Schism or Renaissance?

On the Relationship Between Computational Humanities and Digital Humanities

Michael Piotrowski

https://orcid.org/0000-0003-3307-5386

Abstract The recent emergence of Computational Humanities is often regarded as a secession from Digital Humanities. The narrative of a schism is tempting, but inherently negative and unproductive. Instead, I propose to regard digital and Computational Humanities as heirs of two different traditions. From 2004 onwards, the Anglo-American Digital Humanities became the dominant current and mostly supplanted local European traditions. Although this has certainly been beneficial in some respects, Anglo-American and European academic traditions and institutional contexts differ substantially. The fundamental difference between digital and Computational Humanities is thus less one of *digital* vs. *computational,* but rather one of *humanities* vs. *Geisteswissenschaften:* Digital Humanities are in the former, Computational Humanities in the latter tradition. I therefore reject the notion of a schism and suggest regarding the emergence of Computational Humanities as a sign of renewed interest in the continental tradition of formal methods in the humanities.

Keywords Computational Humanities, Digital Humanities, History, Definition

1. Introduction

Back in 2019, when Twitter[1] was still the town square of Digital Humanities (Grandjean 2016), a tweet by Folgert Karsdorp rocked the community. Shortly after the DH 2019 conference in Amsterdam, Karsdorp posted the following message:

1 As I am writing this (end of July 2023), Elon Musk, who had bought the service in October 2022, has started rebranding Twitter as X. In the light of this and previous changes, the long-term availability of tweets (Twitter posts) is unclear.

Michael Piotrowski: Schism or Renaissance? On the Relationship Between Computational Humanities and Digital Humanities, in: Christopher A. Nunn and Frederike van Oorschot (eds.): Compendium of Computational Theology 1. Introducing Digital Humanities to Theology, Heidelberg: heiBOOKS, 2024, S. 31–49. DOI: https://doi.org/10.11588/heibooks.1521.c21938

> I'm thinking about developing a workshop/event/journal/community for computational research in the humanities that doesn't exclude people with profound computational skills and knowledge. Who's in?[2]

According to Dombrowski (2023, 138), "[t]he response to this turn of events was swift and negative from many parts of DH Twitter,"[3] but this fails to mention that by other parts of the community, Karsdorp's musings were met with "overwhelming enthusiasm and the clear demand for a Computational Humanities research venue,"[4] which prompted Karsdorp, together with other scholars, to proceed further, create a discussion forum,[5] and organize the first Computational Humanities Research workshop, CHR 2020, since then held annually.

Digital Humanities and Computational Humanities, a classic schism, all too familiar to theologians? Heretics that chose to leave the Church of the Big Tent? In the light of the founding myth of Digital Humanities, with Father Busa as the founding father acting on orders he received from God – *"digitus Dei est hic"* (Busa 2004, xvi) – the religious analogy does not seem too far-fetched.

This is a well-known story pattern and thus a compelling narrative for the historicization of the events; Dombrowski (2023, 138) consistently talks of a "splintering-off" of a "group," supposedly homogenous and privileged.[6] However, I do not think that this is the whole story. For a better understanding, we first have to look at the genesis of Digital Humanities.

2 See https://twitter.com/FolgertK/status/1151167545539477504 (Posted: 16 June 2019; accessed: 21 June 2024). Archive link: https://web.archive.org/web/https://twitter.com/FolgertK/status/1151167545539477504 (Accessed: 5 June 2024).

3 For example, Miriam Posner criticized the initiative as "a method of protecting prestige, which tracks closely with masculinization" (see https://twitter.com/miriamkp/status/1152389216363401216, posted: 20 June 2019, accessed: 5 June 2024); in addition to these accusations of elitism and sexism, Roopika Risam alleged racism (see https://twitter.com/roopikarisam/status/1152389797882863617, posted: 20 July 2019, accessed: 5 June 2024), and others heaped further allegations on the initiative in the replies.

4 See https://twitter.com/FolgertK/status/1151572736730439684 (Posted: 17 July 2019, accessed: 5 June 2024. Archive link: https://web.archive.org/web/https://twitter.com/FolgertK/status/1151572736730439684 (Accessed: 5 June 2024).

5 See https://discourse.computational-humanities-research.org (Accessed: 5 June 2024).

6 Similar claims had been made earlier by Lang (2020), who asserted "that they [the Computational Humanities people] are quite over-represented at conferences already. They get all the attention. They get the grants." However, this is not substantiated, and it would be difficult to do so in general. Research funding very much depends on national funding institutions, policies, and politics, so the sweeping claim that "there also are many grants specifically targeted towards CH where DH-only people can't even apply anymore, cutting funding for 'normal' DH projects" is impossible to verify outside a specific academic system.

2. The Genesis of Digital Humanities

Despite the well-known myth of the founding of the field by the Italian Jesuit priest Roberto Busa (Hockey 2004, 4), what we now call "Digital Humanities" is in fact the result of a particular Anglo-American development.[7] For the purposes of our discussion, it suffices to know that the use of digital computers in the humanities in the US dates back to the mid-1950s. Bowles (1967), one of the first books wholly dedicated to the topic, already shows a considerable breadth of applications across many humanities disciplines. At the same time, we also see the beginnings of institutionalization: in 1966, the first issue of the emerging field's first journal, *Computers and the Humanities,* was published. It still bore the modest subtitle "A Newsletter," but in the first article, titled "The Next Step," the author confidently asserts: "We are now moving into the phase of consolidation" (Milic 1966, 3).

In the 1970s, the first learned societies are founded: in 1973, the *Association for Literary and Linguistic Computing* (ALLC) in the UK, and in 1978, its US counterpart, the *Association for Computers and the Humanities* (ACH). The publication of the *Humanities Computing Yearbooks* 1988 and 1989–1990 (Lancashire & McCarty 1989; Lancashire 1991) might be considered the culmination of this work aiming to consolidate the field. However, while reviewers (e.g., Kenner 1989; Potter 1992) found the yearbooks to be useful, they often stressed a lack of coherence: "a *vast* field," but "in a state of free-fall" (Kenner 1989, 360), a "large baggy monster" (Potter 1992, 548). The fact that only two yearbooks were published is thus probably not only due to the size of the field and the rise of the Web (rendering printed directories obsolete), but also to the absence of a unifying vision. On the other hand, the Web probably fostered the adoption of the Text Encoding Initiative's *TEI Guidelines*[8] when they were published in 1994: not only did they put an end to the chaos of incompatible text encoding schemes (Hockey 2004, 12), they also finally brought a consolidated vision, admittedly only for part of the field – mainly philologists – but a very influential one.

The introduction of the term *Digital Humanities,* which eventually replaced earlier terms such as *humanities computing* or *computing in the humanities*, is usually associated with the publication of *A companion to Digital Humanities* (Schreibman et al. 2004a). Even though the volume aims to cover many different humanities disciplines,

7 Digital Humanities has only recently begun to take an interest in its history beyond the "canonical narrative." Publications on the subject are still relatively few, and Sula & Hill (2019, 191) note that despite the variety and breadth of definitions of Digital Humanities (e.g., Gold 2012; Terras et al. 2013), "narratives of its history have been surprisingly homogenous": "all ground DH in mid-twentieth-century humanities computing." The same goes for non-English histories (e.g., Berra 2015; Thaller 2017; Mounier 2018). Burdick et al. (2012) explicitly exclude a discussion of the history of the field; Drucker (2021) only briefly mentions the history of specific methods in the corresponding chapters.

8 See https://tei-c.org (Accessed: 5 June 2024).

the success of the TEI was certainly an impetus for this new attempt at consolidating the field.

As John Unsworth, one of the editors of Schreibman et al. (2004a), related, the editors had originally used "humanities computing" in the title; for marketing reasons, the publisher proposed "digitized humanities," and Unsworth countered with "Digital Humanities" (Kirschenbaum 2012, 5). However, Unsworth did not come up with term spontaneously. In fact, he and colleagues at the University of Virginia had already been using it since at least 2001, in the context of an interdisciplinary seminar "Is Humanities Computing an Academic Discipline?"[9] which also resulted in the proposal for an M.A. in Digital Humanities at the University of Virginia in 2002 [it was not implemented, though; see Rockwell ([1999] 2013), 30]. The "rapid and remarkable rise of *Digital Humanities* as a term" (Kirschenbaum 2012, 56) was certainly also helped by Unsworth's implication in a project aiming to merge the ALLC and the ACH, which ultimately led to the creation of an umbrella organization, the *Association of Digital Humanities Associations* (ADHO) – again, the same people advocating for the same term.

Against this backdrop, Schreibman et al. (2004a) did not aim to create a *new* field of research distinct from humanities computing. The stated aim of the editors – which may come as a surprise – was to envisage humanities computing (or Digital Humanities, the terms are used interchangeably) – as a discipline in its own right rather than making humanities computing "more palatable to humanists in general" (Fitzpatrick 2012, 12).[10] The first paragraph of the introduction reads:

> This collection marks a turning point in the field of digital humanities: for the first time, a wide range of theorists and practitioners, those who have been active in the field for decades, and those recently involved, disciplinary experts, computer scientists, and library and information studies specialists, have been brought together *to consider digital humanities as a discipline in its own right,* as well as to reflect on how it relates to areas of traditional humanities scholarship (Schreibman et al. 2004b, xxiii, emphasis added).

9 See http://www.iath.virginia.edu/hcs (Accessed: 5 June 2024); archive link: https://web.archive.org/web/20010501000000*/http://jefferson.village.virginia.edu/hcs (Accessed: 5 June 2024).

10 This is not to say that the editors and the scholars involved in the University of Virginia seminar were happy with the name *humanities computing*. For example, in an essay originally written for the seminar on the question of disciplinarity at the University of Virginia in November 1999 (see Rockwell [1999] 2013, 32), Rockwell puts forward a number of arguments against "humanities computing" as a name for a study program, e.g., "Humanities Computing is meaningless to people outside its traditions and the program was unlikely to be approved with such an awkward name," or: "Too often humanities computing is focused exclusively on textual computing and is therefore only of interest to students in textual disciplines like English, Linguistics, and Comparative Literature" (Rockwell [1999] 2013, 20).

Thus, despite acknowledging "how broadly the field now defines itself" (Schreibman et al. 2004b, xxiii), further down, the editors stress the continuity: in the conclusion, they talk again about "the digital humanities as they have evolved over the past half century" (Schreibman et al. 2004b, xxvi). The intention to consolidate and institutionalize the field "as a discipline in its own right" must therefore be considered a central concern of the editors.

The actual outcome, however, was almost exactly the opposite: the new term turned out to be so much more "palatable to humanists" that they effectively took over humanities computing under the new name of "Digital Humanities." This led to an opening towards a huge number of fields and interpretations ("big tent"), which naturally led to a dilution of computing, perhaps best exemplified by the still ongoing debate whether programming skills are necessary in Digital Humanities (see, e.g., Ramsay [2011] 2013; Dombrowski 2023).[11] Instead of the establishment of Digital Humanities as "a discipline in its own right," the result was a massive *rejection* of discipline formation.

The "big tent" metaphor to emphasize the diversity, openness, and fluidity of Digital Humanities, can be traced as far back as the DH 2011 conference, entitled "Big Tent Digital Humanities." It is then used to explain (often proudly) that, as a result, Digital Humanities cannot be defined. While not everybody might conclude that "we're all digital humanists now" (Mullen [2010] 2013, 238), over a decade later O'Sullivan (2023, 1–2) has to admit that "despite all this investment […] there are still people who think DH is putting pictures of books on WordPress sites," and laments that "[n]obody wants to talk about who's in and who's out, because to do so will inevitably involve exclusion."[12] His conclusion: "Re-engaging with the question, 'What are the digital humanities?,' has never been timelier. DH is everywhere, across all continents and cultures, all intellectual communities and research practices" (O'Sullivan 2023, 2).

3. The Globalization of Digital Humanities

"DH is everywhere, across all continents and cultures," O'Sullivan (2023, 2) writes. However, the history of Digital Humanities generally ignores the use of computers for humanities research outside of the Anglo-American world. In this respect, the founding myth of Digital Humanities may have less to do with the Italian priest than

11 In a literature analysis, Roth (2019) found that what he calls the "digitized humanities" (creation, curation, and use of digitized data sets) dominate clearly – Roth assigns between 73.9 % and 86.6 % of the contributions to this category. He also finds that the majority of the "numerical humanities" contributions (focusing on the development of mathematical frameworks and computer science methods) "essentially had to do with stylometry" (Roth 2019, 12).

12 "Who's in and who's out" is a reference to a highly controversial essay of the same name (Ramsay [2011] 2013).

with American IBM. In fact, computers have also been used in humanities research in other parts of the world, notably in Europe,[13] at least since the late 1950s. For example, in the field of textual criticism, to take the domain of Busa, the French Benedictine Jacques Froger experimented with the use of computers for collation in 1960–1961 (Froger 1970, 211). But Froger does not play any role in the Anglo-American tradition of Digital Humanities, even though he published extensively on the use of computers in the humanities (see, e.g., Froger 1965a, 1965b, 1970) and, even more importantly, on related methodological questions that are still relevant (Froger 1968).[14]

By the 1980s, the use of computers in the humanities in France had been so firmly established that Borillo (1985) remarks:

> l'utilisation du "calcul" s'est généralisée, au point qu'il n'y a plus guère de centre de recherche important en sciences humaines qui n'ait son équipe d'informaticiens. De fait, la statistique, l'analyse des données, les systèmes documentaires automatisés, les bases de données… on fait leur entrée dans de nombreux laboratoires. (Borillo 1985, 5)

But this was hardly noticed in the Anglosphere; in his review of Lancashire and McCarty (1989), Breu (1990, 395) notes: "Der Band ist durch ein starkes Übergewicht amerikanischer Arbeiten gekennzeichnet, über das durch den Markt gerechtfertigte Maß hinaus, was die Autoren selbst eingestehen."

Of course, developments in Europe took place under different circumstances. Driven by competition with the USSR for global supremacy in the Cold War, the US government generously funded computer science and its applications in all areas. In contrast, Western European governments (perhaps with the exception of France) failed to recognize the strategic importance of computer science and consequently invested little (for a contemporary critique, see, e.g., Steinbuch [1966] 1969). In the Eastern Bloc, the development of computer science was slowed first by Stalinist rejection of cybernetics as bourgeois pseudoscience (see Gerovitch 2002; Shilov 2014) and then by mismanagement and persistent material shortages.

What is more important in the context of this chapter, though, is that the continental European conception of the humanities is quite different from the Anglo-American one, which also leads to a different relationship to computing. There is a long European tradition of formalization in the humanities – for example, Russian formalism, structuralism, the Prague School, the ideas about the unity of science of the positivists or the Vienna Circle, modern hermeneutics (especially Dilthey), Marxism, and so on. When these earlier ideas were combined with the then new ideas of cybernetics and information theory from the 1950s onwards, they all provided moti-

13 I will limit my discussion to Europe.

14 The first, theoretical, part of this book has been recently republished with commentary (Poirel [1968] 2022).

vations and epistemological frameworks for the use of computers in the humanities that went *beyond* the automation of tedious tasks.

This includes work on epistemology (e.g., Granger [1960] 1967; Klaus 1966), on aesthetics (in particular by Max Bense and Abraham Moles, see, e.g., Bašičević & Picelj 1968), in history (e.g., Topolski [1973] 1976; Le Roy Ladurie 1968; Bautier 1977), in linguistics (e.g., Ceccato 1964), and in archeology (Gardin & Garelli 1961). Even the Austrian computing pioneer Heinz Zemanek explicitly relates information technology to the work of Wittgenstein; his lecture series *Das geistige Umfeld der Informationstechnik* (Zemanek 1992) includes a chapter titled "Computer für die Geisteswissenschaften, Geisteswissenschaften für den Computer," which highlights the two-way connection between computing and the humanities.

Ironically, Busa himself is rooted in these traditions and, of course, in the strong scientific tradition of the Society of Jesus, which has been called "[t]he single most important contributor to the support of the study of experimental physics in the seventeenth century" (Heilbron 1979, 2).

As far as I know, there is no research on when exactly scholars in continental Europe became aware of Digital Humanities, either as a term or a concept. The *THATCamp Paris 2010*, the "first unconference on Digital Humanities in France" is likely to have played a role in popularizing it in continental Europe. The fact that the original French version of the *Manifeste des Digital Humanities* (Mounier 2010) ("Manifesto for the Digital Humanities"[15]) published at this meeting gives the gloss "humanités numériques," but uses only the English term, indicates that the French translation had not yet established itself at that time, and that it was perceived as something *new.* The manifesto notes that "experiments in the digital domain of the social sciences and humanities have multiplied in the last half century," its impassioned language nevertheless signals a new beginning rather than a simple announcement of a new name for an existing field. While the authors proclaim that "digital humanities are not *tabula rasa*," the continuity applies to the disciplines of the humanities and social sciences, *not* to *informatique pour les sciences humaines* (humanities computing), which is conspicuously absent from the *Manifesto*.

Thus, Digital Humanities, as a global phenomenon, is the product of a distinctly Anglo-American tradition of the humanities, of computing, and of computing in the humanities. It evolved in particular institutional contexts and around certain social practices.

Svensson ([2009] 2013, 174) raises the question as to whether the discursive transition from the term *humanities computing* to the designation *Digital Humanities* was essentially a simple "repackaging" of the former, or whether the new name indicates more fundamental changes, such as a broadening of the field or a shift in focus. The

15 See https://oep.hypotheses.org/78 (Accessed: 5 June 2024) for the English-language version. The quotes in English are from this version.

Manifesto is a potential piece of evidence[16] that when Digital Humanities arrived in continental Europe, it supplanted, rather than invigorated, local traditions of computing in the humanities (e.g., *informatique pour les sciences humaines, geisteswissenschaftliche Fachinformatik* or *informatica umanistica*). It seems that here, Digital Humanities was considered as a completely new field, inspired by Anglo-American models, rather than just a new name. Digital Humanities still tends to be more "computational" in continental Europe than in the US, which is likely due to a different conception (and institutionalization) of the humanities rather than an influence of these local predecessors; along with the names, much of the approaches, practices, and traditions were marginalized or even lost in the transition.

4. A Short History of the Term *Computational Humanities*

The term *Computational Humanities* is not new; in fact, it is older than the term *Digital Humanities*. The first use I have found so far is in an article on future directions of computing. The author gives two examples to demonstrate that "technology is transforming the scholarship" of humanities researchers, not only because it is more convenient, but because "the representation of and access to information allows them to organize kinds and quantities of information that weren't possible, hence to ask and answer questions about the human record that couldn't be answered before" (Wulf 1997, 111). He draws a parallel to science and engineering, where "we are used to the notion that new instruments allow us to address new questions; now the same is happening in the humanities. And just as in the sciences, the enhanced ability to answer questions provokes us to ask questions we hadn't considered before" (Wulf 1997, 111).

The next published occurrence I could find is by Cruz-Neira (2003), who even gives an explicit definition of Computational Humanities as "an emerging field that bridges the sciences and humanities with the goal of creating accurate computer simulations of historical, social, cultural, and religious events" (Cruz-Neira 2003, 10). This seems to be one of the earliest uses of *Computational Humanities* as a fixed term describing an identifiable field.

To my current knowledge, Bock et al. (2013) is the first publication in which *Computational Humanities* is used explicitly to denote a field *distinct* from Digital Humanities:[17]

16 Among others, such as the creation of Digital Humanities programs *alongside* existing programs in humanities computing.

17 The preface in which the editors explain their choice is is actually dated November 2011.

> *Computational humanities* are an emerging discipline, following concepts like the computational sciences in other fields [...]. The term *computational* is chosen instead of *digital,* used in the name *digital humanities,* since the spectrum of concepts and methods applied is broader and not focused mainly on information sciences (Bock, Jäger, and Winckler 2013, v, emphasis in original).

The editors stress their "hope to attract the interest especially of young researchers to this young discipline" (Bock et al. 2013, vii) and conclude: "Research in *computational humanities* is a challenge, offering many perspectives" (Bock et al. 2013, vii, emphasis in original).

Around the same time, Zundert et al. (2012) hint at "current efforts at developing computational humanities" (Zundert et al. 2012, 298). In fact, the short bio of Zundert in the volume describes him as "a researcher and developer in the field of computational humanities," a description he had already been using for several years at this point. Even though this contribution does not explicitly define Computational Humanities, Zundert et al. (2012) present a clear vision that goes beyond the use of computational methods as mere tools. Specifically, they highlight the role of formalization as "an integral part of humanities practice and not as a feature driven only by computation" (2012, 287). The authors argue that "the ongoing computational 'waves' and 'turns' should not steer the research community away from maintaining and promoting the traditions of humanities in contemporary scholarship," and that Computational Humanities "should be unequivocally recognised as only one stream of contemporary humanities research" (2012, 288). Even though the volume in which their chapter appears (Berry 2012), titled *Understanding Digital Humanities,* Zundert et al. (2012) does not distinguish Computational from Digital Humanities; in fact, they do not use the latter term at all.

In contrast, Biemann et al. (2014), in their report on the 2014 Dagstuhl seminar "Computational Humanities – Bridging the Gap Between Computer Science and Digital Humanities," intentionally use *Computational Humanities* in contrast to *Digital Humanities* – along with a reflection on its definition and its relationship to the humanities, computer science, and DH. The introduction to the report outlines the organizers' understanding of Computational Humanities (CH) as follows:

> At the core of the organizers' understanding of CH is the idea that CH is a discipline that should provide an algorithmic foundation as a bridge between computer science and the humanities. As a new discipline, CH is explicitly concerned with research questions from the humanities that can more successfully be solved by means of computing. CH is also concerned with pertinent research questions from computing science focusing on multimedia content, uncertainties of digitisation, language use across long time spans and visual presentation of content and form (Biemann et al. 2014, 81).

The organizers thus regard CH as a "new discipline," an "independent field of research," and notably one *distinct from DH.* In his talk (for the abstract, see Biemann et al. 2014, 87), Gerhard Heyer from the University of Leipzig detailed this conception by describing CH and DH as being part of computer science and the humanities, respectively, and *jointly* constituting an interface between computer science and the humanities. Arguing that the "degree of mutual understanding of research issues, technical feasibility and scientific relevance of research results will be much higher in the area of overlap between the Computational and Digital Humanities than with any intersection between Computer Science and the Humanities," he proposed to "set up research groups in both scientific communities, Computer Science and Humanities."[18]

Heyer describes Digital Humanities as "the creation, dissemination, and use of digital repositories" and Computational Humanities as "the computer based analysis of digital repositories using advanced computational and algorithmic methods," which "implies a dominance of computational aspects." Heyer further argues that the difference between the two orientations is reflected "in the know-how of researchers and their organizational attachment to either Humanities or Computer Science departments," and that consequently their research is either "more focused on just the creation and use of digital repositories, or on real program development in the Humanities as an area of applied Computer Science" (Biemann et al. 2014, 87–88). This conception seems similar to that of Bock et al. (2013) cited above.

While the descriptions of Computational Humanities cited above vary somewhat, they largely overlap. I only want to highlight two aspects here. First, they distinguish between digital representations and computational operations; Meunier (2014, 22) remarks: "pour ce programme de recherche, la caractéristique d'être numérique est secondaire. La plus importante est la computationnalité." Consequently, the challenge does not consist in digitizing the artifacts studied by the humanities, but rather to identify their *tasks* and to translate these into computational functions. Second, none of the authors who give a description of Computational Humanities hesitate to call it a *discipline.*

18 This is exactly the configuration that was realized at the University of Leipzig: Digital Humanities and Computational Humanities are two research groups, the former leaning more to the humanities side (now defunct) and the latter more to the computer science side. While relatively rare elsewhere, similar ideas have been used by other institutions; for example, Crum et al. (2019, 389) describe "synchronized courses of computational humanities and digital humanities."

5. Defining Computational Humanities

I have previously proposed an explication (or a stipulative definition) of Digital Humanities (Piotrowski 2018; Piotrowski & Xanthos 2020). I chose to use the term *Digital Humanities* rather than *Computational Humanities* for practical reasons: it was (and still is) the more established term. Since then, I have realized that any attempt at defining Digital Humanities will be met with disinterest. My mistake, however, was not so much in underestimating the resistance to defining Digital Humanities, but in believing that what I was trying to define was a subset of Digital Humanities.

I am now convinced that what I am trying to define should not be understood as a subfield of Digital Humanities, but as a field in its own right, which is part of a different tradition and draws on a long history of formal approaches to the humanities,[19] even if it is clearly linked to certain orientations of Digital Humanities.

My definition is based on the following considerations. First of all, a coherent field of research (which may or may not actually be considered a discipline) is characterized by a particular combination of (1) a research object and (2) a research objective; it is *not* dependent on the use of particular methods. Second, as Granger points out, the goal of any systematic pursuit of knowledge is the "construction de *modèles cohérents et efficaces du phénomène*" (Granger [1960] 1967, 215, emphasis in original). All research builds models, since the study of an object is nothing other than the creation of its model. Stachowiak (1973) affirms: "Hiernach *ist alle Erkenntnis Erkenntnis in Modellen* oder *durch Modelle,* und jegliche menschliche Weltbegegnung überhaupt bedarf des Mediums 'Modell'." (Stachowiak 1973, 56, emphasis in original). Bachelard (1979, 3) characterizes the model as "un intermédiaire à qui nous déléguons la fonction de connaissance, plus précisément de réduction de l'encore-énigmatique, en présence d'un champ d'études dont l'accès, pour des raisons diverses, nous est difficile." In short, we model to understand (Le Moigne 2003).

The importance of the computer lies precisely in the fact that is a "universal modeling machine"; "computers came into existence for the sake of modeling" (Mahoney 2000). More specifically, the massive impact of computers on research is due to that fact that they, as Weizenbaum ([1976] 1984, 144) puts it, "make possible an entirely new relationship between theories and models": "A theory written in the form of a computer program is thus both a theory and, when placed on a computer and run, a model to which the theory applies" (Weizenbaum [1976] 1984, 145).

Thus, the difference between Computational Humanities and most traditional research in the humanities is *not* that Computational Humanities constructs models, but that Computational Humanities constructs *formal* models that can be manipulated by the computer, i.e., *computational models.* This general notion is in line with

19 Perhaps we should (like, e.g., Mazlish [1998] 2017) rather speak of the *human sciences* in this context, since it is essential to start from a conceptualization more akin to the *Geisteswissenschaften* or the *sciences humaines,* rather the Anglo-American humanities.

important earlier, mostly European, work on computing in the humanities. However, we need to further distinguish between two subfields of Computational Humanities, because they clearly differ in their research objectives; I call these subfields *applied Computational Humanities* and *theoretical Computational Humanities.*[20]

Applied Computational Humanities refer to those fields of research which, like computational history or computational literary studies, fall within a humanities discipline and have as their object the construction of formal models of the phenomena studied by this "parent discipline," as well as the methodology of this construction. The difference between the "traditional" and "computational" therefore relates specifically to the nature of the models they aim to construct: in the case of the latter, they are *formal* models that can be manipulated by computers. In all other respects, they share the research objects and objectives of the humanities disciplines to which they belong. In particular, computational research must meet all the quality and relevance criteria of these disciplines – it goes without saying that no relaxation of these criteria can be justified by the use of particular methods and tools.

Theoretical Computational Humanities, on the other hand, studies the general properties of such models at a higher level of abstraction. In other words, theoretical Computational Humanities create and study the *metamodels* whose concrete application in the humanities is the domain of applied Computational Humanities, as well as the methodology for constructing these metamodels. One might say that theoretical Computational Humanities deals with the general theory of materials and construction, while applied Computational Humanities raises the building. Because of their metascientific nature, theoretical Computational Humanities is neither "quantitative" nor "qualitative." The goal of theoretical Computational Humanities is to develop abstract models, metamodels, which may or may not have a quantitative dimension, but the research question underlying them is the *adequacy* of these models, not their application. Theoretical Computational Humanities therefore serves as metascience for applied Computational Humanities.

This distinction is crucial, as applied and theoretical Computational Humanities have different research objects and research objectives: in the former, they belong to the humanities, in the latter, to computer science.

As such, theoretical Computational Humanities could be likened to disciplines like business informatics that integrate aspects from both the application domain and computer science.[21] As Wedekind et al. (1998, 265) point out, "Eine der grundlegenden

20 The original inspiration for what follows comes from the definition for *mathematical linguistics* proposed by Gladkij & Mel'čuk (1969).

21 The discipline of business informatics was first established in Germany, and it is one of the disciplines that are commonly grouped under the heading *angewandte Informatik.* While this literally translates to "applied computer science," it refers to something very different, precisely because the disciplines of *angewandte Informatik* integrate aspects from both the application domain and computer science.

Aufgaben der Informatik besteht darin, die aus den Fachwissenschaften stammenden Modelle so umzuschreiben, daß sie mit Hilfe eines Computers dargestellt und bearbeitet werden können." If such models cannot be translated directly into the language of computing, then the model must be reconstructed. Görz (2018, 164) notes that "[i]n the humanities in particular, understanding and explanation of actions in terms of reasons and intentionality provide challenges to operationalized representations." In other words, an in-depth understanding of both domains is essential, rather than just interdisciplinary mediation, which suggests considering theoretical Computational Humanities as a discipline in its own right.

That said, it is important to stress that there are no strict boundaries between applied and theoretical Computational Humanities: researchers in applied Computational Humanities will often be interested in the general properties of the models they are constructing, whereas researchers in theoretical Computational Humanities will naturally be interested in concrete applications of the metamodels they are developing. And of course, Computational Humanities as a whole is in constant exchange with Digital Humanities, the humanities disciplines, as well as computer science.

As Granger ([1960] 1967, 19) points out: "Ce sera l'un des aspects de notre tâche que de montrer la pensée formelle à l'œuvre dans les sciences humaines, non pas seulement comme réduction des phénomènes aux calculs, mais aussi comme invention de structures nouvelles, voire même d'une mathématique originale." The development of this "original mathematics" – today Granger would probably write "informatique originale" – is, I believe, indeed the task of Computational Humanities.

6. Conclusion

In this chapter, I have proposed a new reading of the genesis of Computational Humanities, as well as a concise definition. While the narrative of a schism may be tempting, it is inherently negative and not very productive. Instead, I propose to regard Digital and Computational Humanities as heirs of two different, although obviously related, traditions – perhaps comparable, in their relation, to analytic and continental philosophy. From 2004 onwards, the Anglo-American Digital Humanities established their global dominance and mostly supplanted local European traditions.

Rallying behind the new term "Digital Humanities" has certainly been beneficial, especially for the legitimization and institutionalization of computer-aided research in the humanities in European universities. However, Anglo-American and European academic traditions and institutional contexts differ substantially. Certain interpretations of Digital Humanities adapt quite well to European contexts, but this is much less true for others. At the global ADHO DH conferences the different conceptions of Digital Humanities become apparent and raise questions, for example, about the adequate evaluation of research, a question that is not limited to the acceptance

of papers at the conference, but also touches on issues of recognition and evaluation "at home," in the respective academic systems in which researchers work.

The ideal (one is tempted to say: dogma) of the "big tent" is also strongly rooted in US traditions: it is commonly interpreted as referring to the inclusivity of Digital Humanities; however, it also has a flip side: Digital Humanities as "one field indivisible." Under this ideal, all discussion about evaluation and institutionalization are effectively rendered taboo, because fixed evaluation criteria would either exclude some people, or divide the field.

While such factors have certainly contributed to the frustration of some scholars, the fundamental problem is perhaps less one of *digital* vs. *computational,* but rather one of *humanities* vs. *Geisteswissenschaften:* Digital Humanities are in the former, Computational Humanities in the latter tradition. This is why I reject the notion of a schism and prefer to talk about a re-emergence or renaissance: these different conceptualizations have coexisted for a long time; what we see now is a renewed interest in the continental tradition of formal methods in the humanities – now referred to as "Computational Humanities" – rather than a schism of Digital Humanities.

Acknowledgements

This chapter was written during a stay at the Fondazione Garbald's Studio Cascina in August 2023. I thank Barbara Hof and the anonymous reviewer for their useful comments on the first version of this chapter.

References

Bachelard, S. (1979). Quelques aspects historiques des notion de modèle et de justification des modèles. In P. Delattre & M. Thellier (Eds.), *Élaboration et justification des modelès* (pp. 3–19). Paris: Maloine.

Bašičević, D., & Picelj, I. (Eds.). (1968). The Theory of Information and the New Aesthetics, *Bit,* 1. URL: https://monoskop.org/images/b/bf/Bit_International_1_The_Theory_of_Informations_and_the_New_Aesthetics_1968.pdf (Accessed: 5 June 2024).

Bautier, R.-H. (1977). Les demandes des historiens à l'informatique. La forme diplomatique et le contenu juridique des actes. In L. Fossier, A. Vauchez & C. Violante (Eds.), *Informatique et histoire médiévale. Actes du colloque de Rome (20–22 mai 1975)* (pp. 179–186). Rome, Italy: École Française de Rome [= *Publications de l'École française de Rome* 31]. URL: https://persee.fr/doc/efr_0000-0000_1977_act_31_1_2252 (Accessed: 5 June 2024).

Berra, A. (2015). Pour une histoire des humanités numériques, *Critique,* 8–9(819–820), 613–626. DOI: https://doi.org/10.3917/criti.819.0613 (Accessed: 5 June 2024).

Berry, D.M. (Ed.). (2012). *Understanding Digital Humanities.* Basingstoke: Palgrave Macmillan. DOI: https://doi.org/10.1057/9780230371934 (Accessed: 5 June 2024).

Biemann, Ch., Crane, G.R., Fellbaum, Ch.D., & Mehler, A. (Eds.). (2014). Computational Humanities. Bridging the Gap Between Computer Science and Digital Humanities (Dagstuhl Seminar 14301), *Dagstuhl Reports,* 4(7). Schloss Dagstuhl: Leibniz-Zentrum für Informatik. DOI: https://doi.org/doi.org/10.4230/DAGREP.4.7.80 (Accessed: 5 June 2024).

Bock, H.G., Jäger, W., & Winckler, M.J. (Eds.). (2013). *Scientific Computing and Cultural Heritage.* Berlin/Heidelberg: Springer [= *Contributions in Mathematical and Computational Sciences,* 3]. DOI: https://doi.org/10.1007/978-3-642-28021-4 (Accessed: 5 June 2024).

Borillo, M. (1985). *Informatique pour les sciences de l'homme. Limites de la formalisation du raisonnement.* Brussels: Mardaga.

Bowles, E.A. (Ed.). (1967). *Computers in Humanistic Research. Readings and Perspectives.* Englewood Cliffs: Prentice-Hall.

Breu, W. (1990). Book Reviews. The Humanities Computing Yearbook, *System,* 18(3), 394–396. DOI: https://doi.org/10.1016/0346-251x(90)90016-x (Accessed: 5 June 2024).

Burdick, A., Drucker, J., Lunenfeld, P., Presner, T., & Schnapp, J. (2012). *Digital_Humanities.* Cambridge: MIT Press.

Busa, R.A. (2004). Foreword. Perspectives on the Digital Humanities." In S. Schreibman, R. Siemens & J. Unsworth (Eds.), *A Companion to Digital Humanities* (pp. xvi–xxi). Oxford: Blackwell. DOI: https://doi.org/10.1002/9780470999875.fmatter (Accessed: 5 June 2024).

Ceccato, S. (1964). Automatic Translation of Languages, *Information Storage and Retrieval,* 2(3), 105–158. DOI: https://doi.org/10.1016/0020-0271(64)90002-6 (Accessed: 5 June 2024).

Crum, W.B., Angello, A., Liu, X., & Campion, C. (2019). Enabling Interdisciplinary Instruction in Computer Science and Humanities. An Innovative Teaching and Learning Model Customized for Small Liberal Arts Colleges. In *Proceedings of the ICCS 2019* (pp. 389–400). Cham: Springer. DOI: https://doi.org/10.1007/978-3-030-22750-0_31 (Accessed: 5 June 2024).

Cruz-Neira, C. (2003). Computational Humanities. The New Challenge for VR, *IEEE Computer Graphics and Applications,* 23(3), 10–13. DOI: https://doi.org/10.1109/mcg.2003.1198257 (Accessed: 5 June 2024).

Dombrowski, Q. (2023). Does Coding Matter for Doing Digital Humanities? In J. O'Sullivan (Ed.), *The Bloomsbury Handbook to the Digital Humanities* (pp. 137–145). London: Bloomsbury.

Drucker, J. (2021). *The Digital Humanities Coursebook. An Introduction to Digital Methods for Research and Scholarship.* London/New York: Routledge. DOI: https://doi.org/10.4324/9781003106531 (Accessed: 5 June 2024).

Fitzpatrick, K. (2012). The Humanities, Done Digitally. In M.K. Gold (Ed.), *Debates in the Digital Humanities* (pp. 12–15). Minneapolis: University of Minnesota Press. DOI: https://doi.org/10.5749/minnesota/9780816677948.001.0001 (Accessed: 5 June 2024).

Froger, J. (1965a). La machine électronique au service des sciences humaines, *Diogène,* 52, 110–144.

Id. (1965b). The Electronic Machine at the Service of Humanistic Studies. Translated by Nora McKeon, *Diogenes,* 13(52), 104–142. DOI: https://doi.org/10.1177/039219216501305206 (Accessed: 5 June 2024).

Id. (1968). *La critique des textes et son automatisation.* Paris: Dunod.

Id. (1970). La critique des textes et l'ordinateur, *Vigiliae Christianae,* 24(3), 210–217. DOI: https://doi.org/10.2307/1583073 (Accessed: 5 June 2024).

Gardin, J.-C., & Garelli, P. (1961). Étude des établissements assyriens en Cappadoce par ordinateurs, *Annales. Histoire. Sciences Sociales,* 16(5), 837–876. DOI: https://doi.org/10.3406/ahess.1961.420758 (Accessed: 5 June 2024).

Gerovitch, S. (2002). *From Newspeak to Cyberspeak. A History of Soviet Cybernetics.* Cambridge: MIT Press. DOI: https://doi.org/10.7551/mitpress/3137.001.0001 (Accessed: 5 June 2024).

Gladkij, A.V., & Mel'čuk, I.A. (1969). *Elementy matematičeskoj lingvistiki.* Moscow: Nauka.

Gold, M.K. (Ed.). 2012. *Debates in the Digital Humanities.* Minneapolis: University of Minnesota Press. DOI: https://doi.org/10.5749/minnesota/9780816677948.001.0001 (Accessed: 5 June 2024).

Görz, G. (2018). Some Remarks on Modelling from a Computer Science Perspective, *Historical Social Research. Supplement,* 31, 163–169. DOI: https://doi.org/10.12759/HSR.SUPPL.31.2018.163-169 (Accessed: 5 June 2024).

Grandjean, M. (2016). A Social Network Analysis of Twitter. Mapping the Digital Humanities Community, *Cogent Arts & Humanities,* 3(1). DOI: https://doi.org/10.1080/23311983.2016.1171458 (Accessed: 5 June 2024).

Granger, G.-G. (1960 [1967]). *Pensée formelle et sciences de l'homme.* Nouvelle éd. augmentée d'une préface. Paris: Aubier-Montaigne.

Heilbron, J.L. (1979). *Electricity in the 17th and 18th Centuries. A Study of Early Modern Physics.* Berkely/Los Angeles/London: University of California Press.

Hockey, S. (2004). The History of Humanities Computing. In S. Schreibman, R. Siemens & J. Unsworth (Eds.), *A Companion to Digital Humanities* (pp. 1–19). Oxford: Blackwell. DOI: https://doi.org/10.1002/9780470999875.ch1 (Accessed: 5 June 2024).

Kenner, H. (1989). Curtains for Lady Buxley, *Byte,* 14, 360–361.

Kirschenbaum, M.G. (2012). What Is Digital Humanities and What's It Doing in English Departments? In M.K. Gold (Ed.), *Debates in the Digital Humanities* (pp. 3–11). Minneapolis: University of Minnesota Press. URL: https://www.jstor.org/stable/10.5749/j.ctttv8hq.4 (Accessed: 5 June 2024).

Klaus, G. (1966). *Kybernetik und Erkenntnistheorie.* Berlin: VEB Deutscher Verlag der Wissenschaften.

Lancashire, I., (Ed.). (1991). *The Humanities Computing Yearbook 1989–90. A Comprehensive Guide to Software and Other Resources.* Oxford: Clarendon Press.

Lancashire, I., & McCarty, W. (Eds.). (1989). *The Humanities Computing Yearbook 1988.* Oxford: Clarendon Press.

Lang, S. (2020). News on the DH and Gender Equality, *LaTeX Ninja blog.* URL: https://latex-ninja.com/2020/05/24/news-on-the-dh-and-gender-equality (Accessed: 5 June 2024).

Le Moigne, J.-L. (2003). *Le constructivisme. Modéliser pour comprendre,* 3. Paris: L'Harmattan.

Le Roy Ladurie, E. (1968). La fin des érudits, *Le Nouvel Observateur,* 182, 38–39.

Mahoney, M.S. (2000). Historical Perspectives on Models and Modeling. In *XIIIth DHS-DLMPS Joint Conference on Scientific Models. Their Historical and Philosophical Relevance.* Zürich. URL: https://www.princeton.edu/~hos/Mahoney/articles/models/models.html (Accessed: 5 June 2024).

Mazlish, B. (1998 [2017]). *The Uncertain Sciences. With a New Introduction by the Author.* London/New York: Routledge.

Meunier, J.-G. (2014). Humanités numériques ou computationnelles. Enjeux herméneutiques, *Sens public.* URL: http://sens-public.org/articles/1121 (Accessed: 5 June 2024).

Milic, L.T. (1966). The Next Step, *Computers and the Humanities,* 1(1), 3–6. DOI: https://doi.org/10.1007/bf00188010 (Accessed: 5 June 2024).

Mounier, P. (2010). Manifeste des Digital Humanities, *Journal des anthropologues,* 122–123, 447–452. DOI: https://doi.org/10.4000/jda.3652 (Accessed: 5 June 2024).

Id. (2018). *Les humanités numériques. Une histoire critique.* Paris: Éditions de la Maison des sciences de l'homme. DOI: https://doi.org/10.4000/books.editionsmsh.12006 (Accessed: 5 June 2024).

Mullen, L.A. (2010 [2013]). Digital Humanities Is a Spectrum, or 'We're All Digital Humanists Now'. In M. Terras, J. Nyhan & E. Vanhoutte (Eds.), *Defining Digital Humanities* (pp. 237–238). Farnham: Ashgate. DOI: https://doi.org/10.4324/9781315576251 (Accessed: 5 June 2024).

O'Sullivan, J. (2023). Introduction. Reconsidering the Present and Future of the Digital Humanities. In id. (Ed.), *The Bloomsbury Handbook to the Digital Humanities* (pp. 1–4). London: Bloomsbury.

Piotrowski, M. (Ed.). (2018). *Proceedings of the Workshop on Computational Methods in the Humanities.* Lausanne: COMHUM 2018. URL: http://ceur-ws.org/Vol-2314 (Accessed: 5 June 2024).

Piotrowski, M., & Xanthos, A. (2020). Décomposer les humanités numériques, *Humanités numériques,* 1, 1–35. DOI: https://doi.org/10.4000/revuehn.381 (Accessed: 5 June 2024).

Poirel, D. (1968 [2022]). *Stemma Codicum. La "Méthode Froger" d'édition Critique.* Turnhout: Brepols.

Potter, R.G. (1992). Book Reviews. The Humanities Computing Yearbook 1989–90, *Computational Linguistics,* 18(4), 545–548. URL: https://aclanthology.org/J92-4008 (Accessed: 5 June 2024).

Ramsay, S. (2011 [2013]). Who's in and Who's Out. In M. Terras, J. Nyhan & E. Vanhoutte (Eds.), *Defining Digital Humanities* (pp. 239–241). Farnham: Ashgate. DOI: https://doi.org/10.4324/9781315576251 (Accessed: 5 June 2024).

Rockwell, G. (1999 [2013]). Is Humanities Computing an Academic Discipline. In M. Terras, J. Nyhan & E. Vanhoutte (Eds.), *Defining Digital Humanities* (pp. 13–13). Farnham: Ashgate. DOI: https://doi.org/10.4324/9781315576251 (Accessed: 5 June 2024).

Roth, C. (2019). Digital, Digitized, and Numerical Humanities, *Digital Scholarship in the Humanities,* 34(3), 616–632. DOI: https://doi.org/10.1093/llc/fqy057 (Accessed: 5 June 2024).

Schreibman, S., Siemens, R., & Unsworth, J. (Eds.). (2004a). *A Companion to Digital Humanities.* Oxford: Blackwell. DOI: https://doi.org/10.1002/9780470999875 (Accessed: 5 June 2024).

Eid. (2004b). The Digital Humanities and Humanities Computing. An Introduction. In eid. (Eds.), *A Companion to Digital Humanities* (pp. xxii–xxvii). Oxford: Blackwell. DOI: https://doi.org/10.1002/9780470999875.fmatter (Accessed: 5 June 2024).

Shilov, V. (2014). Reefs of Myths. Towards the History of Cybernetics in the Soviet Union. In *Proceedings of the Third International Conference on Computer Technology in Russia and in the Former Soviet Union 2014.* Washington, DC: Institute of Electrical and Electronics Engineers. DOI: https://doi.org/10.1109/sorucom.2014.46 (Accessed: 5 June 2024).

Stachowiak, H. (1973). *Allgemeine Modelltheorie.* Wien/New York: Springer.

Steinbuch, K. (1966 [1969]). *Die informierte Gesellschaft. Geschichte und Zukunft der Nachrichtentechnik.* Newly revised, updated Edition. Stuttgart: Deutsche Verlags-Anstalt.

Sula, Ch.A., & Hill, H.V. (2019). The Early History of Digital Humanities. An Analysis of Computers and the Humanities (1966–2004) and Literary and Linguistic Computing (1986–2004), *Digital Scholarship in the Humanities,* 34, 190–206. DOI: https://doi.org/10.1093/llc/fqz072 (Accessed: 5 June 2024).

Svensson, P. (2009 [2013]). Humanities Computing as Digital Humanities. In M. Terras, J. Nyhan & E. Vanhoutte (Eds.), *Defining Digital Humanities* (pp. 159–186). Farnham: Ashgate. DOI: https://doi.org/10.4324/9781315576251 (Accessed: 5 June 2024).

Terras, M., Nyhan, J., & Vanhoutte, E. (Eds.). (2013). *Defining Digital Humanities.* Farnham: Ashgate. DOI: https://doi.org/10.4324/9781315576251 (Accessed: 5 June 2024).

Thaller, M. (2017). Geschichte der Digital Humanities. In F. Jannidis, H. Kohle & M. Rehbein (Eds.), *Digital Humanities. Eine Einführung* (pp. 3–12). Stuttgart: J.B. Metzler.

Topolski, J. (1973[1976]). *Methodology of History.* Translated by O. Wojtasiewicz. Dordrecht: Reidel [= *Synthese Library* 88]. DOI: https://doi.org/10.1007/978-94-010-1123-5 (Accessed: 5 June 2024).

Wedekind, H., Görz, G., Kötter, R., & Inhetveen, R. (1998). Modellierung, Simulation, Visualisierung. Zu aktuellen Aufgaben der Informatik, *Informatik-Spektrum*, 21(5), 265–272. DOI: https://doi.org/10.1007/s002870050104 (Accessed: 5 June 2024).

Weizenbaum, J. (1976 [1984]). *Computer Power and Human Reason. From Judgement to Calculation.* With new preface. Harmondsworth: Penguin.

Wulf, W.A. (1997). Look in the Spaces for Tomorrow's Innovations, *Communications of the ACM,* 40(2), 109–111. DOI: https://doi.org/10.1145/253671.253744 (Accessed: 5 June 2024).

Zemanek, H. (1992). *Das geistige Umfeld der Informationstechnik.* Berlin/Heidelberg: Springer.

Zundert, J.v., Antonijević, S., Beaulieu, A., Dalen-Oskam, K.v., Zeldenrust, D. & Andrews, T.L. (2012). Cultures of Formalisation. Towards an Encounter Between Humanities and Computing. In D.M. Berry (Ed.), *Understanding Digital Humanities* (pp. 279–294). Basingstoke: Palgrave Macmillan. DOI: https://doi.org/10.1057/97802303719 (Accessed: 5 June 2024).