THE EPISTEMIC CULTURES OF THE DIGITAL HUMANITIES AND THEIR RELATION TO OPEN SCIENCE: CONTRIBUTIONS TO THE OPEN HUMANITIES DISCOURSE

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Abstract

The humanities reflect a great disciplinary diversity, marked by different practices of knowledge production, which do not have a deep-rooted tradition of using computer-based methods in their research processes. Digital Humanities (DH) follow an interdisciplinary orientation, which can bring together a series of experimental approaches to some central questions of the humanities, applying computational methods, but not only. DH are comprehensive, interdisciplinary, and heterogeneous and are characterized by a great diversity of practices, which correspond to different epistemic cultures. The discourse around Open Science (OS) seems to reflect a more focused discourse on scientific research and communication practices, fundamentally inspired by the hard sciences, which does not seem to consider the peculiarities and characteristics of the digital humanities fully. The main goal of this work is to reflect on the inclusion of the epistemic cultures of DH in the OS discourse. As specific goals, it is proposed (i) to describe the concept of epistemic cultures, particularly in DH, (ii) to identify the approaches adopted by OS and relate them to those of DH, and (iii) to discuss the need for the existence of a discourse dedicated to the opening of the humanities and to prove that DH contributes to it. An exploratory qualitative approach was adopted, by conducting a literature review aiming to contextualize the approach of epistemic cultures, particularly about DH and its relationship with OS. The practices and environment for building scientific knowledge of DH were related to the principles of OS, considering the multidimensionality of the scientific communication system. The conclusion is that the OS adopts a unified view of science, not considering the different epistemic cultures, especially about the digital humanities, and therefore, a specific discourse around the opening of the scientific process in this area is necessary.

Keywords: Epistemic cultures; digital humanities; open science; open humanities

1 INTRODUCTION

Research processes in the humanities are not fundamentally digital, unlike those in the hard sciences. The discourse around Open Science, inspired by the latter, does not effectively represent the heterogeneity of epistemic cultures, in which the humanities are of particular interest (Knöchelmann, 2019). Even with the development of Digital Humanities (DH), considered a field with several disciplinary limits with roots in digital technologies, the application of open and transparent practices during research and scientific communication processes is not always coherent or possible due to the discourse directed from OS to the hard sciences. This is even more evident as the humanities, by themselves, aggregate a wide range of areas of knowledge with their own epistemic cultures that diverge from each other. It is in this sense that Knöchelmann (2019) warns of the need for a discourse dedicated to the open humanities, which articulates the entire dimension of the area, including its interests, methods and

epistemic practices, and the technological dimension, thus enabling the adaptation of processes from OS to the humanities. It is, therefore, necessary to have a single voice and a consolidated vision that can unite all the disciplines of the humanities, turning them into a consistent and coherent nucleus in terms of the discourse of the opening of research. It is expected that the discourse around open humanities will contribute to the recognition of the proportion between the social and the technological in this area, to include all its particularities within the scientific system - that is, to serve as a consolidation of open practices in the area and, at the same time, calling attention to the adaptation of certain characteristics by scientific institutions and funding agencies in scientific research policies and infrastructures for the humanities.

DH follow an interdisciplinary orientation, reflecting a certain ambiguity regarding its definition (Luhmann & Burghardt, 2022). However, they can be characterized as an area in which a series of experimental approaches can be grouped to some of the central questions that are positioned around the humanities, applying computational methods (but not only), in the culture of "traditional" humanities (Schnapp, 2014). DH thus become disruptive, surpassing the habits and traditions of "traditional" humanities, rooted in the printed medium and with a more individualistic vision regarding the production of knowledge. Schnapp (2014) states that DH goes beyond the limits that delineate the way of doing research between the humanities and the hard sciences, contributing to the question of where humanistic scientific practice begins and ends. In other words, DH combine several elements of different epistemic cultures, implementing collaborative practices to the wide dissemination of scientific results to the production of knowledge in the laboratory. At the same time, there seems to be a paradoxical situation in the humanities, in which the discourse of openness of scientific research increases around the various scientific domains, but, at the same time, there is no adoption of OS principles in the humanities. Is it because the discourse around OS is effectively more directed towards the hard sciences than towards the Humanities? Or because the different epistemic cultures of the Humanities use different knowledge construction practices that are not related to those of OS? To what extent does OS fit into the culture of the humanities? Given the multidimensionality of the scientific communication system and the different existing epistemic cultures, does OS's "one size fits all" approach meet the needs felt in the humanities? Can DH contribute to the construction of synergies between humanities and OS, or rather, contribute to the discourse of open humanities?

Based on the studies by Knorr-Cetina (1991, 1999, 2007) - which affirm the fragmentation of science - around the approach of epistemic cultures, which focuses on the construction of the machinery for the construction of scientific knowledge, which, in turn, position culture in the practices used in knowledge production environments, we seek to study how the understanding of the epistemic cultures of DH can contribute to the implementation of OS principles in the humanities. It is intended to study the area of DH as an epistemic culture and to relate it to the discourse of OS, trying to demonstrate, through Marcel Knöchelmann's line of thought, that it does not consider certain characteristics of the Humanities, being, a discourse on open humanities, therefore, necessary. In this sense, the objective is to explore how DH can contribute to the discourse of the open humanities

2 METHODOLOGY

The discourse around OS has been heavily influenced by the so-called hard sciences, not fully considering the specificities of the humanities, ignoring the diversity of epistemic cultures in this area and, consequently, its heterogeneous practices, maintaining a vision very much from the point of view of the hard sciences. The main goal of this work is to reflect on the inclusion of the epistemic culture of DH in the OS discourse. As specific goals, it is proposed (i) to describe the concept of epistemic cultures, particularly in DH, (ii) to identify the approaches adopted by OS and relate them to those of DH, and (iii) to demonstrate the need for the existence of a speech dedicated to the opening of the humanities and to prove that DH contributes to the same.

An exploratory qualitative approach was adopted, by conducting a literature review aiming to contextualize the approach of epistemic cultures, particularly about DH and its relationship with OS. Therefore, three basic topics of the present work stand out – epistemic cultures, Digital Humanities, and Open Science – which served as a guide for information retrieval.

For the search of information, it was used Scopus and Web of Science (WoS) databases, considering that they have a scope that allows gathering broad and relevant cartography of the scientific literature, and, taking into account that they are not full-text databases, they already bring together a vast collection

in open access; and also the collective catalog of the libraries of the University of Coimbra, to gather reference monographs in the area of study, particularly on epistemic cultures.

For the information retrieval in Scopus and WoS, the terms «open science», «digital humanities», «epistemic cultures», «open humanities», «scholarship» and «scholarly communication» were applied, making use of research strategies, through the application of advanced searches by subject, in English, using Boolean operators, quotation marks and proximity operators. For the search in the library catalog, it was implemented searches by author (namely by "Knorr-Cetina, Karin", since she is the pioneer of studies on epistemic cultures) and by subject, using the previously mentioned descriptors, in Portuguese.

Regarding the evaluation and selection of results, the titles, keywords, and abstracts presented by the databases, as well as their relevance, were considered. At the same time, duplicate results were also detected, retrieved in previous searches. For the organization and management of the bibliography, Zotero software, version 5.0 was used.

As for the analysis and interpretation of results, the literature review was carried out at two levels. First, the articles searched in the chosen databases were selected, followed by an analysis of the relevance of the articles by reading the titles, abstracts, and keywords presented in them. This analysis made it possible to reduce the results, recovering only the most relevant ones that integrated the requirements previously defined for their retrieval, namely in terms of content. In a second phase, the in-depth reading of the works, including their bibliography, extended to a set of articles, not included in the search results carried out in the databases, later selected and retrieved for inclusion in the present study.

3 RESULTS

3.1 The Epistemic Cultures Approach

The notion of epistemic culture is introduced by Karin Knorr-Cetina in her ethnographic studies on high energy physics and molecular biology, where she presents the contrast between scientific domains and exposes differences in the process of production and creation of knowledge. Epistemic cultures aim to capture the internalized processes of knowledge, referring to the set of practices, compositions, and mechanisms that, together, in each area of knowledge, produce the way of knowing what is known, thus facing knowledge as a practice (Knorr-Cetina, 2007). For the author, culture refers to the aggregation of patterns and dynamics displayed in specialized practice, varying in its different configurations of specialization (Knorr-Cetina, 1999). That is why the author suggests the term "epistemic culture" instead of just "knowledge culture" since she is concerned with creating and guaranteeing the same, considering previous scientific research and the different pieces of machinery of knowledge (Knorr-Cetina, 1999, 2007). At the same time, this approach seeks to replace the notions of discipline and expertise with epistemic cultures.

Consequently, this approach, with a focus on the construction of knowledge construction machinery, presupposes the disunity and fragmentation of science, when considering several nuclei that make up the different epistemic cultures of science, and when exposing the different architectures of empirical approaches, specific constructions of the referent, particular ontologies of instruments and various social machines (Knorr-Cetina, 1991, 1999, 2007). In other words, the vision of a homogeneous science does not correspond to reality, and each epistemic culture adopts its own process and its own practices, distinguishing itself in the methods, concepts, and forms of argument that reveal a diversity of research styles and epistemological features. In other words, "science" is radically disunified, consisting of different practices and epistemic structures located in different spaces of knowledge (Malazita et al., 2020).

Knorr-Cetina (2007) proposes that to identify epistemic cultures, the query of who are the entities that comprise them should be asked, questioning, at the same time, who or what are the epistemic issues they address, or, in other words, who are the agents and objects of knowledge involved in scientific practice. In this sense, the author notes the importance of field experience in determining a particular epistemic culture. In the study of epistemic cultures, research on the relationship between objects of knowledge and their approach/study strategies is also relevant. This is in line with what Becher and Trowler (2001) show regarding the existence of several academic tribes, each with its own identity and ideology, defending and defining its own intellectual territory.

Each academic tribe has structural different characteristics, being constituted by cultural elements that encompass their own tradition, customs, practices, knowledge transfer, beliefs, conducts, and forms of communication (Becher & Trowler, 2001). The differences between the different domains of knowledge are evident in the characteristics of the objects of research; in knowledge growth; in the relationship between researcher-knowledge; in research procedures; in the extension of the criteria adopted to reach the "truth"; and in research results (Becher & Trowler, 2001). The same authors also emphasize that the different disciplines are subject to historical and geographical variations, undergoing changes, especially at the local level, maintaining, however, a recognizable continuity regarding their identity, adopting a vision that the structures of knowledge are mediated by social processes. In other words, the different research fields are composed of several elements that establish social relationships for the construction of knowledge. In short, each epistemic culture adopts its own construction of knowledge, integrating different practices and approaches regarding its creation and production that is reflected in its own traditions and epistemic elements. This implies different visions, with different results, and the approach of epistemic cultures reveals localized norms and practices, depending on their context. As Cronin (2003) states, epistemic cultures have their own rules and procedures, particularly regarding scientific communication, which is revealed as the ultimate goal of any epistemic culture.

3.2 From Humanities to Digital Humanities

The humanities are part of a wide range of academic tribes, each with its own tradition and culture. In other words, the field of humanities itself encompasses a vast set of epistemic cultures, which have certain practices in common, especially about scholarly communication, since this is essential for sharing the identity of each epistemic culture.

In humanities, cultural artifacts are the object of study. They observe and research the artifacts that were developed and created by the human being, produced in response to a certain context (surrounding environment), and using symbolic language to express themselves. Knöchelmann (2019) states that the characteristics based on which disciplines can be classified in the humanities are perspectivity (as opposed to objectivity in the sciences), verbality (as opposed to reliance on models), and historicity (as opposed to systemic integration), thus reflecting the importance of hermeneutics, source criticism, and contextual meaning for these epistemic cultures. Considering this, the paradigms and methods used in the humanities focus much more on subjectivity and perspectivity, in contrast to the focus on objectivity, reproducibility, and replicability, as in the hard sciences (Arthur & Hearn, 2021).

The introduction of digital technologies within research and, consequently, scholarly communication, influences segments of scientific practice in practically all stages of the scientific process, being indispensable at certain stages (Antonijevic, 2015), in addition to facilitating the dissemination and access to information, to enabling collaboration and socialization between scientists, and even to the opening of the research process. However, considering the diversity of epistemic cultures and their epistemological and methodological specificities, it is natural that the impact that digital tools represent on their scientific practices is different in each field, beyond the time of adoption. At the same time, in substantially all epistemic cultures, the search for materials and resources to support research is carried out electronically, having already become a standard (Antonijevic, 2015). Therefore, there is a relevance in the access to digital information sources, thus highlighting the transforming role of electronic research. As with the research process, the writing phase also maintains a close relationship with digital tools, and most researchers make use of them to produce knowledge (Klein, 2015).

Regarding scholarly communication practices, although the structure of the traditional system is similar across domains of knowledge, the particularities and heterogeneity of different epistemic cultures do not allow just one approach, since the research and communication process is not uniform (Thorin, 2003). This results, then, in the use of different tools and, consequently, in different communication practices. The humanities, by gathering a diversity of epistemic cultures, also produce a variety of outputs with a multifaceted nature, using both printed and digital sources, resulting in printed or digital formats, but with the printed being still very rooted (Arthur & Hearn, 2021). At the same time, data in the humanities maintains a particular uncertainty, with humanists still not interpreting and analyzing datasets, being in line with their traditional methods of analyzing primary and/or secondary sources (Edmond & Lehmann, 2021; Watchorn, 2022).

The communication paradigm, in the humanities, reveals a more discursive character, allowing a more complex description and narrative (Maryl et al., 2020). Regarding the characteristics of the humanities, in general, about their forms of scholarly communication, the prevailing medium continues to be the monograph and book chapters, which, by itself, take more time to produce and disseminate, and has also more costs associated, although the scientific article is also considered. They also display certain

specificities concerning their epistemology, workflow, collaboration, and argumentation, maintaining a close connection with the local context (Cronin, 2003; Giglia, 2019; Knöchelmann, 2019; Maryl et al., 2020). It is, for this reason, their communication is often directed to specific geographic areas and cultural situations, and, therefore, in the native languages of the context in which the research is produced, instead of what is seen in the areas of the hard sciences, in which English is considered the *lingua franca*. With this in mind, the multifaceted nature of the research in the humanities, with multilingualism playing such a relevant role (Balula & Leão, 2021), the main audience of the humanities is much smaller, compared to one of the hard sciences, meaning that the use of English as *lingua franca* imposes some linguistic barriers in spreading the message and developing the research within the humanities epistemic cultures (Arthur & Hearn, 2021).

In the current context of scholarly communication, centered on the OS paradigm, DH have been gaining a prominent role to deal with new methods of digital empowerment in the humanities (Knöchelmann, 2019). DH aim to transform cultural artifacts and phenomena – the objects of study of the humanities – so that they can be found, transmitted, questioned, interpreted, problematized, and imagined, using digital methods and instruments (Nyhan & Flinn, 2016), but also dealing with the generation of greater amounts of data (Edmond & Lehmann, 2021). That is, the DH have the same object of study as the humanities, although they use relatively different practices, due to the application of digital tools and techniques, collaboration practices, but also the fact that DH produce, interpret, and analyzes data, taken in the same context as in the hard sciences (Arthur & Hearn, 2021). According to the Manifesto for the Digital Humanities (2010), DH are concerned with the entirety of the Humanities and Social Sciences, relying on all its paradigms and specificities of the various disciplines, while mobilizing unique tools and perspectives available from digital technologies. Now, this statement means that DH encompasses all the epistemic cultures of the mentioned areas, differing from them only using digital methods, tools and techniques. In other words, they reflect a transdisciplinary level of epistemology, including all methods, systems, and heuristic perspectives related to the digital, in the fields of social sciences and humanities, but also from information and computation science (Edmond & Lehmann, 2021; Manifesto for the Digital Humanities, 2010).

However, it is important to mention that there is still no consensus regarding the definition of DH, even considering the extensive debate around it. Many consider DH as a set of practices, others as a new field of study or even a discipline (Führ & Bisset Alvarez, 2021), although there are also opinions that such a discussion should not even be carried out, being considered unnecessary. – this is due to the lack of understanding of what constitutes them (Luhmann & Burghardt, 2022). It should be noted that DH are already taught in higher education institutions, in addition to the existence of peer-reviewed journals, scientific societies, and research centers, contributing to its consolidation.

For these reasons, it can be said that DH are an approach carried out in the humanities (and social sciences) territory, incorporating digital tools in the different phases of their research cycle, focusing both on the production and on the analysis of data born-digital or digitized, concerned with the implementation of digital information through the collection, creation, enrichment, editing and storage of data, as well as its dissemination and formalization (Maryl et al., 2020).

3.3 The Epistemic Cultures of Digital Humanities and their relationship with Open Science

OS is a new vision/model (or a new paradigm) in the practice and communication of science, which drives innovation and scientific creativity based on collaborative, transparent processes that promote accessibility to all stages of the research production cycle, embracing all stakeholders in the scientific system. Although still without a formal definition, Vicente-Saez and Martinez-Fuente (2018, p. 434) propose that OS is *transparent and accessible knowledge that is shared and developed through collaborative networks*. OS is then possible through the introduction of digital technologies in the scientific research scenario and by taking advantage of the opportunities offered by them, by the elements of the scientific system, as well as the change of culture in the academic and scientific environment. This change allowed the consolidation of its principles based on collaboration and cooperation between scientists, the transparency of research processes, and their openness and accessibility. In turn, the application of these principles contributes to new research practices and the dissemination of scientific results and, therefore, to the improvement of the quality and effectiveness of science, speed of dissemination of scientific results, generation of new knowledge, and scientific progress.

It is, in this sense, that the practice of OS is characterized as being democratic, inclusive, transparent, collaborative, responsible, and reproducible (in a way, the classic values of science). Some authors claim that OS is a concept, while others consider it an umbrella term composed of several pillars that support it and that are related to each other. Of these pillars, Abadal (2021) highlights six – Open Access; Open Data; Open Peer Review; Use of Preprints; Citizen Science, and New Assessment Models. Although the importance of each one at an individual level is highlighted, synergy and coordination between all are urgent for the consolidation of OS. The fact that some "pillars" are more developed and implemented than others influence the development of OS and, in turn, science in general. For instance, in the humanities, with the diversity of research outputs, and since the monograph plays such an important part, institutions implementing traditional metrics, at the level of publication, for assessment, tenure, and promotion, which is still a common practice, jeopardizes this field and their researchers. In this sense, a call is made for the development of sustainable technological tools and infrastructure, or, in other words, open-source - an also fundamental element for OS.

There has been a rapid evolution concerning the initiatives towards the implementation of OS across all sciences, but much of these actions, such as new publishing models or funding mandates, start from the culture of the hard sciences (Watchorn, 2022). By analyzing the definition of OS proposed by several funding bodies, including the European Commission, one must assume that OS presupposes that every research involves the use and creation of data of any kind in every phase of the research process and that it is generated digitally, which in the humanities does not always apply (Watchorn, 2022). Taking these aspects into consideration, Arthur and Hearn (2021) suggest that instead of continuing the discourse on OS, centered on the hard sciences, one should instead raise and pursue the debate around open research, contributing then to the understanding of the dichotomy between both open science and open humanities, thus recognizing the peculiarities of the different epistemic cultures.

In humanities, although the Berlin Declaration on Open Access to Knowledge in the Social Sciences and Humanities (2003), recognized the importance of open access within these epistemic cultures, its transition reveals a smaller percentage compared to hard sciences. This may be related to the fact that, in the humanities, there are used a diversity of information sources, the monograph, which is more costly and time-consuming, still has a lot of presence in the dissemination of the results, or also because of the authorship of the works, which is mostly individual, among others. In addition, these characteristics may imply different models of funding, in relation to the processing fees for publication in open access, both for articles and for monographs (Maryl et al., 2020). A particularity that contributes to a less rapid opening in the humanities is related to the diversity of languages - or multilingualism - used at the time of publication, related, indirectly, or directly, to the evaluation system and scientific recognition, but also the (non) implementation of the culture of preprints in the humanities, and with the peer review processes in these domains. The use of preprints in the humanities is limited, especially because it has a short period of life span, given that the monograph is the main meaning of communication (Arthur & Hearn, 2021). Related to this issue is the fact that the comments made by the peer reviewers play such an important aspect in the critical analysis carried through humanities research, which interferes with the consolidation of the preprint culture in the humanities, but also the open peer review (Arthur & Hearn, 2021; Knöchelmann, 2019, 2020). This implies the non-consolidation of fundamental principles of OS in the humanities, such as open peer review, sharing preprints, and the use of open licenses, not because they are not neglected, but because of the way they are presented and suggested that do not consider the particularities of the epistemic cultures of the humanities and therefore, not allowing it (Knöchelmann, 2019).

It is, in this regard, that the need for a discourse dedicated to the open humanities is imposed, which articulates the entire dimension of the area, including its interests, methods and epistemic practices, and the technological dimension, thus enabling the adaptation of OS processes to the humanities (Knöchelmann, 2019). To achieve this end, a single voice and a consolidated vision are needed, so that they can unite all the disciplines of the humanities, turning them into a consistent and coherent nucleus at the level of the discourse of the opening of research. It is expected that the discourse around the open humanities will contribute to the recognition of the proportion between the social and the technological in this area, to include all its particularities within the scientific system - that is, to serve as a consolidation of open practices in the area and, at the same time, calling attention to the adaptation of certain characteristics by scientific institutions and funding agencies in science policies and infrastructures for the humanities.

DH, although it should be noted that just using digital methods and techniques does not mean that they implement the principles of OS, they can still contribute to their consolidation in their area. Its epistemic cultures, which have the same object of study as the humanities, reveal themself to be inter and

transdisciplinary, implementing certain characteristics of other fields, such as the vision of laboratory life in the production of scientific knowledge (Malazita et al., 2020). This implies large-scale collaboration, something verified in DH and the hard sciences, and which is reflected in a principle of OS. At the same time, as they reflect broad characteristics of several disciplines that are revealed in collaborations at the level of production and communication of knowledge, they also integrate into their team's several elements that translate into transdisciplinary cooperation, broader audiences, and that reveal the understanding of the importance of mutual help around of a common good. Also, because they deal with computational processes and data, they can implement research data management, an essential topic for OS. It is also noteworthy the need for an adequate infrastructure aimed at the humanities (see the example of the OPERAS and DARIAH project) in which DH can serve as pioneer for the consolidation and adaptation of the OS principles to the humanities.

Summarily, DH play an important role in promoting open research in the scholarly communication system and contribute to the discourse around open humanities, having the potential to reach many stakeholders, and thus overcome several barriers concerning its epistemic cultures. Although, it must be highlighted that, to achieve that, the scholarly communication system needs to be aligned with the diverse epistemic cultures in the humanities, thus developing, promoting, and implementing policies and infrastructures that have in mind the peculiarities of humanities research.

4 CONCLUSION

The discussion around open science practices cannot ignore the diversity of epistemic cultures that make up science. In this work, we tried to reflect on this need, calling attention to the heterogeneity of science, which the unified discourse seems to ignore, so well exemplified in the work of Knorr-Cetina. Thus, it was intended to relate the practices and the knowledge construction environment of the digital humanities with the principles of open science, considering the multidimensionality of the scientific communication system. This reflection points to the need to adopt a specific discourse around the opening of the scientific process that considers the diversity of scientific practices, including in this discussion those specific to the humanities. It is hoped, therefore, to contribute to the creation of a debate capable of positioning the humanities, and particularly the digital humanities, on the horizon of discourses on the construction and dissemination of research and scholarly communication practices.

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