly Wittgenstein) would have it. Instead, it is a physical trace on the organism:

[Quote] An engram (roughly corresponding to "memory trace") refers to the lasting physical changes in brain state and structure that occur in response to an event or experience. Once formed, an engram becomes dormant but may be awakened by presentation of parts of the original (or a similar) event, in a process Semon defined as ecphory (roughly corresponding to "memory retrieval"). (Josselyn, Köhler, and Frankland 2017, 4648; see Schacter 1978)

The process of memory, for Semon, involves memory encoding (engrams) and then memory retrieval (ekphory). Russell summarizes this process, which is a physical process, as follows:

[Quote] When two stimuli occur together, one of them, occurring afterwards, may call out the reaction for the other also. We call this an "ekphoric influence," and stimuli having this character are called "ekphoric stimuli." In such a case we call the engrams of the two stimuli "associated." All simultaneously generated engrams are associated; there is also association of successively aroused engrams [...] In fact, it is not an isolated stimulus that leaves an engram, but the totality of the stimuli at any moment; consequently any portion of this totality tends, if it recurs, to arouse the whole reaction which was aroused before. (IV)

[Quote] Following a suggestion derived from Semon,[2] we will give the name of "mnemic phenomena" to those responses of an organism which, so far as hitherto observed facts are concerned, **can only be brought under causal laws** by including past occurrences in the history of the organism as part of the causes of the present response. (Lecture IV, emphasis added)

Second, the question immediately arises, *which* causal laws? Are engrams and ekphora governed by the laws of physics, or of psychology, or of physiology? Russell notes that there is insufficient evidence to support a final conclusion about this question, and he reports on Semon's account:

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[2] *Die Mneme* (Leipzig, 1904; 2nd edition, 1908, English translation, Allen & Unwin, 1921); *Die mnemischen Empfindungen* (Leipzig, 1909).

[Quote] Concerning the nature of an engram, Semon confesses that at present it is impossible to say more than that it must consist in some material alteration in the body of the organism ("Die mnemischen Empfindungen," p. 376). It is, in fact, hypothetical, invoked for theoretical uses, and not an outcome of direct observation. No doubt physiology, especially the disturbances of memory through lesions in the brain, affords grounds for this hypothesis; nevertheless it does remain a hypothesis… (Lecture IV)

[Quote] [W]e can collect all mnemic phenomena in living organisms under a single law, which contains what is hitherto verifiable in Semon's two laws. This single law is: IF A COMPLEX STIMULUS A HAS CAUSED A COMPLEX REACTION B IN AN ORGANISM, THE OCCURRENCE OF A PART OF A ON A FUTURE OCCASION TENDS TO CAUSE THE WHOLE REACTION B. This law would need to be supplemented by some account of the influence of frequency, and so on; but it seems to contain the essential characteristic of mnemic phenomena, without admixture of anything hypothetical. (Lecture IV)

5. The Helmholtz-Hering Debate

In §26 of the *Handbook of Physiological Optics* (first ed. 1867), Helmholtz writes:

[Helmholtz Quote] We use the sensations that light stimulates in our apparatus of sensory nerves, to form for ourselves representations from them [the sensations] concerning the existence, the form, and the location of external objects. We call such representations *visual perceptions*. [...] Since perceptions of external objects thus belong to the representations, and representations always are acts of our mental operation,[1] perceptions can come about only in virtue of mental operation, and thus the doctrine of perceptions in fact already belongs to the domain of psychology, namely insofar as in this connection the type of sense function related to this [*mental operation*] is to be investigated, and its laws are to be established. (Helmholtz 1867, 26:427, my translation)

6. Themes and Consequences

The problem of association - A puzzle that also preoccupied James (see Alex Klein's work). Is the principle that associates particulars with each other physical, psychological, or biological? Or some combination of these? Or something else?

The engram theory of mnemonic phenomena provides an explanation for the connection or 'association' (VII) between particulars that occur from a given perspective at the same time. An 'engram' is the imprint of collective particulars on an organism. These can be retrieved later, and can have an impact on future experiences when they are recalled at that future time (ekphora).

Memory without inheritance - Russell refers to the 'engram' theory but he does not talk about inheritance in the organism. He *does* talk about how engrams can *only* be encoded in organisms (and plants!). So, just because Russell talks about Semon and mnemonic phenomena does not mean he's committed to Lamarckianism.

The relation between psychology and physics - Russell argues in *Our Knowledge of the External World* that the "chief outcome" of the book is the "reconciliation of psychology and physics" (p. 97).[3] Arguably, though, this reconciliation happens fully only in Lecture VIII of *The Analysis of Mind*. In OKEW Russell still argues that we perceive 'atomic facts' and then make logical inferences from them - this is in fact more of a Helmholtzian view, as Klein (2017, 240) notes, or even Wittgensteinian. (There is a direct line from Helmholtz to Hertz to Wittgenstein; see Eisenthal 2022.) In 1914, the facts and the reasoning about them are entirely distinct, as Russell argues in the chapter "The Scientific Method in Philosophy."

In *Analysis of Mind*, in contrast, the perception of simultaneous events and the association of sensations in perception is not held to be essentially distinct from the appearance of objects to a physical brain. In fact, simultaneity and even continuous experience are presented in *Analysis* as continuous with organismal stimulus-response characteristic of empirical psychological phenomena.

Thus, *The Analysis of Mind* can be seen as - in some places anyway - a move away from the earlier Helmholtz-Wittgensteinian inferentialist view, according to which we begin with sensations or with atomic facts and then make inferences from them. Instead, the mnemic theory has it that at least some complex perceptions and experiences are encoded memories, rather than inferences.

One might argue that Russell's employment of the mnemic theory does not quite provide an answer to the problem of how complex perceptions and experiences arise. After all, an engram is an encoding of a response to stimuli: but we still need an account of how that response arises in the first place. Semon and Hering focus on organismal memory, but memory requires an earlier process of moving from particulars to complex phenomena. Helmholtz focuses on that process.

Analysis is a demonstration of the strengths and the limitations of the mnemic view. The strength of the view is its empirical, physical account of association and memory. The weakness is that, without a prior and deeper account of how we arrive at the inferences in the first place, it is difficult to explain why engrams should be considered to be perceptions of objects rather than mere appearances. Lecture 9, "Memory", is a mess for this reason. Russell here tries to distinguish between 'habit-memory' and 'knowledge-memory', where the latter is more epistemically well grounded than the former: but he has not laid any foundation for this distinction.

The mnemic theory in *The Analysis of Mind* is thus a key transition between Russell's view in 1914-15 and his later, more thorough-going neutral monism. Russell did not continue to espouse this view, but a close analysis of this strange-seeming theory can illuminate his thought process in arriving at his mature account.

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[3] Here see Alexander Klein, 2017, "Russell on Acquaintance with Spatial Properties: The Significance of James". In S. Lapointe and C. Pincock (eds.), *Innovations in the History of Analytical Philosophy*, Palgrave.

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