

From Digital to Analog and Back: The Ideology of Intelligent Machines in the History of the Electrical Analyzer, 1870s–1960s

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The example of the electrical analyzer, a genre of computing artifacts known mainly by their development and use in the context of electrification, is treated as representative of the historical oscillation between analog and digital computing orientations. Artificial electric lines, short-circuit calculating boards, and alternating current network analyzers are discussed as examples of electrical analyzers. Counting on the successful employment of the ideology of intelligent machines in the context of the history of the electrical analyzer, the first part of the article searches for a direct ancestor of the post-World War II computing ideology. The second part of the article proposes to interpret the ideology of intelligent machines as an effect related to the social conditions of the appropriation of computing labor. Overall, the article argues about the historical, i.e., antiessentialist, character of the demarcation of digital from analog orientation.

Introduction

The desire of engineer intelligent machines has both recent¹ and distant protagonists.² The historical specificity of the recent history rests on the assumption of several discontinuities between our computing technology and the one before it: digital vs. analog, general- vs. special-purpose (and the related discontinuity between programmable and nonprogrammable), electronic vs. nonelectronic (mechanical or electrical), or the combination of some or all of the above. In this article, I am restricting the focus to the historical effects of the assumption of discontinuity between the analog (technology) and the digital (technology). Theoretical arguments about the continuity between the analog and the digital have been necessary for calling our attention to articulation of ideology and technology.³ There also exists a historiography that follows the general articulation of ideology and technology before the recent decades.⁴ In this article, I am specifically concerned with the articulation of ideology and computing. This articulation is exemplified by the history of the social production and use of the electrical analyzer, a technological genre unanimously considered to belong to the analog.

In order to follow this history, I interpret engineering literature on the electrical analyzer based on some recent suggestions about the integration of textual interpretation into the practice of the historian of technology.⁵ From a synchronic perspective, there is an ideological continuity between the analog and the digital in the ideology of the intelligent machine. From a diachronic perspective,

one can attribute this ideology to the overdetermination by the desire to obtain a social advantage—by substituting machine intelligence for social intelligence. The term *electrical analyzer* captures the continuity of three couples of hegemonic as well as opposing social tendencies:

- mechanizing and calculating, which brought about the mechanical calculator;
- electrifying and analyzing, which brought about the electrical analyzer; and
- electronifying and computing, which brought about the electronic computer.

Mechanization was not simply a social tendency but was instead the hegemonic social tendency throughout modernity up until the end of the 19th century.⁶ From the end of the 19th century until after World War II, electrification was the hegemonic social tendency.⁷ From that time on, electronification has been the hegemonic social tendency.⁸ Calculating, analyzing, and computing have countered mechanization, electrification, and electronification. According to Thomas Hughes, analyzing was the *reverse salient* of electrifying⁹ and computing of electronifying.¹⁰ I consider this functionalist metaphor along with one qualification. In the history of the electrical analyzer, a technological front and its reverse salient were united in continuity, yet in opposition, thus in contradiction. The ideology of the intelligent machine came in order to suppress the contradiction from resulting in dysfunction.