DHQ: Digital Humanities Quarterly
2016
Volume 10 Number 3

Circling around texts and language: towards “pragmatic modelling” in Digital Humanities

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Abstract

In this paper we introduce the syntagm “pragmatic modelling” as a productive way of contextualising research in Digital Humanities (DH). We define “pragmatic modelling” as a middle-out approach (neither top down nor bottom up) that combines formal and experimental modelling techniques with an effective use of language. Furthermore, in order to elucidate a “pragmatic understanding” of model building, we reflect on texts (considered here as objects) and modelling (or strategy of analysis) in DH research (and teaching). This paper does not identify a new practice or approach; rather it offers an explanatory framework for existing practices. As the paper explains, this framework goes beyond existing ones and allows us to think about modelling in a more integral way. Drawing on this framework, we reveal how DH modelling practices challenge epistemological and linguistic restrictions, by, for example, problematising the adoption of terminology belonging to the domain of computer sciences. Reflections on metaphorical reasoning are used to exemplify how polarities and some rigidities DH research could find itself embedded in are overcome in practice. We conclude by advocating the importance of a diachronic and historical analysis of the role of metaphors in DH to further explore the relation between theory and practice as well as to develop models of modelling integral to DH research.

1. Introduction

DH or humanities computing in its former vest [Schreibman et al. 2004] is being institutionalized and is an example of how cross-border fertilisation, namely interdisciplinarity, is possible [McCarty 2016] [Marras 2012]. DH scholars and professionals are making use of a “blended” style reflected both in their language, by adopting expressions to account for new scenarios, and in their research and teaching approaches, often integrating computational methods and terminologies with modes of *discourse* associated with more established scholarship in the humanities [Marras 2013] [Flanders 2009]. DH is surely a field in rapid evolution, where open questions are numerous and self-reflexivity is not new (see for example [Gold 2012]). Modelling is widely agreed to be a central activity of DH; as the discipline is institutionalised to a greater degree, new opportunities and challenges are being opened up, not least to understand the act of modelling far better than we have done in the past. In particular, the sharing of empirical practices and methodologies across borders makes DH somewhat comparable to the techno-sciences;[1] it also anchors humanities scholarship to a practical dimension that renews its 15th-century roots of empirical *studia humanitatis*.[2] This paper will make a contribution to this discussion by asking the following questions: other scholarship in the humanities and techno-sciences has passed/passes via the experimental and the formal; in what way is the experimental and the formal done in DH different and similar? Where do DH modellers position their models in the polarity between texts/objects and theory/practice? Is modelling in computing going to lift our way of seeing, and therefore thinking, to another level of analysis? 1

To address these questions our argument will engage with two interrelated concepts: 2

- “text”: dynamic cultural objects (material documents as well as immaterial objects)[3] contingent to the contexts of production and reading, expressed in a wide range of manifestations from linear to discontinuous narrative, from manuscripts to printed editions, encompassing hybrid modalities;
- “modelling”: a DH-specific research and teaching activity, but also connected to multifaceted conceptualisations of model building as used and understood by other disciplines and practices.

Modelling in DH [McCarty 2005, 20–72] [Jannidis and Flanders 2013] [Flanders and Jannidis] is informed by modelling as rooted in computer sciences and therefore in mathematical reasoning. It is also directly interconnected with work on texts [Buzzetti 2002], the privileged objects of humanities research. Here the perspectives that it can grant are multifaceted and not limited to ways of seeing patterns of similarity across them [Eide 2015]. It should be specified that it is modelling *activities* that we are focusing on here, rather than the models themselves.[4] The premise of our argument is that in describing their modelling activities DH researchers tend to privilege a symbolic analysis of texts instead of a pragmatic one. The former view on text focuses on partitioning it into descriptive chunks or components, be they material or conceptual, while the latter, as we intend it here, calls for an integrative approach where the *use* of language in understanding and manipulating texts is given a prominent place.[5]

By reflecting on modelling practices in DH research, this paper shows how pragmatic modeling combines *theoria cum praxis*. In doing so, the paper discusses a selection of significant literature as well as some examples across different disciplines and approaches. We will begin by setting out our pragmatic understanding of modelling. 3

1.1. A pragmatic understanding of modelling

In this section we will frame DH modeling activities by engaging with recent work on model building [Kralemann and Lattmann 2013]. Our focus is on what Kralemann and Lattmann call the “Act of the Interpreter” or “End” of the model or “Pragmatics”. We aim to highlight how that aspect of pragmatic modelling might need further attention in a DH context with respect to the two following elements: flexibility of language and fuzzy polarities (in particular object vs. model). By using the term pragmatic modelling we intend to emphasise an understanding of the act of modelling as anchored to theory and language. Kralemann and Lattmann explain “the semiotic structure of the model relation” as following: 4

> [...] in the context of an intentional act (i.e. the pragmatics), a subject chooses a set of objects Oi=1,...,n (i.e. the extension of the model) and a theory or language (i.e. the intension of the model), which together determine the semantics of the model, and an object Omod the attributes of which act as the syntax of the model on the basis of a representational relation between themselves and the semantic model attributes: in the context of a theory and with respect to the respective end, Omod becomes a model of the objects Oi=1,...,n [Kralemann and Lattmann 2013, fig. 5]

Their theory of models as icons in the Peircean sense acts as a generic framework to contextualise the creation and use of models in the sciences, humanities and, we could even say, life. To exemplify how this applies to DH (in line with established understandings of modelling), one could think of a researcher who is modelling a set of historical documents (her objects). In doing so she must engage with a theory of text and hence with an understanding of textual features relevant to her historical research. In her modelling activity, the researcher maps the theory of text and scholarly language she uses to describe and understand her documents to a digital model of her texts. She may use, for instance, a formalisation of the widely adopted Ordered Hierarchy of Content Objects (OHCO)[6] model combined with a Text Encoding Initiative (TEI) document model. Our researcher chooses a hierarchical model of text (the OHCO model) which she presumably thinks will allow her to map some of her understandings of the historical documents under study to a pre-defined structure (e.g. a TEI schema) and to process those data in some automatic form (e.g. to create indexes of certain selected elements, to perform combined searches or specific content analysis). However, in the modelling process itself she might question deeply the OHCO model as well as the TEI categorisations, reflecting on her own theory of the historical documents at hand and realising the constraints of both theory and model with respect to her objects of interest. She will most likely go back and forth in her modelling efforts to match – based on her knowledge and scholarly language – what she would like to elicit in the document (e.g. the organisation of the diplomatic formulas, the occurrence of names of witnesses in certain locations in the document, the abbreviations occurring in the date 5

clauses) with the formal hierarchical structure proposed by one or more of the TEI guidelines chapters on the encoding of primary sources. Once this mapping reaches a certain stability and she is able to actually process that model, her interpretative activity will likely have to zoom in and out of these manifestations (e.g. between single cases and emerging patterns). She will often puzzle over exceptions that will allow her to iteratively refine the original mapping or require a total rethinking of categories and of the OCHO model being adopted. Single components or parts of the model itself (e.g. the specific schema adopted and its syntax, the technology, the versions of the model at *x* moments in time) cannot account for the complexity of "model relation" as described above by Kralemann and Lattmann. Within such a reductive analysis of modelling practices, the contextual and relational construction of the semantics of the model as well as its pragmatic end are lost.

A pragmatic understanding of modelling, as we understand it here, and as practiced in DH research, can facilitate the recognition that modelling operates within relational and dynamic cycles which are elicited via negotiations over the use of modelling languages (e.g. by renaming categories of analysis or adopting neologisms). The interplay (usually referred to as mapping) between the object of analysis (texts in this case) and the model, as well as across different levels of the interpretative process (e.g. close and distant reading, symbolic/syntagmatic and semantic/paradigmatic levels of text analysis), exemplify some of these dynamic aspects. 6

2. Modelling in DH

Models and modelling - pervasive in scientific empirical practices – have become part of the methodological approaches of DH research. Thus the question is: in what way is DH rhetoric and practices not only attracted by but borrowing from the techno-sciences? What *model of modelling* can be considered "adequate" to DH? To this end, it is necessary to point out which are the distinctive features of modelling in the humanities. If modelling acts as understood from a semiotic tradition are used to make sense of our cultural objects (mainly but not only texts), they are meaning-making practices and hence in themselves objects of study for the humanities. Indeed, as stated below, the modelling process is often recognised as part of what is being modelled. In this respect it is interesting to note how this applies to natural and literary languages as well as markup languages: 7

> [...] by its nature the TEI is designed to handle not only the modeling of that data, but also the markers of transcriptional, editorial, and interpretative self-awareness: the non-transparency of the modeling process is itself part of what is being modeled (and again, I would claim that this is a distinctive feature of humanities data modeling). [Flanders 2012]

To address the questions above we will reflect on objects, practices and languages of modelling in DH.

2.1. Texts as complex and open objects

Texts are or at least have been so far the privileged objects of modelling activities in DH.[7] Here we chose to focus on some interrelated aspects of the study of texts, which seem to us particularly relevant to exemplify their complexity and openness with respect to modelling in DH: "dynamicity", "multidimensionality", historicity, and processuality. 8

First, we highlight "dynamicity"[8] as an aspect in the study of texts which emerges particularly in the relationship between models and objects as well as models and interpretations. DH researchers have engaged with linear texts all the way towards discontinuous narratives, for instance as structured in relational databases. In addition, texts as objects being modelled in DH research are not only or mainly verbal and encompass hybrid modalities such as maps [Eide 2013]. Indeed, dynamic aspects of texts as modelled in DH research and connected to the nature of cultural artefacts as such could be exemplified in a variety of ways. Researchers engaged in scholarly digital editing, for instance, have attempted at modelling the whole range of material incarnations of texts and the associated interpretative processes from manuscript witnesses to printed editions, from diplomatic transcriptions to critical editing. Hence, often within one and the same digital editing project, textual models do not sit still; they shift along multiple axes with respect to their objects and interpretations. The models themselves change shape. So, the axis of textual sources vs. models of analysis and interpretation of those same sources is mobile; for example, during the modelling process the sample of 9

sources being selected might reveal new important features to model – such as a late pagination within a codex under study originally not included in the encoding model - which in some cases might also challenge the previous knowledge of those sources such as the biography of that codex. The axis between the textual models and the reading interfaces being generated out of them is also mobile; while developing an interface to a digital edition, the DH modeler might realise that some features of the original encoding model are not refined enough to allow for certain visualisations or specific manipulation of the data.[9]

10 Secondly, we mention “multidimensionality” as an aspect of the study of texts that emerges from the relation between objects and interpretations. With this respect, we refer to Sahle’s pluralistic model of text [Sahle 2006] [Sahle 2012] which states that the definition of text (e.g. text as semantic and intentional vs. text as version containing specific graphemes; text as complex visual sign vs. text as linguistic utterance; text as material document vs. text as work or rhetorical structure) depends on how we look at it, on the aspects we are most interested in making explicit in our modelling efforts and the tacit knowledge invested in those efforts. This is why the TEI standard aims to account for many models of texts and is a mobile guide in itself.

11 Next we turn to historicity, which is the aspect via which we put models in relation to their historical interpretations. The concept of historicity is useful to argue that, usually, in DH, modelling acts are also and necessarily meta-modelling activities because they explicitly engage with non-neutral objects, that is with objects mediated by prior interpretative activities even if not always passing via computational formalisations.[10] Therefore, our models of texts also embed historical understandings, categorisations and definitions of those texts.[11]

12 The last aspect we mention concerns the processuality of the study of texts located at the interface between objects and subject’s interpretations. This concept aims at highlighting a further connection between the reading (and hence also modelling) of texts and our being human. How we read, interpret, engage with texts is intimately situated in the performative and eventful process of creating and confirming our own identity [Meister 2007].

13 In conclusion, what this brief encounter with texts aimed to highlight is a reiteration of how entangled any DH modelling process is with the cultural, historical and personal engagement we have and had with these complex and open objects.

2.2. Middle ground: modelling practice and languages

14 In philosophy of science there has been a lively debate around theorisations of models and their position in the middle between theory and data or objects (e.g. [Frigg and Hartmann 2012, 24–25]). Models as used in experimental settings, including computer simulations, are often conceptualised as “mediators between theory and material systems” [Morrison 2009, 47, note 22]. Hence, also computer simulations, as a special type of model, can be perceived as links “between theory and experiment” [Winsberg 2003]. In a simplified view of experimental settings theorised within such frameworks, a rather stable physical system exists; any new knowledge acquired during an experiment is mediated by models of that system (models of materiality) via a causal connection.

15 Without aiming at defining experimental practices in the techno-sciences, this paper dwells on how they are commonly perceived and how DH practice relates to them.[12] These perceptions and relations explain the borrowing from the techno-sciences we aim to unpack and also suggest directions towards a model of modelling integral to DH research. In the case of computational models, for example, a physical system is represented by a simulation model, which is the result of a “discretizing method” [Morrison 2009, 45] passing via various mathematical models of that system.[13] Now even if this is a simplified view which does not take into account that a pure empiricism where objects and theories are entirely separate entities has been questioned by scientists, philosophers[14] and of course by the framework of quantum physics,[15] what is interesting for our analysis is that computer simulations in a techno-scientific context seem to be perceived as adding a level of “immateriality” (or better “fictionality”) to experimental settings, while in DH they tend to be perceived as adding an element of materiality to humanistic interpretation.[16] The latter resonates in particular with respect to the popular claim of DH as evidence-based humanities - or what we could call a Cartesian approach to the humanities - as well as to the criticism towards DH as a new positivistic approach to scholarship [Eyers

2013].

16 History of culture and science can be read as progressively distancing and detaching human life from the world of nature via the meditation of tools and technologies.[17] This is a process that can be summarised as a dialectic tension between two polarities, that of *physis* and of *techne*. Philosophers tried to explain and mediate this process, but the dichotomy between objects and thoughts, models and objects, theories and practices, *explanans* and *explanandum*, observer and *observetur* has become pervasive and intrinsic to the development of Western thought. So we ask: does the fuzziness of the two polarities of objects and models emerge in a new vest in a DH context?[18] Above we saw this with respect to objects (texts); here we also see it contextualised with respect to the language we use, whether intended as modelling language, language of representation or language as vehicle of theories and methods. That modelling practices and language are tightly connected is not new. This is also the case for modelling in DH (our italics):

> You may find you have to *name things*; you may have to *reify* them, not in the social science sense of making them … beneath attention but in the AI [Artificial Intelligence] sense of making them into things that you can *address and talk about and think about*. That's one of the reasons for modelling in general. One reason why do [sic] we care about making our assumptions and fundamental beliefs explicit? So that we can *look at them* and say, "Well, actually I don't like that one! Could we do without that one? Can I build a system that doesn't rely on that assumption?" If you don't ever *surface your assumptions*, you're never going to be able to *think about building* that system, let alone *build it*. And you might want to build it, because our assumptions turn out to *have teeth.* [Sperberg-McQueen 2012]

17 What a pragmatic understanding of modelling enables us to acknowledge though is that the opportunities enabled by modelling (e.g. emergence of patterns of relation, behaviour, and shape) are rooted not only in a "demonstrative" and "literal language" but also in a metaphorical one [Marras 2013] [McCarty 2006]. In the context of modelling, language operates at different levels; for our purposes we could identify at least two: (1) functional and (2) conceptual. In the former case, a language is used to describe a model in descriptive yet operational terms; an example is, for instance, how effectively we apply genealogical terminology (e.g. parent, ancestors, siblings, children) to navigate the hierarchical structure of an XML document or to describe any arboreal organisation of knowledge. On the other hand, in the case of metaphorical language, the terminology being chosen and the relevant metaphorical models being applied organise the modelling processes themselves. Below we provide some examples of what this means in practice.

18 DH scholarship has been reflecting on the limits of adopting uncritically one language of computer sciences. Starting from semantic data modelling and the widely adopted yet controversial term of "ontology", Pasin and Ciula, stated that DH approaches seem to privilege a pragmatic rather than a realist understanding of the term in light of the fact that "ontologies for the humanities must support *diversity* and *variety of viewpoints*; thus they cannot adhere to an underlying model which neglects multiplicity in favor of a monolithic vision of the world." The authors promoted the pragmatic

> concept of an ontology as the *agreement* reached by multiple *parties* (e.g., programmers, scientists, collaborators, librarians) with the aim of accomplishing some objectives (e.g., data exchange between applications, communication between people, integration of disparate representations). Using a metaphor, ontologies are *contracts*, they are the *currency* used to perform some valuable operations. Thus, their importance is ultimately related not to their truth or beauty, but to the ease they bring to the collaboration among people. To use a less "commercial" metaphor an ontology is a *compromise* or a point of contact between specific and possibly divergent models. The issue is therefore not only to identify commonalities between projects, for instance, but also to agree that the compromises so found won't diminish the value of the underlying idiosyncratic models, the specificity of any single project or interpretation. We believe that in the humanities this agreement is not necessarily reachable once for all or hoped for, because it may imply the negation of the interpretative efforts that make a work or a project unique and the negation of the evolutionary nature of scholarship. However, we also think that the possibility to make two incommensurable categorical systems communicate could be a challenge worth pursuing. [Pasin and Ciula 2009]

Some modelling attempts in DH have embarked on dedicated efforts to problematise terminology. For example [Crofts et al. 2011] developed refined formalisations of concepts for cultural heritage information systems; [Eide et al. 2013] tackle the complexity of spatio-temporal concepts in humanities and arts; [Brown and Simpson 2013] discuss how concepts of difference and "personhood" are flattened and smoothened out while cherry-picking extant semantic web ontological models for research in the humanities; [Renear et al. 2010] call for a rigorous analysis of what "datasets" in multidisciplinary contexts are for libraries, publishing, and data curation.

19 Other DH scholarship has also ventured in creative attempts at establishing neologisms. Short and Bradley [Bradley and Short 2005], for example, discuss the choice of name for the prosopographical model they developed and used in various DH projects – "factoid" - as possibly ironic but mirroring the "historian's worry" [Bradley and Short 2005, 8] that what they recorded as assertions in the historical sources under study are not the same as facts.[19] The name is therefore the face of a very much context-aware approach to history, but, as explained by Pasin and Bradley, it becomes also a metaphor structuring the corresponding digital resources in very practical terms:

> During the "data acquisition" phase, factoids provided historians with both a guiding metaphor (helping them conceptualize the broader approach being used) and a usable structure for the data entry work. Secondly, within the "data storage" context, factoids proved to be a practical, flexible, and sustainable schema for designing databases. Thirdly, during the "data presentation" phase, the factoid notion has been used with success to the purpose of building user interfaces that are simple yet rich in the way they combine and organize information about people and make it available to the historians using our online resources. [Pasin and Bradley 2013, 4]

20 These cases cast light on the trade-offs of projecting historical lexicons in new contexts. They are also evidence that, in DH modelling practices, language is not purely observational, but correctable and ambiguous. A model is not an addition to a theory; the non-univocal character of scholarly language has to be recognised. In this perspective, the relationship across borders of disciplines is also to be considered as a translation, which establishes a sort of metaphorical relationship. As the result of an "intercultural marriage" between digital and humanities, DH is a realm of grafting across disciplines. Its scholarship requires adaptable models that are able to grasp such specificity of language as well as models that emerge from the specificity of its theories and objects of analysis, models which emerge out of a modelling process not directly linked to its observational contexts. Without diminishing the value of formal and functional languages at the interface between human and machine communication, what is therefore of interest to us is the strong intrinsically metaphorical component of the DH modeler's use of language (discussed below as modeler's talk).

21 In the continuous effort[20] DH researchers undertake in embracing and fighting a pragmatic model of model building, a constant resistant dialectic between conceptual expansion and formalisation takes place. When examined from a diachronic and comparative perspective, it is also interesting to note that this effort finds parallel approaches in the history of use and functions of metaphors around the organisation of knowledge.[21]

3. The place of DH

22 So where the middle ground is or where models sit depends on where the modeller stands. How DH practices can use the lens of computing to make critical scholarship depends on how imaginative our act of modelling is. According to Godfrey-Smith, it is the modeler's "talk" which fictionalises models and makes them become objects independently of how they are expressed and of where they lie on the continuum between analytic (or descriptive) models adhering to physical objects, on one hand, and schematic (or idealised) models, on the other. He states: "Richly realistic novels are akin to elaborate computer simulations. Spare and schematic fictions are akin to abstract analytic models. Parables are like narrative algebra" [Godfrey-Smith 2009, 107]. Both "models and stories" are used in the techno-sciences and the humanities and both are to be contextualised in space and time:

> Fictions do not have the same role in all of science. They are a particular kind of tool, and their role changes over time and space. Since WWII, model-based science has probably become more prominent, and more recognizable as a distinct strategy rather than an ingredient in a blend. (This

> would make some sense of the earlier tendency to see fictionalizing as either everywhere or nowhere.) Thinking and talking of model systems as imaginary *concreta* may have become more noticeable, too. This is perhaps especially due to the role played by computers. Computers have turned attention away from analytical methods to some extent. They also make it possible to model more causal detail, and are powerful tools for visualization. [Godfrey-Smith 2009, 108]

23 Modelling practices in DH are very well positioned to reveal how choices in model building are made on the basis of flexible principles and strategies potentially open to creative reasoning. [Van Zundert and Haentjens-Dekker 2015], for instance, discusses how assumptions that are tacitly embedded in the code of software designed for DH research "represent rules and choices that could have been different as a result of different scholarly reasoning and argument" [Van Zundert and Haentjens-Dekker 2015]; equally tacit, the model behind the code is "designed, tweaked, and tuned in a continuous communicative and discursive feedback cycle between developers and researchers". In comparison to other contexts, in DH "models and stories" coexist and are not in opposition. Indeed, with respect to modelling theorised in computer sciences, the challenge in DH is to shift the lens of computing up the scale, to embrace the experimental nature of modelling via, for example, computational coding and to see how it can scale up to do critical scholarship with/via it. Below we attempt to outline some general principles on how this can be achieved.

3.1. Middle out method: metaphorical reasoning and pragmatic modelling

24 The pragmatic take on modelling, as outlined above, implies some equilibrium between the two polarities (observation/objects/literal language, on one hand, and theory/model/metaphorical language, on the other) and overcomes the misleading dichotomy between observation of the objects and theorisation (hence modelling) of those objects. A nomologic-deductive process in building models which distinguishes sharply between theory and observation has been surpassed in DH theory. With respect to this but mainly focusing on visual languages in DH, Drucker argues that:

> all data have to be understood as capta and the conventions created to express observer-independent models of knowledge need to be radically reworked to express humanistic interpretation. [Drucker 2011]

25 Linguistic tools and metaphors[22] enable us to move forward the theoretical reflection as framed so far. In this respect, metaphorical reasoning exemplifies a specific strategy that can guide modelling in DH to move away from the dichotomy between bottom-up (models emerging from particulars) and top-down (models imposed on particulars) approaches. We argue that pragmatic modelling brings into focus a middle-out method which acts at the crossing point between data and models adapting itself to specific "textual contexts". Three interrelated properties belonging to pragmatics (adapted from [Verschueren 2012]) can be associated with this method and explain how metaphorical reasoning functions:

- Variability - the range of choices in the use of language cannot be seen as static in any respect;
- Negotiability - such choices are not made mechanically or according to strict rules or fixed form-function relationships, but on the basis of highly flexible principles and strategies, thus also implying the indeterminacy and unexclusiveness of the choices being made;
- Adaptability - such negotiable choices can be adapted based on specific needs and contexts according to a variable range of possibilities.

26 These properties characterise pragmatics not merely in terms of its interpretative function in reading a specific communicative domain, but as a cognitive, social and cultural study of language (and communication) as anticipated at the beginning of this paper. The awareness of the value of pragmatics in modelling acts contributes to making rigorous practices open to a creative and imaginative dimension. In this context, metaphors often function as models to integrate the interpretation of theories, especially when there are not terms or concepts to be used that are directly related to the observed facts/objects, in other words when there is an indirect or remote relation between observer and *observatur*, *explanans* and *explanandum*.[23] In these cases, metaphors compensate or fulfill a "linguistic gap", the "inadequacy" of the ordinary language for scholarly purposes.

Metaphors have been largely used by scientists in building experimental and theoretical sciences, in representing and describing a domain, and in promoting understanding in scientific investigation. Scientific metaphors are pervasive in science from antiquity to our time, from Aristotle's *De Partibus Animalium*, to the early modern scientific attitude to modelling as a partnership with craftsmanship and engineering; from the notion of the world machine, of God as artisan or architect and the world as his handicraft, to Darwin's "tree of life", from the mind-computer to the protein-protein interaction as network in more recent science. Metaphors often act through different "pragmatic" mechanisms directly related to the properties listed above: from transposition - moving concepts from a context to another (variability), to corrections and interpretations due to new contexts (negotiability), to its reformulation (adaptability to new contexts). Metaphors describe novelties, help in understanding and interpreting theories but should not be reduced to be simply the language of a model [Hoffman 1985]. In this sense, the use of metaphors is a strategy to guarantee a non-rigid, descriptive approach to modelling. This allows the preservation of the "openness" of a middle-out pragmatic approach to modelling as a DH context of study requires. 27

In DH research, the use of structuring and modelling metaphors is more and more evident. The metaphorical lexicon certainly pervades the DH discourse, where terminology and metaphors are intertwined (e.g. surfing, navigating, artificial intelligence, computer machinery, etc.). Moreover, metaphors are not only linguistic entities; an interesting range of metaphors in DH is used for structuring concepts at a macro-level, for example, in the use of "ecosystem" [Marras 2015] to stand for research environment [TextGrid] or the cartography/landscape metaphor where the "aim of the research is to extend the cartographic metaphor beyond visual analogy, and to expose it as a narrative model and tool to intervene in complex, heterogeneous, dynamic realities, just like those of human geography" [Knowledge Cartography]. Metaphors are also used to organize content and visualise knowledge and data [Hestia] or to conceptualise the main features and aims of a research project, for instance in the use of "discovery" in the Steve project [Steve], where the social tagging is conceived to lead to new ways to describe and access cultural heritage collections. A metaphor is the "agreement" in the framework of scholarship online promoted by [NINES]; metaphors design the process-orientation and cross border approach of the review platform for European history (Recensio.net). Furthermore, metaphors are used to structure the knowledge embedded in some research projects, highlighting for example their innovative aspects, as in the Discovery project ("You can travel through the territory at will but can also design new maps and author guidebooks for others to read and respond to" [Discovery Project]) or making emerge the interrelated work space as formal arena as in [AGORA]. 28

In a pragmatic understanding of model building theory and object are complementary; the model takes a middle position operating within a "middle-out approach". The model preserves its representational characteristics *vis à vis* the object – for instance its intentionality and extensionality as explained in section 1.1 - but the reality such a model organises at a conceptual level is not based on a purely descriptive language nor in a projection or interpretation of properties.[24] The model has its syntax, grammar, and semantics but within a processual consideration of the use of language (a non-static perspective according to the pragmatic properties listed above). 29

Bringing to the fore the metaphorical language element allows DH modellers to also give prominence to the openness and complexity of their objects of analysis. So within a pragmatic understanding of modeling any model is primarily pragmatic because it privileges the specificity of the objects and the contexts of use (of the humanities), but also because its pivot lies in the manipulability of the models themselves, in terms of their negotiability and flexibility. 30

4. Conclusions

In conclusion, departing from open and interdisciplinary conceptualisations of objects of analysis (such as texts, Section 2.1) and of certain explorative and epistemological strategies of analysis (such as modelling, see 2.2) we have attempted to show how a pragmatic framework can be used to contextualise DH research (under 3.1). Such a framework is useful because it emphasises the fallacy of rigid polarities (object vs. model; model vs. theory) and the prominent role of language in the central activity of modelling in Digital Humanities. What we call "pragmatic modeling" is not a new approach but rather a more adequate explanatory framework for existing practices that combine formal and experimental modelling techniques with a constructive use of language. 31

Indeed, this de-dichotomisation reveals that modelling practices are constrained by the language they are embedded in. In order to overcome this, we attempt to show how metaphorical language facilitates cohesion and coherence within theory and practice. Therefore, we draw attention to the role metaphors assume in organising and structuring knowledge in DH and within its modelling activities in particular, where the dichotomy between theory and objects is very nuanced. 32

What we subscribe to is a sort of "deflationary account"[25] of the modelling practices in DH. Indeed, on one hand, we take the insider's perspective by accounting for these practices and by treating our models as independent objects to study and manipulate, but on the other hand, we enact the outsider's critical perspective of self-reflexivity by highlighting the metaphorical nature of the DH modeler's talk. 33

In this paper we attempted to problematise some of the established conceptions and practices around modelling in DH; however, each issue around model-building would need further analysis both at the theoretical and practical level. For instance, it would be useful to corroborate our work with a diachronic and historical analysis of the role of metaphors in DH and build a map of DH-specific as well as wider thematic metaphors. In order to further explore the relationship between theory and practice within DH models of modeling, it will be important to develop appropriate *ad hoc* guiding frameworks (based on case studies designed around the needs of specific contexts of modelling). Eliciting a pragmatic awareness and giving prominence to a metaphorical language seems to us a promising way forward to explore such relationships. 34

Acknowledgments

We would like to thank Øyvind Eide for his stimulating questions and feedback. 35

Notes

[1] For an overview of models in science see in particular [Frigg and Hartmann 2012]. For an in depth discussion and examples of the use of analogical modelling in science, see [Shelley 2003] [Skousen et al. 2002]. For an overview on modelling in information science see [Mahr 2009]. Note that we use the term techno-sciences, as McCarty does in his work, to be inclusive towards engineering and to recognise the profound role of computing in contemporary science.

[2] Considered within an historical perspective, empirical approaches in humanities research have an independence to claim: "Sadly modern humanists often believe that they are moving towards science when they use an empirical approach in studying texts, art, music, or the past. They are mistaken. Scholars using empirical methods are returning to their roots in the 15th-century *studia humanitatis* when the empirical approach was invented — and not since disappeared." [Bod 2014]

[3] Modelling of texts intended in this way makes it akin to what in the philosophical debate is described as fictional models (we will return to this under section 3).

[4] In McCarty's [McCarty 2004] words: "By 'modeling' I mean *the heuristic process of constructing and manipulating models*, a 'model' I take to be either *a representation of something for purposes of study, or a design for realizing something new*. These two senses follow Clifford Geertz's analytic distinction between a denotative 'model of' such as a grammar describing the features of a language, and an exemplary 'model for' such as an architectural plan (Geertz 1973: 93)."

[5] By using "pragmatic" we subscribe to a functional perspective, which favours the *use* of language over other aspects. By focusing on use, a pragmatic perspective is also integrative in that it aims at encompassing the full complexity of the cognitive, social, and cultural functioning of language [Verschueren 2012].

[6] For a recent discussion on the OHCO model as empirical observation of the publishing process naturalised as a theory of texts see [Pierazzo 2015, 61–64].

[7] In explaining why DH belongs to an English department and so in the context of English studies, Kirschenbaum explains the prominent DH interest for texts ascribing it to five factors: its processability compared to other media like images or audio; "the long association between computers and composition"; the convergence "between the intense conversations around editorial theory and method in the 1980s and the widespread means to implement electronic archives and editions very soon after"; the "much- promoted belle-lettristic project around hypertext

and other forms of electronic literature that continues to this day"; "the openness of English departments to cultural studies, where computers and other objects of digital material culture become the centerpiece of analysis"; the growing interest in e-reading devices and distant reading methodologies. [Kirschenbaum 2010, 6]

[8] Our use of dynamicity combines the notion of variants of material texts with an overarching principle of fluid textuality and the sociology of texts theory. With respect to the former, for instance, Burdick et al. state: "Fluid textuality refers to the mutability of texts in variants and versions whether these are produced through authorial changes, editing, transcription, translation, or print production. In a fundamental sense, then, texts have always been fluid and modular. But the advent of word processing drew intensified attention to this aspect of textuality" [Burdick et al. 2012, 34]. The most recent and comprehensive reflections on the dynamic aspects of textuality connected to interpretations and modelling activities in DH can be found in [McGann 2014]; he defines texts as "dynamic autopoietic things" [McGann 2014, 99]: "How, then, are traditional texts marked? If we could give an exhaustive answer to that question we would be able to simulate them in digital forms. We cannot complete an answer for two related reasons: first, the answer would have to be framed from within the discourse field of textuality itself; and second, that framework is dynamic, a continually emerging function of its own operations, including its explicitly self-reflexive operations" [McGann 2014, 91]. And further: "Organizing our received humanities materials as if they were simply information depositories, computer markup as currently imagined handicaps or even baffles altogether our moves to engage with the well-known dynamic functions of textual works" [McGann 2014, 107–108].

[9] These two axes illustrate the interplay of "model of" vs. "model for" as described, for example, in [Mahr 2009, 372] and [Ciula and Eide 2014, 36].

[10] On the historiographical aspect to modelling see also [Flanders and Jannidis, 16].

[11] It is evident that this statement does not apply only to modelling in the humanities. However, while the expression of the molecular model or of the evolutionary theory have their own "historicity", the meta-modelling role in the sciences is much less prominent and necessarily embedded in modelling activities: "If that past model has changed, or is inconsistent, or incoherent, or unintelligible, we may be able to correct it, or we may need to incorporate it and model its difficulties and historicity as well, depending on what we are trying to accomplish." [Knox 2012]

[12] Flanders and Jannidis state for example that "In computer science, among both theorists working in the academy and those working in industry doing practical data modeling, most regard data modeling as a description of a real and objective world (which includes the possibility of assessing the correctness of data models) while only a minority views it as a design process. However, in digital humanities there seems to be a general understanding that a data model, like all models, is an interpretation of an object, either in real life or in the digital realm. Michael Sperberg-McQueen in his closing keynote to the workshop stated this position clearly: 'modeling is a way to make explicit our assumptions about the nature of a text/artefact.' Furthermore, most digital humanities researchers assume that data modeling is primarily a constructive and creative process and that the functions of the digital surrogate determine what aspects have to be modeled." [Flanders and Jannidis, 14]

[13] For example, (ANSYS) offers a comprehensive software suite that spans the entire range of physics, providing access to virtually any field of engineering simulation that a design process requires. CAD (Computer Aided Design) suites are another example of systems to draw objects independently from their assumed representation scale, implying a high level of abstraction from the object. Such modelling systems are of course also applied in the humanities but this paper aims to focus on a wider interpretation of modelling embedding processes and language.

[14] For example, Morrison argues that direct materiality can be seen as a myth in empirical sciences too when she states "Without models there is not measurement" [Morrison 2009, 50] to say that models are *sine qua non*. Transposed to a computational simulation context, she sees materiality not in the machine (the computer) itself but in the simulation model.

[15] No doubt the underpinning concepts of uncertainty, instability, the role of the observer and of conscience, the many worlds etc. in quantum physics bring to the fore all sorts of interesting bridges between the humanities and the techno-sciences which are beyond the scope of this paper.

[16] See for instance the vision proposed by Svensson (2012): "The digital humanities need to be materially and technologically grounded in order to facilitate the often intertwined practical, expressive and critical work associated with the field" [Svensson 2012]. Beyond empirical and evidence-based humanities, this view is also connected to design practices, as argued, for example, by Burdick et al.: "The methodologies of Digital Humanities are robust precisely because they place lasting pedagogical value in the creative, generative and experimental process of design-based research" [Burdick et al. 2012, 22].

[17] Interesting the position of Floridi [Floridi 2011] and his intellectual project in which philosophy is seen to mediate and contribute to harmonise *physis* and *techne*. For an overview on objects as subject of scientific enquiries see [Daston 2000].

[18] This polarity is theorised in philosophy of science as well as in more generalist approaches like the one in [Kralemann and Lattmann 2013] outlined above and more or less implicitly inherited by DH research.

[19] Pasin and Bradley [Pasin and Bradley 2013] reflected further on this model and its developments spread over thousand of years in its conceptual or "fictional" incarnation and over a decade in its digital form:

> Multidimensionality, complexity, and non-linearity are just a few among the many characteristic features of narratives that could not be easily reduced to the unambiguous abstract language of databases. As a result, downplaying or eliminating narratives about people in virtue of a systematic use of formal structures often causes historians to worry [...]. It is precisely in this context that the 'factoid'- based prosopography was first developed. [...] the factoid model has been used in a number of prosopographical projects that, taken as a whole, span across almost two thousand years of history. This would not have been possible unless this conceptual framework was general enough to allow this degree of reusability; however, it is also true that each single project required a number of extensions to the model. [...] our factoid approach can show that formal structuring if designed correctly need not impose, as Veltman implies, a single perspective on the data it models, but is capable of accommodating a range of views from the different sources. [Pasin and Bradley 2013, 4–11]

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[20] This effort is what McCarty calls "struggle" [McCarty 2014, 288] after Flanders [Flanders 2009].

[21] See, for example, how metaphors structure and conceptualise some key concepts in philosophy, in particular in the work of the German philosopher G. W. Leibniz [Marras 2010].

[22] On the linguistic and creative power of metaphors, see [Getachew 2006] and [Mazzocchi 2013]. Note that [Kralemann and Lattmann 2013, 3408–3409] offer a conceptualisation of metaphors as meta-models.

[23] This relation assumes different characteristics in the empiristic and neo-empiristic tradition. For a detailed and critical discussion on this point and for an overview of the realist and formalistic approach toward metaphors in science as well as the role of analogy see [Montuschi 1993, in part.: 448–9]. For an interesting review of the features and functions of scientific metaphors and related literature see [Sangoi 2014]. For an example on the use of metaphors in understanding the complexity of biomolecular objects see [Wolynes 2001].

[24] As argued in [Batterman 2009] for mathematical modelling.

[25] Godfrey-Smith argues for a "deflationary view" [Godfrey-Smith 2009, 115] where we give account of the real achievement of a field without using the ontology embodied in the practice (e.g. that models are representing the real world). Such deflationary views appear in the way we talk (hence the connection to language) about e.g. fictional models: "Scientists in the field get used to discussing how such systems behave, get used to talking of what is true or false of them -- get used to treating a fictional model system as an object in itself. An outsider might come along and re-interpret this talk as a collection of claims about deductive relations, conditionals, and so on, giving a deflationary account of model systems as objects. But inside the field, it does not seem like this; there it feels like the fictional model system has a life of its own."

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