

Airoidi Massimo (2022) *Machine Habitus: Toward a Sociology of Algorithms*. Cambridge, UK: Polity Press. 200 pages, ISBN: 9781509543281

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Sociology originates in theorising social relationships and social interaction between humans. While especially STS research has moved to include ordinary machines as co-constitutive for sociality and everyday life, by now machines have started to ‘learn’ and internet platforms have given rise to such learning machines interacting with humans on an everyday basis. In his book *Machine Habitus: Toward a Sociology of Algorithms*, Massimo Airoidi (currently Assistant Professor of Sociology at the University of Milan) investigates the consequences of this development for (cultural) sociology. Concretely, the author provides a theorisation of inductive machine learning (ML) algorithms using the Bordieusian concept of ‘habitus,’ thereby proposing to understand ML algorithms as social agents and formulating a ‘techno-social’ account of “the good old circle of socio-cultural reproduction” (p. 143). The underlying rationale is that, similar to humans, ML is based on learning through experience.

At first, in chapter two, ‘Culture in the Code,’ Airoidi tackles the question of how machines learn. Drawing on analogies to the sociological concept of socialisation, the author develops a notion of ‘machine socialisation,’ for which in case of supervised ML algorithms there are three distinct steps: Firstly, similar to genes for a human, ML systems are programmed and set up for a specific purpose (which Airoidi calls ‘*deus in machina*’). Secondly, analogous to primary socialisation, a supervised ML algorithm is trained with existing data using a global data context, i.e., they

“acquire a sort of ‘practical reason’” (p.59) about, for example, general relevance and irrelevance. Finally, similar to secondary socialisation, ML algorithms are applied to (and learn within) a local data context, whereby they adapt to interacting with specific individuals and their preferences, i.e., they become personalised. Airoidi suggests that due to the lack of a global data context, unsupervised ML only undergoes step one and three of this analogy.

Next, in the third chapter, ‘Code in the Culture,’ Airoidi reverses the starting point of the previous chapter, wondering instead “how do socialized machines participate in society — and, by doing so, reproduce it” (p. 23)? Airoidi suggests to tackle this question along dimensions of, firstly, cultural alignment of both algorithmic outputs and an individual’s or society’s understanding, and, secondly, information asymmetry, such as how much the algorithm knows about the user’s preferences and how much a user knows about the origin and manifestation of a ML algorithm’s outputs. Based on this, Airoidi suggests four ideal types of interactional configuration between humans and algorithms: On the one hand, when there is high information asymmetry—i.e., when the algorithm knows a lot about the user but the user may not be aware of the aims of the algorithm—algorithms can reinforce (assist when there is cultural alignment) or transform (nudge in case this is not given) users. On the other hand, when the user is highly aware of the algorithm or the algorithm does not know much about



the user, algorithms and users can co-produce (collaborate) or alternatively, there may be misunderstandings (disillusionment of the user in case there is no cultural alignment).

In the fourth chapter, 'A Theory of Machine Habitus,' Airoldi outlines his main contribution, and only here provides a definition: "Machine habitus can be defined as the *set of cultural dispositions and propensities encoded in a machine learning system through data-driven socialization processes*" (p. 113, italics in original). Providing this definition, Airoldi adapts Bordieu's writing to the more-than-human, suggesting that even though machines "have no consciousness or meaningful understanding of reality, they contribute practically to the reproduction of society, with its arbitrary discourses, invisible boundaries, and structures" (p. 112). Concretely, the author suggests a framework on how symbolic boundaries ("how people and content are ranked and associated in both algorithmic outputs and people's minds," p. 137) and as a result social boundaries (both as a direct consequence or because of implicated changes in economic, cultural, or symbolic capitals) are shaped by both habitus and machine habitus on user-level and platform-level. The result is an analytical toolkit of four prototypical scenarios of 'techno-social reproduction' which can be distinguished along two axes based on the previous chapters: global data contexts (platform-level, through algorithmic setup and training data) v local data contexts (user-level, through personalised suggestions) on one axis, and reinforcement (cultural alignment, i.e. algorithmic outputs and user/societal predispositions are aligned) v transformation (lack of cultural alignment) of existing understandings on another axis. In order of least to most implications on the "power configuration of the field" (p. 139), these four combinations are: boundary differentiation (alignment with individual preferences), boundary fragmentation (nudging of individual users beyond their preferences), boundary normalisation (alignment on platform-level, reinforcing societal predispositions), and boundary reconfiguration (nudging on a platform level, e.g. when goals or assumptions underlying algorithmic infrastructure are updated). Airoldi notices, however, that there will likely be additional social dynamics at play,

and "that the temporal oscillations and multiplicity characterizing user-machine dispositional trajectories make these scenarios no more than static approximations of ever-flowing bundles of practice" (p. 142).

In the final chapter, 'Techno-Social Reproduction,' the author summarises the main points of the book and outlines a research agenda that builds on understanding algorithms as social agents. Here, the author reminds the reader that

the locus of the power piloting our digital lives is ultimately not the algorithmic code, but rather the hierarchical culture sedimented within it and elsewhere: a socially fabricated matter made, on the one hand, of platform owners' and machine creators' arbitrary goals and interested assumptions and, on the other, of machine trainers' habitual practices, tacit rules, prejudices and implicit assumptions. (p. 146)

Arguing on the basis of the ever-growing relevance of ML, Airoldi calls for an inclusion of the study of algorithms and mechanisms of techno-social reproduction in a novel sociological research agenda, and ultimately suggests a "(cultural) sociology of algorithms" (p. 150). He suggests four research directions, for all of which existing literature is provided, namely: following the machine creators, following the users, following the medium, and following the algorithm. In an ideal world, the author concludes, ML should be designed to be 'ignorant,' that is to include horizontal and exchange-oriented relationships — just like humans —, instead of being an opaque, all-knowing system ridden with information asymmetry.

Airoldi is aware that the book's propositions might not be surprising or novel to the reader, especially those "familiar with STS or ANT literature" (p. 118). He emphasises that "The purpose of this book is to restate the obvious in a sociologically less obvious fashion, deliberately designed to 'transgress' disciplinary borders, as suggested by Bordieu himself" (p. 31). Thus, it is unavoidable that some readers may find some parts of the book redundant. Nevertheless, Airoldi's sociologically grounded theorisation of ML algorithms as social agents may be intriguing for STS and ANT scholars, and an "epistemological rupture" (p. 149)

for sociologists with a suggestion of socialised machines as “a source and factor of social order” (p. 147).

In opposition to much recent critical scholarships on algorithms, Airoldi suggests that research should go beyond the study of algorithmic biases and instead focus on concepts from cultural sociology “like *culture, socialization, practice, and habitus* [which] open a whole new set of questions” (p. 48, italics in original) when applied to the study of ML systems. Accordingly, the examples in the later stages of the book are increasingly focused on everyday life, including taste and cultural consumption, which requires some efforts from readers to transfer insights to other research areas, but which (so I thought) is highly rewarding. Given the focus of the book, Airoldi does not include much discussion on the configuration of everyday life through affordances (a term not even mentioned in the otherwise useful index) of ML system’s inputs or platform design.

The consistent and thorough focus on the influence of algorithmic systems on everyday life, consumer society, and culture is an important contribution to research on algorithms. Airoldi’s “mechanisms of techno-social reproduction” (p. 149) open up possibilities to account for “second-order consequences [of ML algorithms] on society and culture” (p. 85), thereby affirming the constitutive impacts of ML on societal meaning-making and enabling research to, for example, interrogate ML’s involvement in and contribution to the multiple crises of late capitalist consumer culture. Overall, then, despite some redundancy for STS and ANT scholars, the book fruitfully links various literatures including Bordieusian cultural sociology, STS, and critical algorithm studies. It provides an eclectic introduction into the social scientific study of algorithms paired with intriguing concept development, providing the reader with the necessary analytical tools to understand and theorise ML algorithms as social agents participating in techno-social reproduction.