Enacting Algorithms Through Encoding and Decoding Practices

Riccardo Pronzato[a]

Abstract

In the field of digital sociology, debates continue about the best strategies to analyse the social role of algorithms, their design and uses, as well as their implications. To contribute to this conversation, this paper bridges a practical approach to culture – which considers culture as an outcome of social activities – with the tradition of cultural studies – which frames culture as a set of practices in the construction and interpretation of media messages and technological artifacts. Specifically, I focus on how Nick Seaver's "algorithms as culture" approach intersects with Stuart Hall's "Encoding/Decoding" model and the following applications to algorithmic media of different authors. Through this analysis, I argue that algorithms are culturally enacted by the encoding and decoding practices of their producers and end users. Thus, algorithms are considered as brought into being by the activities underlying their design, as well as by their uses, analyses, and interpretations. Furthermore, I propose different methodological strategies to analyse how encoding/decoding activities culturally enact algorithms within the social realm.

Keywords: algorithms as culture, encoding/decoding model, enactment culture as practice, cultural studies, critical algorithm studies.

1. Introduction

Digital platforms have become infrastructural elements of our everyday life (van Dijck et al., 2018) and, as extensively highlighted by recent research, the algorithmic models underlying platforms' functioning are not neutral intermediaries, but socio-technical artifacts contributing to the reproduction of cultural values and biases (Aragona and Felaco, 2020; Seaver, 2022; Vicari and Kirby; 2023), as well as social agents participating in social life (Airoldi, 2021).

[a] Department of Sociology and Business Law, University of Bologna, Italy.

In this scenario, questions have been raised about how researchers can scrutinise the functioning, design and implications of algorithms and, in particular, their relationships with culture.

This paper is a theoretical proposal that merge a practical approach to culture – which consider culture as an outcome of the human activities composing social life (Swidler, 1986; Mol, 2002), with the tradition of cultural studies (e.g., Hall, 1980) – which consider culture as "as a set of practices" and as the "giving and taking of meaning" (Hall, 1997, p. 2) in the production and interpretation of texts and artifacts by individuals. Specifically, I return to Nick Seaver's (2017) claim to consider algorithms "as culture" and I place it in dialogue with Stuart Hall's Encoding/Decoding model (1973, 1980), along with its various applications to algorithmic media by different authors (e.g., Shaw, 2017; Lomborg and Kapsch, 2020; Siles et al., 2020; Airoldi and Rokka, 2022). In his STS-oriented anthropological analysis, Seaver (2017) proposes to adopt a practical approach to culture to analyse how algorithms are "culturally enacted", i.e., how they materialize in and through human practices. This paper analyses how this conceptual foundation intersects with Hall's Encoding/Decoding model, which was developed within a different theoretical tradition, and later adapted by media scholars to scrutinise how algorithms are produced and interpreted. Within this framework, I contend that algorithms are culturally enacted by the encoding and decoding practices of both their producers and end users. Furthermore, I highlight that algorithms need to be considered as discursive elements whose meaning is continuously negotiated within human-machine interactions. Indeed, how individuals make sense of algorithms during their design, implementation, and in everyday engagements contributes to the definition of what algorithms are and emphasises their unstable nature.

Through this analysis, I aim to advance research on algorithmic media and to provide a theoretical framework that can foreground future empirical studies. Specifically, the goal is to contribute to the field of digital sociology and to the research area of critical algorithm studies.

The article is structured as follows. The first two sections describe Seaver's "algorithms as culture" approach and Hall's Encoding/Decoding model. Then, I explain how the latter has been adapted by different scholars to investigate the ways in which algorithmic systems are encoded and decoded by their producers and end users. The next section discusses how the study of encoding and decoding practices can illuminate on the process of enactment of algorithmic systems, and it proposes some methodological strategies to do so. Finally, the conclusions will examine the implications of this theoretical proposal.

2. Algorithms as culture. Enacting algorithms

Given the situated and non-neutral nature of algorithms, how it is possible to approach them is a primary and continuing concern within the field of critical algorithm studies. While the "black box metaphor" has been often used to describe algorithms as unknowable devices whose functioning was not possible to understand (e.g., Pasquale, 2015), more recently, several scholars have highlighted the limits of this metaphor. Within this framework, Bucher (2016) claimed that the black box analogy is an "epistemological limit" (p. 94) that do not allow us to focus on potential crucial issues regarding how digital platforms are built and interpreted. Similarly, O'Dair and Fry (2020) argued that considering algorithms as black boxes overlooks the broader power dynamics at play beyond mere code, thereby impeding to focus on salient aspects of algorithmic systems.

One of the authors that in the last few years has focused more on how to unpack algorithmic media is Nick Seaver, an anthropologist with an STS sensibility that investigated, through ethnographic methods, companies producing recommendation systems for music streaming services in the US. For Seaver (2019), "algorithmic systems are not standalone little boxes, but massive, networked ones with hundreds of hands reaching into them". To understand the underlying logic of algorithms, attention must extend beyond algorithms themselves to "the logic that guides the hands" (p. 419), i.e. the "technical" and "non-technical" individuals that continuously manipulate, adjust, and experiment with the components of algorithmic systems. Since the first steps of algorithmic production, programmers, developers, engineers, etc. constantly engage in discussions regarding the goals, possibilities and functioning of the system with "non-technical" people. Different individuals may have different ideas regarding what algorithms are, how they should be designed and the ways in which they are supposed to work. Indeed, algorithms take shape within a complex environment where contrasting human responses, structural biases, personal evaluations, cultural prejudices and corporate goals intertwine and echo in each other (Seaver, 2022). Thus, "in practice there are no unsupervised algorithms. If you cannot see a human in the loop, you just need to look for a bigger loop" (Seaver, 2018, p. 378). Given this scenario, Seaver (2017) argues that algorithms should be approached "as "multiples" — unstable objects that are enacted through the varied practices that people use to engage with them" (p. 1), without a clear division between technical and non-technical concerns, which are rather blended together.

To build his argument, Seaver (2017) draws on Annemarie Mol (2002), an anthropologist whose work is situated within a practical approach to culture, which focus on actions and strategies rather than on the typical cultural tropes

of norms, texts and models (see Abu-Lughod, 1991; Stern, 2003). Specifically, in her "praxiography", Mol (2002) argues that culture is an outcome of human practices, rather a priori setting for them. This approach also resonates with other practical conceptualizations of culture, such as the one of Ann Swidler (1986), who claims that culture is a "tool kit" that provide people with "strategies of action" (p. 273), equipping individuals "both by shaping their internal capacities and by helping them bring those capacities to bear in particular situations" (Swidler, 2001, p. 71-72). Within this framework, individuals "do not act on pre-given objects, but rather bring them into being" (Seaver, 2017, p. 4). Thus, social reality materializes through the practices of the people involved in it. Mol (2002) refers to this process as "enactment" to describe how objects are brought into being in social reality by human practices and become "multiples", i.e., "more than one and less than many" (p. 82).

Seaver (2017) applies the idea of "enactment" to investigate algorithms. Following this perspective, algorithms are not stable, pre-given artifacts, but "the manifold consequences of a variety of human practices" (p. 4), malleable objects that materialize in and through human activities, perceptions and interpretations. Specifically, this position considers algorithms as culture, i.e., not as "singular technical objects that enter into many different cultural interactions, but (…) rather [as] unstable objects, culturally enacted by the practices people use to engage with them. (…) Algorithms are multiple, like culture, because they are culture." (p. 5).

Within this framework, the networks of "culturally situated interpretive processes" (Seaver, 2018, p. 379) within which algorithms are built and interpreted need to be a primary concern of scholars investigating algorithms. If Seaver's work has been foundational for several research endeavours (e.g., Bonini and Gandini, 2019; Pronzato, 2023), a different scholarly tradition that focused on "culturally situated interpretive processes" is the one of cultural studies which took shape primarily in the work of Stuart Hall.


3. Encoding/Decoding model

Mass communications research, in the US and the UK, in the 1950s and 1960s aimed to measure the "effects" of mass media on individuals, which were only "receivers" of "messages", holding an already fixed and stable meaning, created by the "senders". As a response, Stuart Hall (1973; 1980) elaborated the Encoding/Decoding model. By focusing on television communications, Hall elaborated on three claims: "(i) meaning is not simply fixed or determined by the sender; (ii) the message is never transparent; and (iii) the audience is not a passive recipient of meaning" (Procter, 2004, p. 59). For Hall (1980), the

reception and production of media messages are not identical, but related, i.e., "differentiated moments within the totality formed by the social relations of the communicative process as a whole" (p. 130). Specifically, communication takes place within a circuit in which receiver become consumers, thus playing an active role in the interpretation of messages and, therefore, in the (re)production of meaning. Within this circuit, the meaning of a message can never be guaranteed in advance and the same media event can be read differently by various audiences. However, this new communication model does not ignore (but rather highlights) the asymmetrical, political, and power-laden relationships that underpin communicative exchanges.

In particular, drawing on a semiotic perspective and jargon, Hall considers communication as taking place "within sign systems" (Procter, 2004, p. 59), thus emphasizing the importance of the discursive form and its essential role in the exchange of messages from sender to receiver (Pillai, 1992). Within this framework, he develops the idea of "encoding" and "decoding" (Hall, 1980), which are considered as the entrance and exit points from the systems of discourse (see figure 1).

Figure 1. Hall's encoding/decoding model (Hall, 1980, p. 130).
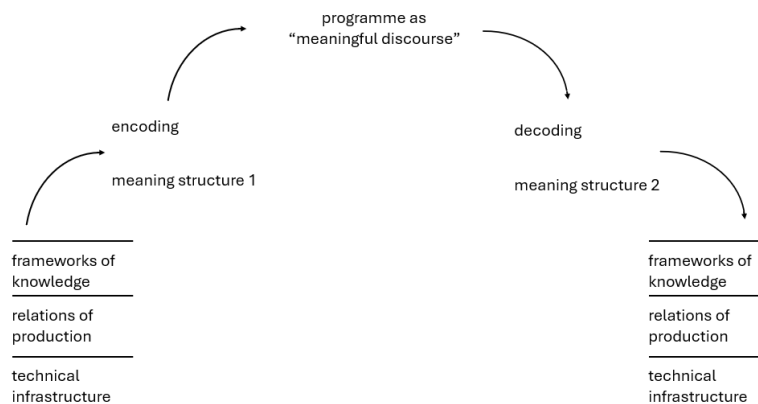
Encoding refers to the process through which a message is produced by individuals working in media settings (e.g., television), while *decoding* refers to the interpretation of that message by the audience. In the encoding phase, "the institutional-societal relations of production must pass under the discursive rules of language" (Hall, 1980, p. 130). Thus, events become stories and are "placed within a set of codes or system of signs" (Procter, 2004, p. 63), by individuals working in broadcast media settings. Given specific frameworks of

knowledge, technical infrastructures, relations of production, ideas about the audience, etc., producers create messages in which are encoded specific "meaning structures", in other words, a preferred reading of the message, in accordance with the "dominant cultural order" (Hall, 1980, p. 134). These codes help audiences to "reference" a broader spectrum of meanings, relationships and associations. They "are the means by which (…) the taken for granted knowledge which society's members possess of its institutions, beliefs, ideas and legitimations are 'brought within the horizon' of language and culture" (Hall, 1977, p. 330).

Despite the "preferred meaning" suggested by producers, however, the encoding process "is determinate but not determining" (Pillai, 1992, p. 228). It is, in fact, open-ended and cannot assure that the encoded and decoded moments correspond. "Preferred meanings" are not univocal, and they can be constantly contested, as receivers *decode* the messages, thereby permeating them with social utility or political efficacy. How messages are decoded is a continuous site of struggle. Specifically, Hall (1980) identifies three potential decoding positions:

1. The *dominant-hegemonic position*. When individuals decode messages in accordance with the dominant cultural order, thus accepting the preferred (dominant) reading encoded into the message.
2. The *negotiated position*. It contains both "adaptive and oppositional elements", as "it acknowledges the legitimacy of the hegemonic definitions to make the grand significations (abstract), while, at a more restricted, situational (situated) level, it makes its own ground rules" and "operates with exceptions to the rule" (p. 137).
3. The *oppositional position*. It describes when audiences "decode the message in a *globally* contrary way" (p. 138, emphasis in the original), recognising the dominant preferred meanings intended by the producers of a message and opposing them.

Thus, Hall's model challenges theories postulating direct media effects and highlights that audiences have an active role in the interpretation of "polysemic" media messages. However, every message carries a "preferred meaning", i.e., a hegemonic classification of the social realm, which is "structured in dominance" (Hall, 1980, p. 169) and embedded (encoded) into the texts circulating within a specific socio-cultural context and media environment. Specifically, drawing on Gramsci, Hall considers culture and ideologies not as external monolithic structures which are imposed on individuals following a top-down, one-sided logic, but rather as sites of continuous negotiation and struggle within which individuals act, reproducing and also contesting those structures. As supported by Procter (2004), the Encoding/Decoding model claims that televisual discourse serves "a key ideological role in reproducing and securing, by *consent*

rather than force, the values and meanings of the dominant cultural order" (p. 72, emphasis in the original). However, it should be noted that it is always possible to contest or transform preferred meanings. Indeed, media are not pure expressions of ideology, but rather sites of ideological contention.

If the Encoding/Decoding model has been highly influential in studies investigating how individuals interpret broadcast media messages, recent literature situated within the field of critical algorithm studies supports that this model can be applied also to how algorithmic media are produced (encoded) and then interpreted (decoded) in everyday life.

4. Encoding algorithms

Hall considered the "encoding" phase as the moment during the production, for instance, of a news item, in which meaning structures were inscribed into the message by media workers. This idea of inscription of meaning into an artifact has been related to the process of algorithmic production, in which are encoded values, goals and behaviours. Specifically, there are two subjects differently encoding algorithms: *algorithmic producers* and *end users*.

Algorithmic producers are the workers behind the design and implementation of digital platforms, and their diverse practices encode meaning structures into these artifacts. As highlighted by Adrienne Shaw (2017), in fact, Hall's Encoding/Decoding model can be adapted to critically engage with the ideological assumptions embedded into networked technologies. To do so, she focuses on the affordances of digital platforms[1]. In digital environments, the term "affordances" comes to indicate platform-specific features – such the 2200 characters-limit of a caption on Instagram – and, more specifically, the "multifaceted relational structure" (Faraj and Azad, 2012, p. 254) existing between an artifact and its use, which facilitates or restricts potential behaviours within a given context (Evans et al., 2017). Thus, "affordances mediate between a technology's features and its outcomes. Technologies don't make people do

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[1] "Affordances" is a concept firstly developed in ecological psychology to indicate "[t]he affordances of an environment", i.e., "what it offers the animal, what it provides or furnishes, either for good or ill" (Gibson, 1979, p. 127). Then, the idea of possibilities and constraints enabled by a natural environment has been adapted by sociologists to different artifacts, thus referring, in general, "to the range of functions and constraints that an object provides for, and places upon, structurally situated subjects" (Davis and Chouinard, 2017, p. 241).

things but instead, push, pull, enable, and constrain. Affordances are how objects shape action for socially situated subjects" (Davis, 2020, p. 6).

The affordances of a digital platform are decided and constructed by such workers as managers, developers, engineers, data scientists, etc. participating in the process of platform design, within which the actions requested, demanded, encouraged, discouraged, refused, or allowed to end users on that platform are set (Davis, 2020). Affordances are "a form of power" (Jordan, 2008, p. 139) as they set specific limits and possibilities, on users' activities and relationships (see also Caliandro and Gandini, 2016). According to Shaw (2017), there are "intended uses" which are "encoded into the design of interactive objects/texts" (p. 597) by their producers. Drawing on Hall (1980), these "intended uses" can be considered as "meaning structures" inscribed, i.e., *encoded* into the affordances of a platform.

Here it should be noted that the affordances of a platform and its architecture are not the same thing, although they are necessarily intertwined. While the affordances refer to the "the possibilities for action", the architecture indicates the "digital structure" (Roskos et al., 2017, p. 42) of a platform. For example, the algorithms of social media services which track users, regulate the ranking of contents and work to maximise the extraction of data, are an essential part of the architecture of those platforms, but they are not the affordances. Instead, the affordances are one part of this complex assemblage favouring the functioning of the architecture. However, both the affordances and architecture of a platform undergo a process by which dominant meanings are encoded into their design. Indeed, if in the affordances of a platform are encoded the "intended uses" and therefore, the preferred and dominant meanings of that platform (Shaw, 2017), then, the socio-cultural values, biases, opinions, which emerge as practices, embedded into the architecture of digital platforms are another phase of the encoding process through which platforms acquire and suggest meaning.

Then, another element to consider is that affordances are not completely autonomous elements, which only impose their conditions on users. Indeed, affordances emerge "at the intersection (…) between the technical architecture of a platform that shapes patterns of communication (e.g., hashtags, algorithms, etc.) and the collective practices of those social groups that use the platform and its technicalities for specific communicative purposes" (Caliandro and Anselmi, 2021, p. 3). Thus, how individuals act within the possibilities and constraints imposed by the platform's affordances is fundamental to better understand "the communicative ground through which the meanings of technology are negotiated and renegotiated by users through perception, mediation, and materiality" (Nagy and Neff, 2015, p. 7).

This aspect is highly interesting as it highlights the second subject encoding algorithms, i.e., *end users*. Individuals, in fact, take part in the configuration of algorithms with their online activities (Airoldi and Rokka, 2022; Risi and Pronzato, 2022). Within this process, a key element is the recursivity of digital platforms. As highlighted by such authors as Massimo Airoldi (2021) and David Beer (2022), recursive feedback loop mechanisms underpin the functioning of algorithmic media. Every time a platform, such as Netflix or Spotify recommends users a content, that output is the outcome of a process in which the platform combined the data previously collected about our behaviour, i.e., the data *input*, with other data, in order to produce a result, the data *output*, such as a recommended movie or song. This process is recursive, as "the output of a computational process becomes itself embedded in the input of a new iteration" (Airoldi and Rokka, 2022, p. 416-417). When the system provides an output, users react to these stimuli by, for example, skipping, sharing, liking that content. All these activities produce data points that are reabsorbed by the platform as new data inputs employed to propose new contents, which are in turn consumed by users. In other words, "users feed algorithmic media and are continuously fed by them within a recursive loop" (Risi and Pronzato, 2022, p. 160). Given this scenario, it can be argued that users' practices and meaning-making processes are continuously *encoded* into the design and functioning of platforms. Indeed, as argued by Bucher (2017), users' activities "play a generative role in moulding the algorithm itself", as they "have the ability to affect the very algorithms that helped generate (…) [their] responses in the first place" (p. 41-42).

Then, end users' encoding activities are dramatically different from the ones of platform designers. Indeed, users are not necessarily conscious of recursive processes, which take place within a pre-structured networked environment, and do not primarily serve users' interests. However, users' practices can be considered as a different type of encoding activities, as they participate in the moulding of algorithmic systems and its overall functioning.

5. Decoding algorithms

For Hall, the "decoding" phase was the moment when receivers interpreted the message broadcasted to them. By extending on Hall's Encoding/Decoding model (1973; 1980), users' interpreting practices of the everyday role and functioning of algorithms can be considered *decoding* activities.

In this regards, Stine Lomborg and Patrick Heiberg Kapsch (2020) adapted the concept of decoding to how individuals interpret digital platforms, in order to better understand their comprehensions of algorithms, the ways in which

they imagine algorithms to work and how they frame the role and usefulness of computational operations in their everyday life.

1. First, they illustrate the *dominant position of decoding algorithms*, which describes when individuals use "algorithms as intended, thereby reifying their encoded meanings and biases" (Lomborg and Kapsch, 2020, p. 755). Feeding the platform with as much behavioural data, personal information and contents as possible are instances of this mode of interaction as they imply the acceptance of the social, political and economic model underpinning digital platforms.

2. Then, *the negotiated position of decoding algorithms* explains an intermediate stance whereby individuals interpret algorithms as essential daily elements, considering data collection and profiling practices as acceptable under the condition that they are employed to enhance service quality and offer improved products and options. This more cautious position includes both negative and positive opinions regarding digital platforms.

3. Finally, the authors describe *the oppositional position of decoding algorithms.* Although this position is certainly marginal in their dataset, it shows modes of interaction drawing on mainly negative opinions regarding algorithmic media. Individuals perceive algorithms "as problematic technologies, whose gaze must be evaded, and whose operations must be undermined". Specifically, individuals embrace an activist attitude, "refrain from using algorithm-driven media and web services", and view digital platforms as "unethical, discriminatory, and otherwise problematic" (Lomborg and Kapsch, 2020, p. 756).

Drawing on the aforementioned adaptation of Hall's model by Shaw (2017), Lomborg and Kapsch (2020) show that, while algorithmic media are encoded to favour and prompt certain types of activities, end users play a key role in actualising these activities, and they can introduce alternative opinions and unintended practices into the communication process. Indeed, although technologies are encoded by their designers in ways that embed particular interests and values, individuals agentically use technologies, which can and often have uncertain and unplanned effects, as well as multiple uses and implications that are not initially foreseen by their producers (Ytre-Arne and Das, 2021). As noted earlier, algorithmic media materialize within a complex ecosystem of different social structures and not always expectable agentic actions (Davis, 2020). Despite the affordances and exploitative logics imposed by digital platforms, individuals are able to use and interpret digital technologies, and they can even "possibly push back on algorithmic operations performed on them in everyday life. If algorithms are the central mechanisms of encoding in

digital systems, it matters how people become aware of and make sense of them" (Lomborg and Kapsch, 2020, p. 759).

In this scenario, while users' activities are datafied, thereby becoming encoded into the algorithmic infrastructure, their usage practices and interpretations are a form of decoding that can accommodate or subvert the intended uses and meanings inscribed in algorithmic media. How individuals use digital platforms, how they believe these artifacts work and the ways in which they comprehend the role of algorithms in the organization of everyday life are generative realms where production and consumption intertwine, thus highlighting the different material instances in which a technological artifact acquires and contributes to the production of meaning.

In this regard, a potential intermediate level between the producers of digital platforms and the end users is the category of digital experts (e.g., Aragona and Felaco, 2020). Indeed, while the analysis by Lomborg and Kapsch (2020) primarily refers to end users, digital experts who scrutinise algorithms and make their functioning more accessible to the general public are an interesting example of how specific encoding capacities can enable oppositional decoding activities. For example, individuals involved in algorithm audits decode algorithms with the aim to evaluate their functioning and social implications (Aragona, 2022).

6. Enacting algorithms through encoding and decoding practices

Earlier in this paper, it was discussed how algorithms are unstable objects which are enacted by meaning-making processes, situated in specific cultural contexts. These interpretive processes within which algorithms are always built and understood are key to investigate how algorithms take shape, emerge and intervene in social life. Considering algorithms "as culture" implies considering algorithms as enacted, i.e., brought into being by the social-cultural activities underlying their design, that is, *encoding* practices, and by the situated ways in which individuals think, interpret, and relate to them in different settings, that is, *decoding* practices.

Given this scenario, in accordance with a practical approach to culture (Swidler, 2001; Mol, 2002; Seaver, 2017) – i.e., an outcome of social practices – and the tradition of cultural studies, which consider culture as "as a set of practices" (Hall, 1997, p. 2), I claim that the encoding and decoding practices related to algorithms are a fruitful site to examine how algorithms are enacted in everyday life.

6.1 Encoding/enacting

If algorithms are "culture", i.e., malleable objects that materialize in and through human activities, perceptions and interpretations, it is crucial to investigate the cultural practices of the individuals working behind their production. As explained earlier, the activities of tech workers contributing to the production of algorithms can be considered as encoding practices, as they inscribe structures of meaning and preferred readings into algorithms, which are adjusted and retuned over time. Simultaneously, these activities can also be considered as practices enacting algorithms, since it is those same practices that define what and how algorithms are. Within this framework, the encoding practices of algorithmic producers materially bring algorithms into being as cultural objects, thus culturally enacting algorithms in social reality.

As shown in several studies (e.g., Aragona and Felaco, 2020; Kotras, 2020; Sachs, 2020; Pronzato, 2023), producers' meaning structures are never definitive and rather continuously negotiated within the production environment. Indeed, the construction of algorithmic media occurs through constant negotiations between different tech workers, within "a sort of constant battlefield" (Hall, 1981, p. 233), in which different actors, involved in asymmetrical power relations, continuously redefine what algorithms are. These negotiations and the places where they occur are interesting sites where to observe how cultural meaning is inscribed and enacted.

According to Seaver (2018), to investigate these encoding practices and the deployment of algorithmic media, researchers need to observe "the makeup of technical teams, the social processes by which those teams define and discover problems, how they identify acceptable solutions, and their culturally situated interpretive processes" (p. 379), as it is in those instances that the cultural meaning of algorithms emerge. For example, exploring the socio-technical imaginaries of the tech workers participating to platform design and implementation can be useful to better understand whether they share the "technocratic ideal of complete scientific calculability and technical objectivity associated with algorithmic practice", aiming at "calculating, predicting and pre-empting human behaviours and social institutions through technical platforms" (Williamson, 2018, p. 222). Another highly interesting area to investigate is the classification of data by the so-called data workers, that is, outsourced (and usually underpaid) workers located in the Global South, who contribute to the tagging of datasets on which algorithmic systems will be trained through machine-learning techniques (Posada, 2022). These activities, in fact, inscribe and construct meaning within the algorithmic production process. To do so, the use of multi-sited ethnographic approaches has been proposed by different authors (e.g., Seaver, 2017; Bonini and Gandini, 2020).

Then, by focusing on end users, i.e., the second subject encoding algorithms through everyday activities which are datafied by digital platforms, it can be noticed another site where algorithms are enacted. Indeed, algorithmic outputs are partly the outcome of previous activities which were datafied and processed by the system to classify and recommend contents in unneutral manners (Airoldi, 2021; Risi and Pronzato, 2022). In other words, the platform absorbs those "practices people use to engage with them" (Seaver, 2017, p. 5), which become a form of encoding (Airoldi and Rokka, 2022). The digital traces extracted by users' behaviours mould algorithms, therefore, they culturally enact these artifacts in the form of material outputs that are the result of machine-learning activities. The contents suggested and ranked by digital platforms are material instances where researchers can notice how algorithms are brought into being in the social realm. Those outputs are not only the results of the encoding practices of tech workers, but also of the activities of end users which are datafied by digital platforms, thus encoding those practices in their functioning. Within this framework, also how the encoding practices of end users culturally enact algorithms should be scrutinised by researchers accordingly.

To do so, at the empirical level, analyses using reverse engineering techniques (Bishop, 2018), and walkthrough methods (Light et al., 2018) may be really valuable. On the one hand, reverse engineering techniques examine what data is fed into an algorithmic system and what results are produced to better understand its composition (how it weights and prioritizes certain criteria) and its actions, thus showing how users' encoding practices can enact algorithms. On the other hand, through the walkthrough method, researchers can investigate the interface of a digital platform and examine its technical mechanisms and embedded cultural references, thus exploring how, based on users' activities, it guides and shapes their experiences.

Algorithms are artifacts whose meaning remains uncertain and constantly negotiated. There is a complex relationship between human cultural practices and how algorithms are produced and shaped. The encoding practices of technical and non-technical figures within corporate environments mould what algorithms do but especially, what algorithms mean. The datafication of users' activities further contributes to the shaping and enactment of algorithms. Focusing on these relationships can allow researchers to gain insights not only into how algorithms reflect and shape social life, but also into how algorithms are defined by and, in essence, are social life.

6.2 Decoding/enacting

The architecture and affordances of a digital platform pose specific possibilities and constraints to users. However, how a technology is agentically used by individuals is not fully determined by the intentions of the designers. Indeed, how algorithmic systems, i.e., socio-cultural artifacts, deploy in social reality is also the result of usage practices, which can even subvert the intended meaning inscribed in a platform (e.g., Ytre-Arne and Moe, 2021; Yu et al., 2022; Bonini and Trerè, 2024).

While several studies have investigated the uses and practices around digital platforms (e.g., Bucher, 2018; Swart, 2021), end users have often been framed as somehow powerless. However, as argued by Ignacio Siles and colleagues (2019; 2023) also how end-users perceive, relate, agentically use and make sense of digital platforms can be considered a relevant setting to better understand how algorithms are enacted in social reality. According to Wanda Orlikowski (2000), considering the uses of technology as "a process of enactment" (p. 404) can enable a better understanding of how technology deploys, as individuals "enact structures which shape their emergent use of the technology" (Constantinides and Barrett, 2006, p. 31). More recently, also Siles and colleagues (2020) highlighted that the idea "of "enactment" points to how people forge and sustain specific realities", how individuals act on and through platforms, and the ways in which their practices and sensemaking processes can "enact data assemblages by forging specific links between their constitutive dimensions" (p. 3). Their analysis draws on Swidler's (1986) following Swidler's (1986) practical approach to culture and her idea that culture provides "strategies of action" (p. 273) employed to navigate everyday experiences. Specifically, this research group argues that scholars need to look at how individuals understand the functioning and role of platforms and focus on the ways in which they "make sense of other dimensions of data assemblages, such as the platform's place in their daily lives and social relations, how they think it makes money, what their typical appropriation practices are, what (…) platforms and devices they use, in what places they typically appropriate them, what kind of social groups they belong to", and so forth, in order "to situate systems of thought about datafication within the wider context in which the mechanisms and affordances of platforms acquire certain cultural meaning" (Siles et al., 2020, p. 3). This does not entail a denial of the oppressive power of platforms, nor an underestimation of the hegemonic relationships imposed on users by these data assemblages (see Pronzato and Markham, 2023), but only the recognition of users' capacity to act within the affordances and architectural features of digital platforms (Risi et al., 2020), and the role of these practices in bringing algorithms into being as cultural objects.

However, how can it be possible to approach the decoding/enacting practices carried out by individuals? Regarding the everyday engagements with digital platforms, there are different heuristic devices that can be used for this purpose. To begin, folk theories – "intuitive, informal theories that individuals develop to explain the outcomes (…) of technological systems" (DeVito et al., 2017, p. 3165) – can be an example of the cultural meaning of agential practices in relation to algorithms. In other words, people develop opinions and suppositions about how a certain medium works. These folk theories are not only abstract ideas, but they are also grounded into lived experience and provide basic repertoires for users' sensemaking activities (Toff and Nielsen, 2018), "resources that allow them to foster certain cultured capacities" (Siles et al., 2020, p. 9). In this regard, it should be highlighted social character of folk theories. Indeed, the group dimension is key: individuals develop folk theories while they share and discuss these theories with other people in their social circles.

Then, Siles and colleagues (2020) recognise folk theories as a key element of "algorithmic imaginaries", a concept elaborated by Taina Bucher (2017) to refer to "the way in which people imagine, perceive and experience algorithms" (p. 31), as well as "what these imaginations in turn make possible" (p. 39-40). Both concepts focus on how individuals develop opinions and feelings regarding algorithms, and how these beliefs influence users' actions. Specifically, for Bucher (2017), "what the algorithm does is not necessarily 'in' the algorithm as such (…). Rather, we may begin to understand the performance of algorithms through the ways in which they are being articulated, experienced and contested in the public domain." (p. 40). This mechanism shows the "productive function" of algorithmic imaginaries, as they shape how users experience the social realm and contribute to the production of various feelings associates with the use of algorithmic media (see Raffa and Pronzato, 2021). Given this scenario, folk theories and algorithmic imaginaries can be considered "productive sites" to investigate how individuals "relate to opaque entities" (Siles et al., 2019, p. 502), thus enacting these entities as cultural objects.

Furthermore, another domain that may be of interest to better understand the enactment of algorithms is the one of algorithm audit – i.e., the scientifically grounded examination of algorithms in the public sphere conducted by independent researchers. Specifically, there are two different aspects to consider in the examination the decoding/enacting practices. First, as shown by Biagio Aragona (2022), within these activities aimed at controlling algorithms, scholars can conduct surveys to analyse the experiences and opinions of individuals affected by the outputs of algorithmic systems. Second, ethnographic methods can allow to investigate the activities of the digital experts scrutinising

algorithms to promote transparency and accountability, in order to better understand how these groups of people decode and enact algorithms during the auditing process. Overall, also the study of these interpretive processes can show how people's decoding practices enact algorithms as cultural objects within social life.

7. Conclusions

In this paper, I analysed algorithms as entities which are enacted by the encoding and decoding activities of the human beings contributing to their production and relating to them after their implementation. Specifically, I have considered the activities of tech and data workers underlying algorithmic design as practices encoding and, therefore, enacting algorithms. Likewise, I have argued that users' digital traces absorbed by digital platforms are material instances that encode algorithms, thus framing algorithmic outputs as forms of cultural enactment. Then, I considered the situated ways in which individuals interpret and relate to algorithms in everyday life, arguing that these activities can be considered as decoding practices which enact algorithms within the social realm.

This paper contributes to extending theoretical knowledge in the field of digital sociology and to the research area of critical algorithm studies by bridging two different traditions: the practical approach to culture, often related to STS-oriented research, and the tradition of cultural studies, prevalent in the field of media studies, especially in the European context. To do so, I have argued for the merits of complementing Nick Seaver's "algorithms as culture" perspective (2017) with the Encoding/Decoding model elaborated by Stuart Hall (1980), and the following applications to digital platforms by different scholar, such as Shaw (2017), Lomborg and Kapsch (2020), Siles et al. (2020) and Airoldi and Rokka (2022). Indeed, I have contended that what Stuart Hall originally defined as the encoding of meaning structures in an artifact and its decoding by audiences can be considered forms of culture in practice. Thus, meaning-making processes in relation to algorithms can be seen as culturally enacting the meaning of these objects within social reality.

This theoretical contribution emphasises the role of algorithms as socio-cultural artifacts, and especially as discursive and textual elements whose meaning emerge from the interactions humans have with them. Algorithms are unstable objects not only because they are lines of code continuously retuned and updated by their producers to direct and organise social activities, or because they adapt to users' behaviour. Algorithms are shifting entities because how individuals make sense of them during their design, implementation and

in everyday interactions shapes what algorithms are, what they mean and, therefore, how they intervene in defining and governing social life. As argued by Simone Natale (2021), "things, like people, have social lives, and their meaning is continually negotiated and embedded within social relations" (p. 14). Scrutinising how these processes unfold is key to get a better understanding of the cultural and social implications of algorithms and of how individuals relate with them.

More broadly, this paper provides a theoretical framework that can foreground future research endeavours. Algorithms exist "within, not outside of culture and hegemonic power structures" (Shaw, 2017, p. 595) and it is within this scenario that individuals encode/decode, i.e., enact algorithms as material realities and cultural narratives. This does not imply that algorithmic infrastructures and power relationships do not impose constraints on individuals, but that human beings have an undeniable role that need to be taken into account in the examination of those artifacts. Thus, similar conceptualizations based on human practices and sensemaking open interesting possibilities for studying algorithmic media and situating interpretations, perceptions, and practices about them within a wider framework in which algorithms and the arising datafication structures obtain cultural meaning and different degrees of power and agency are at play.

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