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Neuroscience and Generalized Empirical Method Go Three Rounds

Review of Robert Henman's *Global Collaboration: Neuroscience as Paradigmatic*, Axial Publishing, Vancouver, 2016, 68 pages.

Robert Henman claims that he is showing the way for a paradigm shift in neuroscience. And that is precisely what he does. He explains how generalized empirical method (GEM) can help neuroscientists develop their understanding and make progress in their field.[1] Neuroscience research is also intended to serve as an example, offering clues about how scientists and scholars in other disciplines can move beyond commonsense to adequate positions on GEM, objectivity, emergent probability, and functional specialization. It is a timely book. Today the findings of neuroscientists are celebrated in the popular scientific press and although it is no surprise that GEM is unknown to neuroscientists, for many Lonergan scholars GEM means little more than using Lonergan's work in a discipline that is neither philosophy nor theology. This book was also written for them.

An important part of the work of neuroscientists is to collect data – brain scans and images – in their search for correlations between neural activities at particular locations in the brain and the occurrence of mental acts such as problem-solving. They take it for granted that they know what they are talking about when they talk about conscious mental activities. But the question Henman poses in Chapter One is "What empirical data are neuroscientists referring to when they use terms such as problem-solving, understanding, knowing, judging, paying attention, thinking, or decision making?" What exactly do they mean?

Henman's answer is that neuroscientists use these terms in a commonsense fashion. They have a cloudy recognition of what, for Henman, are patterns of distinct mental activities. Here Henman uncovers a very serious problem. Neuroscientists have no specific empirical data, no data referent in mind when they talk about sensing, attention, thinking, decision making, and problem-solving. In other words, neuroscientists lack accurate descriptions and any grasp of functional relations among

[1] Recall B. Lonergan's text: "Generalized empirical method operates on a combination of both the data of sense and the data of consciousness: it does not treat of objects without taking into account the corresponding subject; it does not treat of the subject's operations without taking into account the corresponding object" (Bernard Lonergan, "Religious Knowledge," *A Third Collection,* New York, Paulist Press, 1985, p. 141).

cognitive activities that Lonergan scholars know as distinct conscious mental acts that are functionally related. Presumably, this failure renders purported correlations between neural activities and conscious operations & experience invalid. The upshot is that if neuroscientists ignore relevant data, namely the data of mental acts, their work is not scientific.

Henman then makes the case that neuroscientists can and should include the data of consciousness in their research. He stresses that images from brain scans are one type of data and that the data of mental acts are another type of data. His point is that mental operations are data, but not data in sense that they have to be measured. Rather, conscious operations and experiences of paying attention, understanding, knowing, decision making, problem-solving are data in the sense of being something that can be attended to, described, and understood. The way forward is for neuroscientists to pay attention to themselves, and reflect on their performance of problem solving in order to discover the data of consciousness – the 13+ cognitional activities - that must become part of their methods. However, if neuroscientists included the data of mental acts in their work it would "help them refine their tests so subjects can be deliberately walked through various mental acts and reveal with more specificity the brain locales and activities correlated with distinct cognitional acts."[2] He emphasizes this point by quoting Bernard Lonergan on scientific method: "…attending to their performance, (meaning the scientist) figuring out what is involved in any process from inquiry through discovery to experimentation and verification, and assembling the elements of the larger movement from one discovery to another."[3]

It follows that the answer to the question posed by the title of this chapter is that a theory of thinking cannot be achieved solely through imaging and scanning techniques. A theory of cognition must include and account for both the data of sense – the data produced by imaging and scanning – and the data of consciousness – the data produced by the researcher and the subject's performance. Henman bluntly captures the problem in current neuroscience research: "working out the correlations between neural activity and mental acts is not the same as identifying the mental acts with their neural correlates."

A little reflection on Henman's argument that an adequate theory of cognition must account for the data of sense and the data of consciousness should put Lonergan scholars on alert. Don't we ignore the data of sense? There is easy talk about attention, understanding, and judging, but no mention of neurodynamics. Isn't relevant data being neglected? Wouldn't such work also be unscientific?

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[2] Robert Henman, *Global Collaboration: Neuroscience as Paradigmatic* Vancouver: Axial Publishing, 2016), 7.

[3] Robert Henman, on page v, quoting B. Lonergan, 'The Scope of Renewal,' *Philosophical and Theological Papers 1965-1980*, *Collected Works of Bernard Lonergan*, volume 17, (Toronto: University of Toronto Press, 2004), 293.

Chapter Two reveals further negative consequences of ignoring and neglecting the data of consciousness in neuroscience research. The subject is the language-use of neuroscientists. The chapter begins with musings about whether the operations that terms such as "interpretation, determine, knowledge, recognize, decode, information, and formulate" refer to, can be empirically located in cellular processes? In other words, do cells perform these activities? For instance, are cells capable of interpretation? Of decoding? Of formulating? How do they do it?

For Henman this type of language is problematic because it attributes conscious mental acts to unconscious biological and biochemical events and processes. Neuroscientists mistakenly talk and write as if conscious mental operations are in some way equivalent to, or caused by, biological processes. What unfolds in this chapter is a brilliant but convoluted criticism of this type of language-use and its consequences. I will attempt to untangle the argument.

Henman zeros in on the use of one term, 'information.' Neuroscientists talk and write about neurons transmitting and transferring information, processing information, copying information, storing information, retrieving information, representing visual information, and having prior knowledge. Next he contrasts what neuroscientists mean by 'information' with what he means by 'information.' For neuroscientists 'information' is an attribute of cells and neurons, something that is passed from one cell or neuron to another cell or neuron. By contrast, his position (in light of cognitional theory and GEM) is that "what constitutes information are conscious operations resulting in correctly understanding data. Until such understanding occurs, what is named information in the samples is, in fact, data."[4] Readers who have achieved some success in self-understanding will grasp the stark contrast in these two positions.

So, do cells and neurons pass on correctly understood data? Henman leans into an answer by drawing an analogy between an engine and the biochemical processes of cells. "Just as spark plugs do not pass on information to cylinders, biochemical processes do not pass on information, knowledge, or make decisions." Further, "by conscious processes of reflecting on one's performance, one arrives at the conclusion that knowing is a conscious activity and there is no evidence-based data to verify that cellular processes carry out such acts."[5] In other words, neural pathways do not carry information from a sensory site to the brain, and the brain is not the source of judgments. The crux of the issue is that the development of understanding does not occur in biological processes, it occurs in the mind.[6]

It is not simply that this type of language-use is misleading; it negatively influences neuroscience research by fostering a reductionist tendency. When conscious acts are reduced to biological processes,

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[4] Henman, 25.
[5] Henman, 26.
[6] Henman, 24.

conscious acts are not acknowledged by the scientific community as something to be studied and understood. They are ignored and neglected. One consequence is that a more adequate understanding of biological and biochemical processes of the brain is undermined when unconscious biological events & processes are conflated with conscious mental activity. The second consequence is that this form of reductionism inhibits the development of an adequate theory of thinking which explains the relationship between unconscious cerebral correlates and acts & states of consciousness. In other words, the search for an adequate theory to explain the relationship between the brain and the mind is hindered.

Henman's diagnosis is that the main inhibitor of progress and development in neuroscience is lack of reflection on performance. Henman is quite clear that progress in neuroscience requires: (1) an adequate position on objectivity, namely a stance that affirms objectivity is achieved by verifying insight into data, that scientific reality is a verified explanation, and that commonsense reality is the 'already out there now real,' (2) an adequate position on GEM, meaning that neuroscientists must take into account both the data of sense and the data of consciousness, and (3) an adequate position on emergent probability, in the sense that higher and more complex levels of activity integrate less complex levels of activity and that brain activities are an underlying level to conscious activity.[7] Neuroscientists must move forward. They can begin paying attention to their performance, grasping that questions, insights, and judgments are distinct mental operations that occur in the mind, and that they have biological correlates in the brain.

This chapter also opens up fascinating novel lines of inquiry into the brain and the mind. For instance, Henman writes that "the function of the brain is being an integrator of biological processes into possible intelligible patterns and being an operator towards higher schemes of recurrence"[8] and that "the function of consciousness is awareness of these patterns as well as the occurrence of cognition, the desire to understand discovered intelligibilities in data."[9] In fact, Henman believes that the task of future neuroscience is to explain the relationship between the brain and the mind which he characterizes as an integral collaboration.

In Chapter Three, the final chapter, a neuroscience experiment is used to illustrate how functional specialization will, in the author's opinion, eventually be used to implement GEM and promote progress in neuroscience. Henman proceeds by identifying the role cognitional operations play in the selected experiment on working memory. Conscious mental activities are lined up with particular functional specialties. Links between Research and data, between Interpretation and understanding, between History and judgment, between Dialectics and decision, and so on are made explicit. For instance, the analysis of Functional Research

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[7] Henman, 25.
[8] Henman, 31.
[9] Henman, 31.

excavates the range of cognitional operations involved in the planning stages of research leading up to, and running, a particular neuroscience experiment. The complex enterprise focused on gathering data is made explicit in his analysis of Functional Research. The discussion of Functional Interpretation focuses on the task of understanding just what the data derived from the experiment – images showing the results of fMRI scans and two graphs – mean. In the study selected by Henman the neuroscientist presents five interpretations or explanations of the experimental results. The task of Functional History is judging, judging which interpretations are viable for further study. This specialty requires a thorough understanding of the whole subject, plus a systematic understanding of it. The successive systems that have developed over time have to be understood. The job of Functional Dialectics is to decide which interpretation passed on from Functional History is the most viable or best explains the results. Similar types of connections linking cognitional operations with Foundations, Policy, Planning, and Communications are made explicit. In this way the dominant cognitional operations and aims of each functional specialty are identified.

Generally, discussions of functional specialization focus on reorganizing entire disciplines. But here a single scientific study was used to draw attention to the important role of cognitional operations in neuroscience research and to describe how functional specialization could help neuroscientists better organize their work. The challenge facing neuroscientists becomes evident - to be a specialist in an area of science and to be a specialist in one of the functional specialties.

While Henman's three chapters focus on methodological issues in current neuroscience research a Forward written by Philip McShane reminds us of the larger context and significance of neurodynamics. McShane points to the dysfunctional neurodynamics manifest in the business personality, brutalized educational structures, and unlivable lives all calling out for intelligent and effective global collaboration and control of meaning. Obviously, the dynamism shaping and misshaping patterns of neural activity is worth paying attention.

Bruce Anderson
Department of Accounting
Sobeys School of Business
St. Mary' University