

kind. The teacher represented a fully, socially embedded member of the village community, who often also worked as scribe and served the community in other activities. Students transcribed their own textbooks on palm leaves in the process of learning at the *tiṇṇai*, and examples of those individualized books allow Senthil Babu insights into the curriculum.

The *Enṇuvaṭi* constituted ‘the quintessential Tamil multiplication table book’ (p. 152) that students learned by heart. The schools’ pedagogical drive incentivized the acquisition of mathematical knowledge, which was ultimately applicable in the context of manual labour. ‘The curriculum of the *tiṇṇai* school rested upon this process of gaining credibility and legitimacy among the local measuring public’ (p. 138). The concept of the ‘measuring public’ (p. 128) relates to those laypeople who used mathematics in their day-to-day work-related activities.

Senthil Babu’s monograph constitutes an important building block for future inquiries that can further differentiate between regional and transregional traditions of mathematics in South Asia and how they relate to those in other parts of the Indian Ocean world and beyond. At the same time, it is a welcome addition to the reading lists of those interested in the sociocultural complexities of knowledge transmission in early modern south India.

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Grant Bollmer, *The Affect Lab: The History and Limits of Measuring Emotion*

Minneapolis: University of Minnesota Press, 2023. Pp. 290. ISBN 978-1-5179-1546-9. \$28.00 (paperback).

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Grant Bollmer’s *The Affect Lab* illuminates the challenges associated with attempts to measure emotion over the course of the twentieth century. By applying a method of media archaeology – similar to Foucauldian genealogy – to four extended case studies, Bollmer convincingly demonstrates that emotions and affects are not independent of the tools used to produce them.

Bollmer begins by offering a definition of the Affect Lab: an experimental space ‘in which a technical instrument identifies something moving inside a body, something emotional, something we refer to as the affects’ (p. 1). This definition, however, obscures the variability and the complexity of the work going on in such spaces.

The Affect Lab is not singular. The techniques in question range from William James’s use of the planchette, a spiritualist toy of the sort familiar to anyone who has played with a ouija board; to Paul Ekman’s use of series of photographs to capture universal categories of emotion; to the use of EEG in prisons to measure the empathic capacities of psychopaths. The contexts within which these techniques are employed also vary, in both their background assumptions and their wider aims. As Bollmer writes, ‘The techniques of the Affect Lab can happen and have happened in a range of locations – the university,

the asylum, the prison, the parlor – locations that often mark the boundary between science and pseudoscience in the history of emotions’ (p. 1). The case studies take us into each of these spaces to show the permeability of this boundary.

The sense in which the techniques ‘identify’ is also not straightforward. As Bollmer’s case studies so beautifully demonstrate, the instruments in question do not provide a straight read-out of the something moving inside the body. Instead, that something – the affects and the emotions – must be provoked. The methods of provocation hinge on theoretical assumptions about the emotions as well as the technological constraints of the day. Furthermore, in being provoked, the affects and emotions are liable to undergo modification. Here, Bollmer’s method of media archaeology is fitting: it brings out the reciprocal dependency between the targets of research (affect and emotion) and the tools used to study them.

Because it is so varied and complex, the Affect Lab defies abstract definition. The introduction of the book, which sets out the main target of research and the method of investigation, therefore does not quite give the reader a sense of what is at issue. It comes across as jargon and obscure. Where the book shines is in the case studies. With vivid detail, each of these invites the reader into a fascinating moment in the history of the science of emotion.

The first case study is about William James’s efforts, using the methods of empirical science, to understand states that appeared to be supernatural. He conducted experiments using the planchette, a spiritualist toy consisting of a small wooden plank with a writing instrument affixed to it. Bollmer challenges standard narratives about James – namely that he was unscientific and a poor experimentalist. He convincingly frames James as more open than many of his contemporaries to subjecting the spiritual to scientific study. Bollmer’s analysis helps to make sense of the connections between James’s commitments to pragmatism, empiricism and spiritualism. It also highlights the importance of the unconscious in James’s theory of the emotions.

The second case study is about the use of photography as a technique for studying the relationship between emotions, experienced as internal, and their outward expressions. It traces the foundations of Paul Ekman’s affect programme theory, which continues to have a strong hold on theorizing about the emotions today. This case study provides a forum for engaging with questions about the nature of photography and its relationship with truth, and about categorization and classification in the sciences. Many of the photographic subjects were women incarcerated in mental asylums. By showing how these women’s emotional displays were taken as suspect, Bollmer illuminates the gender dynamics at the heart of the study of the emotions (especially pain) which has continued relevance today.

The third case study is about the development of the dynograph, a tool for inscribing EEG signals, and its use in prisons. Bollmer shows how the dynograph became a measurement of anticipation and of empathy: ‘In a prison, empathy would come to refer to a neurobiological ability to imagine the relation between one’s actions and another’s emotional response, to understand one’s capacity to affect and be affected, to anticipate a potential reaction, and to regret reactions that happened in the past’ (p. 128). This not only marked a major transition in the meaning of empathy but also had serious practical consequences. The absence of empathy was taken to be indicative of a dangerous neuropsychiatric abnormality – psychopathy – and was used to justify permanent incarceration. This case study pinpoints an important transition in the history of empathy research that could be further expanded upon. Specifically, Bollmer does not tell us much about how this transition happened, just that it did. This case also has important resonances with our contemporary landscape, where measures of empathy continue to be used to determine who can be rehabilitated – and who is beyond hope.

The fourth case study bookends the first by returning to the domain of the spiritual. It is about the development of dianetics by the science fiction writer L. Ron Hubbard, as a therapeutic self-help technique, and its transformation into Scientology. This chapter brilliantly illustrates the tensions between science and pseudoscience as they manifest in attempts to come up with objective measures. It shows that the ability to come up with a technological measurement does not necessarily offer evidence of veridicality. This case study furthermore illustrates the complex intertwinement of the politics of popularization and monetization.

Overall, Bollmer's book offers a far-reaching and engaging study of four moments in the history of the emotions. It highlights as yet underappreciated connections between traditions of spiritualism, aesthetics, education, therapy and measurement. It is not a comprehensive survey – but it is not meant to be. This is, in some ways, a strength of the work insofar as it opens up space for further investigation. This book will be of interest to anyone working in the history and philosophy of the human sciences, and especially to anyone curious about how measurement shapes our lives.

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Michel Anctil, *Animal as Machine: The Quest to Understand How Animals Work and Adapt*

Montreal: McGill-Queen's University Press, 2022. Pp. 334. ISBN 978-0-2280-1053-1. CS\$49.95 (cloth).

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Saharan desert ants live in a profoundly inhospitable environment. Venturing out beyond their nests, they find temperatures higher than forty degrees Celsius. Not especially resistant to desiccation, their survival depends upon exiting and returning to their nests as efficiently as possible. In the 1960s, French graduate student Gérard Délye studied the ants and found that they avoided prolonged exposure to the sun in this way. But a few decades later, under the eye of physiologist Rüdiger Wehner and his colleagues, the impressiveness of their feat became even clearer. The ants, it happens, leave their nest at the hottest midday period – a seemingly disastrous choice. Their main predator, however, a desert lizard, retreats to its burrow during precisely this time. Walking a 'thermal tightrope', the ants explode out of their nests, race to find food, and return home with the help of a powerful 'celestial compass' supported by specialized retinal signals. 'As the ants narrowed their search with experience, they gained two advantages: they gathered more food in a shorter outing, thus limiting the risk of overheating', Michel Anctil reflects in *Animal as Machine* (p. 213).

Animal as Machine: The Quest to Understand How Animals Work and Adapt traces the history of comparative animal physiology from the ancient era to the present, focusing on efforts such as Délye's and Wehner's to understand how animals in a stunning variety of forms function and adapt to their environments. The first four chapters offer a conventionally chronological and Europe-focused history of the discipline's early development, while