This isn’t your parents’ history of computing. It would have to be at least your great-grandparents’. *Endless Intervals: Cinema, Psychology, and Semiotechnics around 1900* finds a prehistory for digital technologies in media that was new at the beginning of the twentieth century, long before the early electronic “giant brains” were fired up in the mid-1940s. It adds to a burgeoning body of literature that locates the roots of our digital age beyond mid-century defense research and the start-ups of Silicon Valley, offering instead the flickering screens of early cinema halls and the laboratories of turn-of-the-century psychologists. What debt does whatever it is we call (often very inexactly) “the digital” owe to older “analog” media? Material histories connect them, as when early German pioneer Konrad Zuse turned to discarded 35mm film stock as a programming medium for his Z3 and Z4 computers. And analog optical media are (rather literally) baked into contemporary digital systems, as with the use of photolithography for the production of integrated circuits.

But, here, Jeffrey West Kirkwood argues for a deeper theoretical entanglement. He contends that the discretization we associate with digital operations—the way they encode reality as distinct 1s and 0s without anything in between—first appeared in those early cinema halls and laboratories. Cinema, often taken as an analog technology in a dichotomy with later digital ones, itself leverages gaps between discrete frames to produce the illusion of continuous reality and meaningful narrative. Starting from this insight, Kirkwood explores early cinema’s “regulation of moments in which nothing was shown” as the birth of a supremely psychological technology, one that would trouble its contemporaries’ theories of how human minds made meaning (p. 29). Already in Karl Marx’s vision of commodity fetishism, the manufactured table “stands on its head, and evolves of its wooden brain grotesque ideas.”[1] But Marx’s thinking table is a metaphor, one that points to the way the commodity obscures the social relations that produce it. With early cinema, Kirkwood argues, we have no such thing: the apparatus begins to think for itself, or at least engages in “semiotechnics,” the production of meaning by technical systems through their “management of absences, breaks, and gaps” (p. 9). This is a reading of early cinema that runs against the grain of canonical accounts of it as the paradigmatic modernist medium, adding one more bump of fragmentary stimulus to the overly nervous and addled industrial subject. Instead of yet another mechanical technology that made mincemeat of human meaning and subjectivity, the real threat of cinema was elsewhere, in something much more like the threats...
we ascribe to our contemporary media. Early cinema’s antagonism was not its technological capacity for shock but for the production of a seamless fullness of meaning, a capacity that brought in its wake anxieties that “human signification might also rely on similarly technical processes” (p. 48).

The book’s five body chapters explore this nascent semiotechnics from a handful of different angles. The first chapter follows scientific psychologists’ investigations of how the continuous moving images of early cinema in fact depended on regulated pauses, a discovery that reshaped how they believed human thought might manipulate discrete stimuli to arrive at a coherent whole. The second chapter follows this “dangerous proposition” as it shifts the nature of opposition to early film among the German cinema reform movement in the 1910s, which began to worry less about the physiological strain of badly regulated flicker and more about cinema “mechaniz[ing] the very logic of human subjectivity” (pp. 16, 17). From there, in chapter 3, Kirkwood shifts to how psychologists took up proto-cinematographic tools to investigate that key site of Enlightenment subject formation: reading. He argues that, along the way, reading was discretized, made cinematographic, replacing a hermeneutics of text with one in which “meaning was a kind of epiphenomenon or emergent property of mechanical alternation—at the level of perception, cognition, and text” (p. 89). If the liberal subject formed from reading was profoundly shifting, chapter 4 examines the cinematic subjects that began to emerge. When the human mind was already viewed as mechanical, as cinematic, psychologists and pedagogues began to imagine a properly cinematic Bildung (character formation), one that would produce newly programmable subjects. Finally, the fifth chapter explores the infiltration of cinema and the models of mind it gave rise to into theories of psychopathology, through nuanced readings of early psychoanalyst Viktor Tausk’s “On the Origin of the ‘Influencing Machine’ in Schizophrenia” (1918) and of cinema reformer Robert Gaupp’s involvement in the trial of Germany’s first mass shooter. There’s a sort of looping structure that runs throughout, revisiting again the technical conquest of flicker or the embryonic film theory produced by scientific psychologists to show a different set of branching connections. Instead of starting with, say, Gustav Fechner’s 1860 Elemente der Psychophysik and proceeding linearly up to the emergence of cinematic style, Kirkwood’s chapters double back like a stitch, circling around the turn of the century. The “around 1900” in the book’s subtitle (a nod to Friedrich Kittler’s Discourse Networks 1800/1900 [1985]) isn’t a periodization kludge but a notice to the reader to prepare for this grindhouse historiography. It is an appealing choice, one that allows the full complexity of the period to come gradually into view.

The connections Kirkwood draws between early cinema and psychophysics and contemporary digital computing are often more adumbrated than explicit. But they are endlessly thought provoking where they do appear spelled out. Cinema, as Kirkwood describes the context of scientific praxis and moral panics that swirled around it, predicted a hotly debated function of contemporary digital technologies, in that it seemed “to present a vision of the real without also training people in the techniques for its representation” (p. 113). The anxious turn-of-the-century pedagogues and cinema reformers Kirkwood is engaging in the section this quote comes from might as well have been writing about our own media landscape, rife with convincing deepfakes that spring from neural networks’ hidden layers. These threads that tie contemporary computing back to the cinemas of the early 1900s seem even more prescient now, as I write in June 2023, than they would have when Endless Intervals was published in October of last year, a month before the release of an early demo of ChatGPT. Since then, we have been increasingly told that the human hegemony over meaning-making is coming to a rapid end, if it hasn’t ended already. But Kirkwood gives us one deep media historical explanation for why we are
so quick to impute intelligence to our Bings and Bards. Kirkwood convincingly argues that early cinema established “an enduring nexus between technical discretization [that is, digitality] and the continuities of what it meant to have a mind” (p. 169). After the interchange between cinema and psychophysics that Kirkwood documents, all intelligence might be conceived of as artificial, whether we locate it in the cloud or between our ears, and all meaning-making as technological. As a new round of hand-wringing over the abrogation of uniquely human capacities by sophisticated machines unfolds, another interval in this dialectic opens. At the close of *Endless Intervals*, Kirkwood points out that what this fretting really points to is the way that “our working models of the uniquely human are entirely conditioned” by the meaning-making media we fear (p. 172). Instead of despairing over a future in which large language models might write all of our term papers, knock-knock jokes, and ad copy, we might begin to wonder, alongside Kirkwood, what already technological history of the “uniquely human” our very fear makes visible.

For a book whose opening gambit is to declare it’s “about nothing,” *Endless Intervals* has plenty to offer any reader interested in the history of computing, of the psy-sciences, and of cinema, as well as anyone with an oar in contemporary media theoretical debates about the fundamental nature of our digital present and where it comes from. It tells its story with an enviable intellectual panache, whether describing how tachistoscope-wielding experimenters made reading cinematic or how quietly insubordinate psychoanalysts snuck cinematic projection into the theory of schizophrenia. But most importantly, following Kirkwood in his circuit “around 1900,” weaving from cinema to psychophysics, from analog to digital and back, might just enable us to ask better questions of semitechnical futures soon to come.

Note

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