Exploring Actor-Network Theory in the Investigation of Algorithms

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ABSTRACT

This short paper, a submission for the HCI workshop 'Standing on the Shoulders of Giants', looks at scholarly studies of the presence of algorithmic selection in everyday life and how existing research benefits from and is connected to Actor-Network Theory (ANT). The paper then suggests that the empirical and philosophical strengths of ANT could benefit not just algorithms, but the broader field of HCI. With this exercise, this submission touches upon multiple key topics of the workshop. Most prominently, the paper addresses topics 2 and 6 by suggesting how ANT could connect to existing debates on, for example, 'post-userism'. Also topic 5 is relevant, since the rather obscure philosophical underpinnings of ANT need to be made more accessible if we hope to make its approach useful for HCI.

CCS CONCEPTS

• **Human-centered computing** → **Human computer interaction (HCI)**;

KEYWORDS

HCI; philosophy; social theory; ANT; algorithms

UBIQUITOUS ALGORITHMS

Enter the algorithm

The notion of 'the algorithm' no longer simply refers to a set of precise instructions within a computer program, but instead has taken on a broader meaning. The term now includes both the computer program itself and the material effects it has on other systems. Related to this shift is the fairly recent entrance of the term into the public sphere cite [21]. The broader attention algorithms receive is connected to their increased presence in and influence on "the technologised everyday" [27, p. 148]. Whether it is in social media, 'legal tech', online shopping or financial trading: seemingly everywhere algorithms are used to prioritize, classify, associate and filter, all without direct human involvement [13].

These developments have challenged scholars both within and outside of the field of Human-Computer Interaction to reflect on the presence of these 'black boxed' [20] decision makers. This short paper takes this new academic attention as an opportunity to reflect on the potential contribution of Actor-Network Theory (ANT) to the domain of HCI. First I briefly mention how attention to algorithms highlights existing questions and discussions within HCI. Next, I mention some core characteristics of ANT before suggesting how these might be of value for HCI research.

Algorithms and challenges

Different waves of HCI can be distinguished, each with a different construction of the three core concepts: user or human, computer, and interaction [6]. These transformations in the third wave, as described by Baumer and Brubaker [6], can be illustrated through the omnipresence of algorithms. The user is no longer merely a user, but also a provider of data, thereby feeding the algorithms. Algorithms, in turn, are no longer solely situated within computers, but exist through complex constellations of devices. The algorithmic intervention, finally, is present in such a wide variety of domains, that the concept of 'interaction', too, is severely affected by its presence.

INSPIRATION FROM ACTOR-NETWORK THEORY

Algorithms as assemblages

Social scientists and philosophers discussing algorithms have pointed out that algorithms are not only constituted by rational procedures, but also involve institutions, people in a multitude of roles, and various intersecting contexts [e.g., 11, 22, 27]. These authors suggest that both academic research and design practice can benefit from broadening the conception of 'the algorithmic' to include not only technical but also social, legal, economic and material elements. To do so, algorithms can best be conceived of as what French philosopher and sociologist Michel Callon has called *agencements* [8], using the term to indicate that agency, or the capacity to act, is generated through the arrangement

[1]Although the dictionary suggests terms as 'arrangement' or 'assemblage' as English equivalents, *agencement* is often left untranslated in order to emphasize its etymological connection to 'agency'. Originally coined by Deleuze and Guattari, Callon develops the notion when writing on the performativity of economics [see 8]. The concept forms part of the broad vocabulary developed by ANT and STS researchers studying their attention to the study of economics [see 9, 10].

of heterogeneous elements into a network.[1] Such a perspective emphasizes that algorithms are socio-technical assemblages where human and non-human actors intertwine [e.g., 2, 3, 25, cf. infra].

A note on ANT

In order to explore how this conception of algorithms as assemblages is connected to Actor-Network Theory, a brief introduction is indispensable. First it should be noted that – contrary to what the name suggests – ANT is more a semiotic method or a sensibility [26] than a theory in the classical sense, aimed at innovation rather than consolidation [19]. Rather than making substantive statements about how the world works, it is a theory "about *how* to study things" [15, p. 142]. The name of 'Actor-Network Theory' itself has been problematized from early on. John Law, for example, who is together with Bruno Latour and Michel Callon considered as one of the grandfathers of ANT, prefers to call the approach 'material semiotics', since it better indicates the uniqueness of the approach [16].

In any case, any exploration of ANT should consider the case studies carried out under through its lens, rather than approaching it in the abstract [16]. It is telling that Latour has been described as an "empirical philosopher" [12]: Latour's philosophical contributions cannot be understood separate from his empirical work, while his empirical work cannot be separated from his philosophical thought. Both philosophy and case studies are at the core of ANT.

At its most basic level, ANT is aimed at removing the borders that are often drawn between domains, for example between the political, the legal, the social and the technological [see 14, 15]. Moving beyond these traditional distinctions allows for a greater sensibility to the various ways in which elements from all of these spheres are intertwined in material praxis. Within the ANT case-studies, the distinction between 'the human' and 'the non-human' is not only considered to be of little use, it is even deemed counter productive since it limits what one is able to see. In contrast, ANT proposes to do away with these distinctions and instead consider them as achievements rather than as starting points for inquiry.

Heterogeneous elements

This crossing of borders, or rather their elimination, allows the researcher to take a variety of elements into consideration. For the study of algorithms, this also means weaving together matters of concern that are usually categorized into separate domains (which is, to repeat, precisely what Latour and his colleagues try step away from). The topic of algorithmic decision making brings together elements that are:

- technical (including related questions of complexity and opacity [7]);
- social (or rather, since ANT specifically attempts to redefine what 'social' means [15], we should speak of roles, interpersonal relations, and power imbalances);

- legal (in terms of data rights, a central topic related to big data [18]);
- and commercial (both in terms of business practices, as for the use of algorithms in financial practice [on the latter, see 17].

It should be noted that not this list is far from exhaustive. What's more: according to the ANT philosophy, each of these elements is in turn made possible thanks to the networked connections with other elements.

TAKING ANT TO HCI

Of ethics and design

In the world of design, too, ANT has had left a mark and suggested new ways of thinking about what design is, what it includes and how it can be approached [see 4, 23, 24, 28]. Further reflection could suggest how these new insights can be used in design for HCI, both on the topic of 'algorithmic experience' [1] and 'human-centered algorithm design' [5], and within the broader field of HCI. Also broader questions concerning the ever increasing presence of algorithms and automated systems benefit from a ANT-inspired approach. Illustrative of fruitful use of similar philosophical insights is Mike Ananny's discussion of an ethical framework for the discussion of algorithms [2].

The above paragraphs attempted to surface connections between ANT and existing research on algorithms. The same philosophical approach could be applied to other topics that HCI is concerned with. At its core, the ANT approach advocates for a radical widening of scope, to include a variety of elements that might otherwise be overlooked but are crucial for a thorough understanding of what is happening.

Most notably, the broadening of perspective that ANT promotes, can be linked to what Baumer and Brubaker [6] have identified as a development towards 'post-userism' in HCI: a reconceptualisation of not only 'the user', but also of what it means to 'interact' and what constitutes a 'computer'. This – very brief – overview suggests that similar conceptual and theoretical developments are present within recent research on algorithms.

As Baumer and Brubaker [6] suggest, HCI could benefit from an exploration beyond traditional conceptualizations of what it means to 'use' and be a 'user'. It is to such a task that ANT can most certainly contribute. One major challenge, though, is related to ANTs notoriously obscure philosophical underpinnings. Further exploration of existing ANT-inspired studies, both within HCI and in the broader study of technology, could make its theoretical and philosophical potential more accessible to the HCI community.

AUTHOR BIOGRAPHY

Elias Storms is HCI researcher at the *Meaningful Interactions Lab* (mintlab) at the University of Leuven, Belgium, where he researches algorithmic accountability and transparency. For his current research prorject, he deploys qualitative and participatory methods to investigate and improve user experience and transparency of algorithms in the dissemination of news.[2] Questions about algorithmic accountability and the influence of these black boxes on society and social life form the backdrop of this research project.

More generally, his academic interests include social theory, the sociology of digital life, and tools for digital cooperation. From 2011 to 2018, Elias was researcher and teaching assistant in the domains of general and theoretical sociology at the Department of Sociology at the University of Antwerp. He is in the prosess of finishing a PhD in sociology at the same university.

[2]This project, called *Accountability and Transparency in Practice*, conducts exploratory design research. Together with legal researchers, who empirically investigate the GDPR's 'right to explanation' in the context of news recommender systems and the collection of users' data, the aim is to explore the potential of achieving 'explanation through design' of algorithmic news recommenders. To do so, we make use of a participatory and user-centered approach to algorithm design.

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