The Trading Zones Model

Dimensions of Trading Zones

The concept of trading zones was introduced by the historian of science Peter Galison to describe how two communities with vastly different practices and discourses can interact and negotiate a joint enterprise. As I briefly introduced in the previous chapter, the concept describes how two communities that do not coordinate practices on a global scale may be able to do so on a local scale. He considered the practices of scholarly communities as "language", building upon the work of the philosopher of science Thomas Kuhn.[170] Different scholarly communities can consequently be conceptualised as employing incommensurable languages.[171]

By considering the practices of a scholarly community as a language, the differences between scholarly communities can be described as when people from two cultures with different languages meet. Imagine the difficulty between someone who solely speaks German when they have to coordinate with someone who solely speaks French. From this problem follows the core concept of trading zones, namely the formation of inter-language as a language between languages. Galison distinguishes between two phases of inter-language. At first, a pidgin may develop so that two communities can exchange goods, specialised just to enable that coordination. Participants do not use the pidgin outside of an exchange, but return to their native languages when the interaction is over. Over time, a pidgin may develop into a creole, where an inter-language becomes complex enough to allow a wide variety of practices beyond the exchange and is able to serve as a native language by itself. In the case of scholarly communities, scholars can then sustain activity within this new creole language. The community becomes one on its own, without it being an extension of another discipline.[172]

The extent of exchanges is described by Galison as follows: "it is possible to share a local understanding of an entity without sharing the full apparatus of meanings, symbols, and values in which each of us might embed it."[173] This means that historians can share local understandings of concepts from computer science that are relevant to a task, without needing to understand the

170 Kuhn, *The Structure of Scientific Revolutions*.

171 Peter Galison, "Trading with the Enemy," in *Trading Zones and Interactional Expertise: Creating New Kinds of Collaboration*, ed. Michael E. Gorman (MIT Press, 2010), 25–52.

172 Peter Galison, *Image and Logic: A Material Culture of Microphysics* (The University of Chicago Press, 1997).

173 Galison, "Trading with the Enemy," 44.

https://doi.org/10.1515/9783110682106-002

entirety of computer science or become computer scientists themselves. This can also be said in the opposite direction for computer scientists with respect to history. The concept of "trading" is thus not meant to denote an economic exchange or a *quid pro quo*, but refers to the shallow sharing and exchanging of concepts and practices in different local settings.[174] Instead, the concept of trading zones demands a deeper probe into digital history, to investigate not just what is coordinated, but how the coordination of practices takes place.

Galison's original use of the concept was in his study of the interactions between experimental and theoretical physicists, who arguably came from the same discipline despite their different practices. Digital history might instead be characterised as a meeting from particularly distant positions, as a bridging of the Two Cultures divide between the humanities and hard sciences.[175] Yet besides the meeting of two different communities, what Galison's study and mine furthermore share is the transforming role of computers. The meeting between experimental and theoretical physicists was significantly altered by the introduction of computers, which increasingly replaced physicists to perform tasks. At first, computers took over the demanding task of data reduction, the cleaning and selecting of data from a large dataset. Later, computers were used to automate analysis, interpreting data to create visualisations and charts. Finally, computers replaced physical experiments with simulation, reproducing experiments in mathematical models.[176] Throughout this process, physicists continuously negotiated the roles of computers and physicists; what it means to be a scholar, to do an experiment and how science relates to reality.[177]

In short, digital humanities and digital history are not unique in their renegotiation of practices following the introduction of computational methods. It is

174 Galison, "Trading with the Enemy."

175 Julie Thompson Klein, "A Taxonomy of Interdisciplinarity," in *The Oxford Handbook of Interdisciplinarity*, ed. Robert Frodeman et al. (Oxford University Press, 2010), 15–30; C.P. Snow, *The Two Cultures and the Scientific Revolution* (Cambridge University Press, 1959).

176 While simulation does not play a significant role yet in digital history, some authors have explored agent-based modelling for simulating historical events; see Marten Düring, "The Potential of Agent-Based Modelling for Historical Research," in *Complexity and the Human Experience: Modeling Complexity in the Humanities and Sociol Sciences*, ed. Paul A. Youngman and Mirsad Hadzikadic (Pan Stanford Publishing, 2014), 121–37; Michael Gavin, "Agent-Based Modeling and Historical Simulation," *DHQ: Digital Humanities Quarterly* 8, no. 4 (2014); digital history may benefit from synergies with digital archaeological research, where experiments with simulation have a longer history, see Timothy A. Kohler and George G. Gumerman, *Dynamics in Human and Primate Societies: Agent-Based Modeling of Social and Spatial Processes* (Oxford University Press, 2000).

177 Galison, *Image and Logic*.

a common assumption that other disciplines, especially from STEM, do not need digital labels. Yet the period that Galison describes as the "pidginization" of computers in physics might as well have been called "digital physics" as a transitional term, similar to "digital history".[178] The trading zones concept is therefore highly relevant to digital history, as a description of exchanging practices between two communities that are both affected by the introduction of computers.

Yet a limitation of the concept is that Galison's original study only considered one trading zone between communities, and as such he did not elaborate a comparative analysis between different trading zones. Therefore, the sociologists Harry Collins, Robert Evans and Michael Gorman extended the concept by describing trading zones according to two dimensions.[179] First, homogeneous-heterogeneous (the extent to which two communities become alike or stay apart). Second, coercive-collaborative (the extent to which one community forces the other community to trade).

Changing Practices: Homogeneous-Heterogeneous

The first dimension, changing practices, touches directly upon the most common questions in digital history; will historians become like programmers? Will historians lose touch with some of the core values of the discipline? As a historian of science, Galison wrote about the temporal process of trading, with periods of negotiation, resistance and acceptance. A collaboration continuously moves across the changing practices dimension between homogeneous and heterogeneous, where it is likely that a collaboration will be more heterogeneous at the beginning but might end up more homogeneous.

Heterogeneity, especially at the start of a collaboration, might become apparent in a number of different ways. The first problem might be that of language in the literal sense. Terminology between scholarly communities is a common issue. Especially in the beginning of a collaboration a participant might be unaware of what the other means with certain words.[180] For example, in one collaboration in

178 Zaagsma, "On Digital History."

179 Harry Collins, Robert Evans and Michael Gorman, "Trading Zones and Interactional Expertise," *Studies in History and Philosophy of Science* 38, no. 4 (2007): 657–66, https://doi.org/10.1016/j.shpsa.2007.09.003.

180 Lynne Siemens, "'It's a Team If You Use "Reply All"': An Exploration of Research Teams in Digital Humanities Environments," *Literary and Linguistic Computing* 24, no. 2 (2009): 225–33, https://doi.org/10.1093/llc/fqp009.

which I participated, there was a debate about whether a digital archive could automatically create metadata for items. The historians contended that this was not possible, as they understood "metadata" to mean descriptions of an object as an archivist would do. The computer scientists did not understand the problem, since they understood "metadata" to mean descriptions such as file format, encoding, or date of upload. Once this confusion was understood, the collaboration decided to use the term "annotation" for the metadata as desired by the historians, to denote the manual effort in creating such descriptions.

Another important difference between scholars may be publication strategies.[181] In digital history, for example, the contrast between historians commonly publishing books and computer scientists commonly publishing conference papers introduces different desires about the speed of publication, co-authorship and how to determine prestige.

Finally, the aim of a research project can be fundamentally different. As the political scientists Gary King and Daniel Hopkins put it: "computer scientists may be interested in finding the needle in the haystack (such as a potential terrorist threat or the right web page to display from a search), but social scientists are more commonly interested in characterizing the haystack."[182] Following this metaphor, historians could be said to be interested in characterising how the needle is part of the haystack, individually unique but part of a greater whole.[183] Interdisciplinary collaborations therefore require coordination to align participants with respect to the project's goals, terminology, and desired results. I elaborate this aspect of coordination in Chapter 4.

Such differences between scholars or scholarly communities may emerge through different disciplinary backgrounds, as scholars are part of the historical discipline or the computer science discipline. The sociologist Karin Knorr Cetina describes disciplines as epistemic cultures: "those amalgams of arrangements and mechanisms – bonded through affinity, necessity, and historical coincidence – which, in a given field, make up *how we know what we know*."[184] She describes epistemic cultures as self-referential systems. That means that, for example, historians are trained by other historians at history departments, read

181 De Jonge Akademie, "Grensverleggend: Kansen En Belemmeringen Voor Interdisciplinair Onderzoek" (KNAW, 2015); Eric T. Meyer and Ralph Schroeder, *Knowledge Machines: Digital Transformations of the Sciences and Humanities* (MIT Press, 2015).

182 Gary King and Daniel J. Hopkins, "A Method of Automated Nonparametric Content Analysis for Social Science," *American Journal of Political Science* 54, no. 1 (2010): 230, https://doi.org/10.1111/j.1540-5907.2009.00428.x.

183 Tim Hitchcock, "Big Data, Small Data and Meaning," Historyonics, 2014.

184 Knorr Cetina, *Epistemic Cultures*, 1, emphasis in original.

work from other historians, are supervised by a historian during their PhD and when staying in the academy usually try to end up at a history department at some university. The concept not only intends to describe the practices of scholars, but how those practices are guided by systems of culture. That is, the notion of culture goes beyond the mere behavioural repertoire, to describe the "control mechanisms" that govern behaviour, which may help understand why scholars act differently between disciplinary communities.[185]

In this line, the scholar of higher education Tony Becher spoke of disciplinary cultures and investigated specifically the shared repertoire of language and taboos present in disciplinary communities.[186] For example, within the history discipline, words of praise include "scholarly" and "original", while words of condemnation are "trivialising" and "thin". A taboo would be to misuse evidence to prove one's point, rather than to try and gain alternative perspectives. Despite the wide array of subfields of history related to different periods or geographical areas, historians still maintain there is a unified field of history. Yet Becher also noted deeper disagreements in the field. Historians looked down on historical biographies or narrative history. At the margins of the discipline he found a distrust of quantification, modelling and economic history. Arguably, these results have changed over time. Becher published this work in 1981, shortly after the hype of quantitative history, around the shift toward cultural history and narrative.

I might, therefore, investigate history and computer science by these aspects of disciplines and gain an understanding of their differences or common interests. A question might then be how the disciplines relate to one another within digital history, and what form of cross-disciplinarity is performed:[187]

- multidisciplinarity (historians and computer scientists work in parallel or serially on a shared problem, applying their own disciplinary perspective and analysis),
- interdisciplinarity (historians and computer scientists work together on a shared problem and coordinate their practices to join their disciplinary perspectives),

185 Clifford Geertz, *The Interpretation of Cultures: Selected Essays* (Basic Books, Inc., 1973), 44.
186 Tony Becher, "Towards a Definition of Disciplinary Cultures," *Studies in Higher Education* 6, no. 2 (1981): 109–22, https://doi.org/10.1080/03075078112331379362.
187 Bernard C.K. Choi and Anita W.P. Pak, "Multidisciplinarity, Interdisciplinarity and Transdisciplinarity in Health Research, Services, Education and Policy: 1. Definitions, Objectives, and Evidence of Effectiveness," *Clinical and Investigative Medicine* 29, no. 6 (2006): 351–64; Patricia L. Rosenfield, "The Potential of Transdisciplinary Research for Sustaining and Extending Linkages between the Health and Social Sciences," *Social Science & Medicine*, Special Issue Building Research Capacity for Health Social Sciences in Developing Countries 35, no. 11 (1992): 1343–57, https://doi.org/10.1016/0277-9536(92)90038-R.

– transdisciplinarity (historians and computer scientists create a shared understanding and approach towards a problem, each no longer within their own disciplinary boundaries).

Multidisciplinary interactions are the least significant form, in the sense that historians and computer scientists still mainly perform traditional practices and require little mutual coordination. In contrast, transdisciplinary interactions require significant coordination to establish joint practices and perspectives. While combining multiple disciplinary perspectives, the outcome may be described as a single unity of knowledge.[188] This model of synthesis has been popularised especially due to the argument that it is necessary in order to address real-world problems, rather than theoretical ones.[189] Comparing this typology to that of trading zones, it could be argued that transdisciplinary research constitutes a homogeneous and power symmetric trading zone, or creole. Interdisciplinary research might constitute a heterogenous trading zone. Multidisciplinary research finally might constitute a heterogeneous trading zone without any real sharing of expertise.[190]

The scholar of interdisciplinary studies Julie Thompson Klein characterises the digital humanities as methodological interdisciplinarity.[191] Methodological interdisciplinarity encompasses the borrowing of tools, concepts and methods from other disciplines to improve one's own research questions or results. In this sense, digital humanities can be described as importing tools, concepts and methods from computational sciences to improve humanities scholarship. The dimension of changing practices then considers the extent to which practices of scholars in digital history remain heterogeneous, historians with historical practices and computational experts with computational practices, or homogeneous, historians and computational experts no longer distinguishable by their practices.

188 Thierry Ramadier, "Transdisciplinarity and Its Challenges: The Case of Urban Studies," *Futures* 36, no. 4 (2004): 423–39, https://doi.org/10.1016/j.futures.2003.10.009.

189 Michael Gibbons, "Introduction," in *The New Production of Knowledge: The Dynamics of Science and Research in Contemporary Societies*, ed. Zaheer Baber et al., vol. 24 (SAGE Publications, 1994), 1–19, https://doi.org/10.2307/2076669.

190 Harry Collins, Robert Evans and Michael Gorman, "Trading Zones Revisited," in *The Third Wave in Science and Technology Studies*, ed. David S. Caudill et al. (Cham: Springer International Publishing, 2019), 275–81, https://doi.org/10.1007/978-3-030-14335-0_15.

191 Klein, *Interdisciplining Digital Humanities*.

Power Relations: Symmetric-Asymmetric

The second dimension of trading zones, power relations, describes the extent to which one party or community has control over the other party or community. Within digital history collaborations historians and computational experts both need to negotiate the goals of the collaboration and the individual tasks of participants. This process is called coordination, which may be defined as "the integration or linking together of different pieces of a project to accomplish a collective task."[192] Coordination is a continuous process, enduring as long as the collaboration does. Throughout a collaboration, participants are in constant negotiation of the project goal or goals, while mutually accountable towards one another to fulfil their individual tasks.

Yet a collaboration does not exist in a vacuum; negotiations are positioned in a broader system that influences the collaboration, such as the institutes where collaborators are employed, their disciplinary backgrounds, funding structures, etc. Furthermore, negotiations are not necessarily level, although this would be the preferred situation, but can be conducted through different power relations. In the history of the trading zones of physics, Peter Galison discussed three metaphors employed by physicists who feared a loss of control.[193] First, the metaphor of prostitution, to critique physicists selling out to engineering, focusing on applied rather than basic research. Second, the metaphor of handmaidens, to describe the relationship between a boss and a servant, with physicists demanding engineers perform certain tasks. Third, the metaphor of flies and spiders, to describe the danger of physicists following engineers for too long, after which they end up trapped and unable to return.

Control, and specifically who is in control, is an aspect of great significance to the participants of trading zones, leading to desirable or less desirable results. In the model from Collins et al., a significant aspect of coercive trading zones is that they lack a mutual exchange of practices and concepts. They consequently describe two types of coercive trading zones, along the dimension of changing practices. In the first type, coercive-heterogeneous, two communities ultimately do not trade practices at all. The dominant community protects its expertise against the subordinate community and is not interested in learning from the weaker community either. For example, computational experts might dictate how a tool will work and what the goal of a project should be, without teaching historians anything

192 Jonathon N. Cummings and Sara Kiesler, "Collaborative Research Across Disciplinary and Organizational Boundaries," *Social Studies of Science* 35, no. 5 (2005): 704, https://doi.org/10.1177/0306312705055535.

193 Galison, *Image and Logic*.

about the internal workings, nor trying to understand how historians would want to use the tool. Or vice versa, historians might demand certain features to be developed by computational experts, without communicating the tacit knowledge of historical practice or trying to understand what software development entails. In the second type, coercive-homogeneous, the dominant community replaces the practices of the subordinate community. For example, computational practices might end up replacing historical practices, emphasising programming at the expense of reading, or data processing at the expense of hermeneutics.

A problem with the term "coercion" may be, however, that it too strongly implies that one party is unable to make their own choices. It is no surprise that digital history collaborations are emphasised to be collaborative rather than coercive, since historians are part of collaborations out of their own choice.[194] Yet concluding trading zones are fully collaborative merely because practices are insufficient to count as coercive would be a simplification. Instead, I propose that trading zones should be analysed as embedding power asymmetries as consisting of mutual, but not necessarily equivalent, power relations.

The philosopher Michel Foucault defined a power relation as "a mode of action which does not act directly and immediately on others. Instead, it acts upon their actions: an action upon an action, on existing actions or on those which may arise in the present or the future."[195] A power relation is thereby understood not an act directly on another person, but on their actions. Furthermore, Foucault argued that "[t]o govern, in this sense, is to structure the possible field of action of others."[196] Thus, a power relation consists of one party shaping the possibilities of behaviour of the other party. Yet this latter party might resist, in forms of opposing a power relation or disconnecting the relationship. An individual's autonomy then exists in their resistance to imposed power relations. It is in this resistance that power relations become visible for analysis.

The political scientist Clarissa Hayward takes autonomy a step further.[197] Not only can a person resist a shaping of their field of action, they can act upon the boundaries and shape their field of action themselves. Building on the work of Foucault, she makes a number of characteristics of power relations between two (or more) parties explicit that aid my discussion. Both parties are affected by power mechanisms, so that there is no possibility to discern between "authentic"

194 E.g., Svensson, "The Digital Humanities as a Humanities Project."

195 Michel Foucault, "The Subject and Power," *Critical Inquiry* 8, no. 4 (1982): 789, https://doi.org/10.1086/448181.

196 Foucault, 790.

197 Clarissa Rile Hayward, *De-Facing Power*, Contemporary Political Theory (Cambridge: Cambridge University Press, 2000).

action and actions resulting from power relations. Both parties have some form of power, and encounter constraints in their practices. Furthermore, power relations need not always be intended, but might follow from unintended consequences of actions or decisions. Finally, power not only constrains, but simultaneously enables practices.

To illustrate, a digital history collaboration defines a certain project goal and establishes a group of participants. The project goal prescribes the field of action of what each participant should do in the collaboration. The computational expert might be envisioned to develop a computer algorithm for the historical texts of interest to the historian, rather than some other dataset. Simultaneously, the historian might be envisioned to do historical research with the computational expert's algorithm to analyse these historical texts, rather than through traditional methods of close reading. Such requirements are the trading zone's boundaries of action that both confine and enable the practices in the collaboration. Throughout the project, participants coordinate with one another about specific implementations of the project's goal. This is where one can investigate the power relations. The computational expert might actively shape the field of action of the historian, enabling practices of distant reading, while preventing possible research questions or conclusions. Vice versa, the historian might instead not only choose their own research questions, but perhaps even resist the project's goal of adopting the algorithm for their research, pushing the boundaries of their field of action to include practices of historical research without the algorithm.

I am, therefore, interested in investigating two different dynamics of power relations. First, the extent to which participants in a trading zone constrain or enable the actions of other participants. Second, the extent to which participants in a trading zone are able to define their own boundaries of action. Power asymmetries in trading zones are thereby defined as the extent to which some participants are less able to shape their own field of action, and where one party is able to shape the field of action of the other party to a greater extent than vice versa.

Engagement: Connected-Disconnected

Finally, a limitation of the work on trading zones by Galison and Collins et al. is that they did not investigate the extent to which two communities interact with one another. Engagement is assumed, since without exchanges or trades there is no trading zone to speak of. Yet, this does not cover differences between deep or shallow engagement, such as the extent to which trading occurs on a daily basis in an office or on a much sparser basis via email. That the physical organisation

influences cross-community engagement was shown by the information scientists Susan Leigh Star and Karen Ruhleder, who found that the adoption of a digital information system was affected by the physical access of users to the required computers.[198]

To better understand engagement within and between communities, one aspect to consider is the configuration of people participating in digital history. Because digital history is commonly described as an interdisciplinary activity, one approach would be to consider the interactions between different disciplines such as history and computer science. Disciplines have been classified according to two general aspects: first, the cognitive aspect, the general topical area of expertise and established research methods and resources. For example, history can be described as a discipline topically concerned with events in the past, with hermeneutics and source criticism as established research methods, and archives and libraries as resources. The second aspect is the social, predominantly defined by institutional incorporation such as history departments at universities.[199] Other aspects with which individual disciplines can be described are discourses and methods of communication in journals, the founding myth of a discipline and the construction of the boundaries of a discipline.[200] This final aspect is better known as boundary work, i.e. defining what falls within scope by contrasting it with what falls outside scope of a discipline.[201]

Yet viewing digital history on the level of global disciplines poses several limitations. Describing historians and computer scientists by their discipline does not cover the different practices within a single department, even if I were to take a more granular level of computer science into knowledge modelling, information retrieval, or artificial intelligence.[202] Another limitation is that in collaborations where collaborators come from industry, computer engineers building tools, this

198 Susan Leigh Star and Karen Ruhleder, "Steps Toward an Ecology of Infrastructure: Design and Access for Large Information Spaces," *Information Systems Research* 7, no. 1 (1996): 111–34, https://doi.org/10.1287/isre.7.1.111.

199 Tony Becher and Sharon Parry, "The Endurance of the Disciplines," in *Governing Knowledge*, ed. Ivar Bleiklie and Mary Henkel, vol. 9 (Springer, 2005), 133–44, https://doi.org/10.1007/1-4020-3504-7_9.

200 Cassidy R. Sugimoto and Scott Weingart, "The Kaleidoscope of Disciplinarity," *Journal of Documentation* 71, no. 4 (2015): 775–94, https://doi.org/10.1108/JD-06-2014-0082.

201 Gieryn, "Boundary-Work and the Demarcation of Science from Non-Science: Strains and Interests in Professional Ideologies of Scientists."

202 Juha Tuunainen, "When Disciplinary Worlds Collide: The Organizational Ecology of Disciplines in a University Department," *Symbolic Interaction* 28, no. 2 (2005): 205–28, https://doi.org/10.1525/si.2005.28.2.205.

is not covered by the concept of disciplines.[203] Especially in considering the digital of digital humanities as a single heterogeneous community consisting of computer scientists, software engineers, computational linguists and others, this cannot accurately be described as a discipline.[204]

Rather than disciplines, I describe collaborators according to their membership of communities of practice. This framework describes communities according to three dimensions:[205]

1. mutual engagement (involving regular interaction),
2. joint negotiated enterprise (mutual goal and accountability),
3. shared repertoire of negotiable resources (such as jargon and practices).

Note that the shared repertoire is congruent with the earlier dimensions of changing practices. Furthermore, the joint negotiated enterprise is dependent on the power relations dimension, insofar as the negotiation of this enterprise is shaped by power relations.

Communities of practice (COP) can take shape in a wide variety of situations, such as projects, needs for standards and virtual networks.[206] Disciplines too arguably constitute communities of practice. For example, the historical discipline covers mutual engagement through conferences and journals, a joint enterprise in studying the past and a shared repertoire in hermeneutics, source criticism, archival research and discourses. Yet a COP is not necessarily homogeneous, containing both core and peripheral members, or encompassing multiple configurations of nested communities.[207] Continuing my example, while the entire history discipline might be described as a community of practice, this contains nested COPs for subfields interested in different periods such as ancient, pre-modern, modern, contemporary history, or in different geographical areas such as French, German, or European history.

Rather than their institutional embedding, communities of practice are defined by, as the name suggests, their practices: "doing in a historical and social

203 Becher and Parry, "The Endurance of the Disciplines."

204 I therefore employ the generic term "computational experts" to refer to computer scientists, computational linguists, software engineers, or other computational collaborators of digital history trading zones.

205 Etienne Wenger, *Communities of Practice: Learning, Meaning, and Identity* (Cambridge University Press, 1998), 73.

206 Harriett E. Green, "Facilitating Communities of Practice in Digital Humanities: Librarian Collaborations for Research and Training in Text Encoding," *The Library Quarterly* 84, no. 2 (2014): 219–34, https://doi.org/10.1086/675332; Klein, *Interdisciplining Digital Humanities*.

207 Wenger, *Communities of Practice*; Etienne Wenger, "Communities of Practice and Social Learning Systems," *Organization* 7, no. 2 (2000): 225–46, https://doi.org/10.1177/135050840072002.

context that gives structure and meaning to what we do."[208] It is, therefore, congruent with the description of scholarship as the weaving of social, intellectual and technical practices.[209] These practices include both explicit and tacit knowledge. Sharing tacit knowledge among members tends to involve face-to-face interactions to achieve enculturation; gradually acting in accordance to the norms of a COP.[210] The framework thereby puts local rather than global communities at the forefront, enabling alignment with the locality of trading zones. Insofar as knowledge can be disseminated explicitly, this knowledge can become part of a delocalised, global community of practice, such as a discipline, the difference being that knowledge that one should do something might be encoded globally, while how one should do something is exposed locally.[211]

The third dimension of engagement describes the extent to which collaborators engage with one another. An important aspect of this is what Wenger calls the "geography of practice". This concept describes the distance between collaborators within a trading zone. Although physical distance by itself is a fairly straightforward metric, the distance in meters between collaborators, it has a diverse set of consequences.[212] Distance has an impact on communication; when collaborators are closer together, communication has lower cost (e.g. of travelling), higher quality, and higher frequency.[213] When collaborators are closer, it is easier to communicate face-to-face, which in turn has been found to improve coordination.[214] Distance affects the awareness about other collaborators, following the "out of sight is out of mind" adage. The effect of this distance may be experienced very soon already: "if two people reside more

208 Wenger, *Communities of Practice*, 47.

209 Latour and Woolgar, *Laboratory Life*; Andrew Pickering, "From Science as Knowledge to Science as Practice," in *Science as Practice and Culture*, ed. Andrew Pickering (The University of Chicago Press, 1992), 1–26.

210 John Seely Brown, Allan Collins and Paul Duguid, "Situated Cognition and the Culture of Learning," *Educational Researcher* 18, no. 1 (1989): 32–42, https://doi.org/10.3102/0013189X018001032; Paul Duguid, "'The Art of Knowing': Social and Tacit Dimensions of Knowledge and the Limits of the Community of Practice," *The Information Society* 21, no. 2 (2005): 109–18, https://doi.org/10.1080/01972240590925311.

211 Duguid, "'The Art of Knowing.'"

212 Sara Kiesler and Jonathon N. Cummings, "What Do We Know about Proximity and Distance in Work Groups? A Legacy of Research," in *Distributed Work*, ed. Pamela Hinds and Sara Kiesler (MIT Press, 2002), 57–82.

213 Robert Kraut and Carmen Egido, "Patterns of Contact and Communication in Scientific Research Collaboration," in *Proceedings of the 1988 ACM Conference on Computer-Supported Cooperative Work* (ACM, 1988), 1–12, https://doi.org/10.1145/62266.62267.

214 Kiesler and Cummings, "What Do We Know about Proximity and Distance in Work Groups?"

than 30 meters apart, they may as well be across the continent."[215] Finally, distance affects the social grouping of collaborators. Groups located close together develop a group culture distinct from groups located elsewhere, leading to collaborators speaking in terms of "us" and "them". Though not quite as dramatic as to occur after 30 meters, this was found to happen in collaborations involving multiple institutes, so that a national inter-institutional collaboration is similar to an international collaboration.[216] Considering this final aspect, a collaboration between historians from one institute and computational researchers from another institute would be expected to lead to group identities in their disciplinary background and their institute, limiting the ability to develop shared practices and become more homogeneous. While heterogeneity by itself does require coordination to align the collaborators, these disciplinary differences have not been found to increase problems of coordination, as physical distance does.[217]

This is not to say that physical distance is merely a negative aspect, nor does physical proximity guarantee a better collaboration. Too many collaborators in too close proximity might even lead to negative experiences. For collaborations within a university, the number of collaborators was found to correlate with negative collaborative experiences. Yet this correlation was not found for collaborations between different universities.[218] When placed together in a single space, close proximity might even lead to less engagement in order not to disturb others in the same space, as has been found for "open office" spaces.[219] Allowing a larger physical distance introduces advantages, such as the ability to find the most fitting collaborators, rather than being limited to who is available nearby.[220] Physical distance in

215 Judith S. Olson et al., "The (Currently) Unique Advantages of Collocated Work," in *Distributed Work*, ed. Pamela Hinds and Sara Kiesler (MIT Press, 2002), 114.

216 David J. Armstrong and Paul Cole, "Managing Distances and Differences in Geographically Distributed Work Groups," in *Distributed Work*, ed. Pamela Hinds and Sara Kiesler (MIT Press, 2002), 167–86.

217 Cummings and Kiesler, "Collaborative Research Across Disciplinary and Organizational Boundaries"; John P. Walsh and Nancy G. Maloney, "Collaboration Structure, Communication Media, and Problems in Scientific Work Teams," *Journal of Computer-Mediated Communication* 12, no. 2 (2007): 378–98, https://doi.org/10.1111/j.1083-6101.2007.00346.x.

218 Chin-Chang Tsai, Elizabeth A. Corley and Barry Bozeman, "Collaboration Experiences across Scientific Disciplines and Cohorts," *Scientometrics* 108, no. 2 (2016): 505–29, https://doi.org/10.1007/s11192-016-1997-z.

219 Ethan S. Bernstein and Stephen Turban, "The Impact of the 'Open' Workspace on Human Collaboration," *Philosophical Transactions of the Royal Society B: Biological Sciences* 373, no. 20170239 (2018), https://doi.org/10.1098/rstb.2017.0239.

220 Lynne Siemens and Elisabeth Burr, "A Trip around the World: Accommodating Geographical, Linguistic and Cultural Diversity in Academic Research Teams," *Literary and Linguistic Computing* 28, no. 2 (2013): 331–43, https://doi.org/10.1093/llc/fqs018.

a collaboration can moreover be a strategy to disseminate knowledge beyond one's own local network.[221] Despite the arguments opposing physical distance, collaborations are increasingly conducted on a large distance using digital communication technologies. Studies on such "virtual teams" show these are successful, in contrast with predictions from earlier literature. However, the formation of mutual trust was found to be impaired in virtual teams.[222] Face-to-face communication was, furthermore, found to be stronger related to team performance than virtual communication.[223] Yet "hybrid teams" may prove to be advantageous, where complex problems are coordinated face-to-face, while clearer tasks may be coordinated via communication technology such as email. Establishing trust and coordinating ill-defined problems, which are common in digital history, thus benefits from face-to-face meetings throughout a collaboration, while other tasks may be coordinated otherwise.[224]

From the above literature, geography of practice is less about the exact distance in meters between collaborators, but rather about how people may be divided into distinct groups. I consequently consider distance in terms of institutional space. That is, distance is discussed in terms of sharing an office, being in the same building, being at different institutes etc. I regard collaborations where the main participants are located in a single space as one end of this dimension. In contrast, collaborations where the main participants are located in different institutes in different countries are the other end of this dimension. The dimension of engagement, therefore, ranges from connected engagement to disconnected engagement.

I consider the main participants of collaborations, since I observed that collaborations are often officially led by professors who have their own offices, but mainly conducted by researchers in PhD or postdoc positions, who might be sharing an office together. It is the interactions of these main participants that are of interest for the development of shared practices. While this is not to deny that professors may be among the main participants of a collaboration, not all individuals on a collaboration are equally engaged.

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221 Alex H. Poole, "Now Is the Future Now? The Urgency of Digital Curation in the Digital Humanities," *Digital Humanities Quarterly* 7, no. 2 (2013).

222 Radostina K. Purvanova, "Face-to-Face versus Virtual Teams: What Have We Really Learned?," *The Psychologist-Manager Journal* 17, no. 1 (2014): 2–29, https://doi.org/10.1037/mgr0000009.

223 Shannon L. Marlow et al., "Does Team Communication Represent a One-Size-Fits-All Approach?: A Meta-Analysis of Team Communication and Performance," *Organizational Behavior and Human Decision Processes* 144 (2018): 145–70, https://doi.org/10.1016/j.obhdp.2017.08.001.

224 Siemens and Burr, "A Trip around the World."

Expanding the Trading Zones Model

In summary, in this book I conceptualise digital history as a meeting of two communities of practice. Digital history can be described as consisting of the digital and of the history; the computational domains and the historical discipline.[225] Both communities are defined by their practices and perform boundary work to distinguish practices that fall within and outside the interests of their communities. To investigate the cross-disciplinary practices of digital history, I consider how boundary work is combined with practices to cross and negotiate those boundaries within trading zones. My main interest is how this affects the practices of historians, in learning computational practices or unlearning traditional historical practices.

In order to investigate trading zones of digital history, I propose to expand the trading zones matrix by Collins et al. with the third dimension of engagement, in order to better understand how trading occurs. This leads to the updated trading zones model in Figure 2, describing six different types of trading zones according to three dimensions (see Table 1). I elaborate these types of trading zones in the next section by applying the model to discussions surrounding digital humanities.

By adding the third dimension of engagement the symmetric-heterogeneous trading zones, what Collins et al. called "fractioned" trading zones, as well as the asymmetric-homogeneous trading zones, what they called "subversive", are both split into connected and disconnected types. A significant effect is that this model reflects the split that Collins et al. made in fractioned trading zones between boundary objects and interactional expertise.[226] In my model, scholars are not in close connection in a disconnected fractioned trading zone, so that each develops their own perspective on the objects under investigation. These objects are what holds the collaboration together, but need no continuous negotiation towards a shared framework, thereby constituting boundary objects.[227] Boundary objects have been described as "objects which are both plastic enough to adapt to local needs and the constraints of the several parties employing them, yet robust enough to maintain a common identity across sites."[228] As such, the same object can be interpreted as a different thing by the different communities. For example,

225 Edmond, "The Role of the Professional Intermediary in Expanding the Humanities Computing Base"; Svensson, "The Digital Humanities as a Humanities Project."

226 Collins, Evans and Gorman, "Trading Zones and Interactional Expertise."

227 Susan Leigh Star and James R. Griesemer, "Institutional Ecology, `Translations' and Boundary Objects: Amateurs and Professionals in Berkeley's Museum of Vertebrate Zoology, 1907–39," *Social Studies of Science* 19, no. 3 (1989): 387–420, https://doi.org/10.1177/030631289019003001.

228 Star and Griesemer, 393.

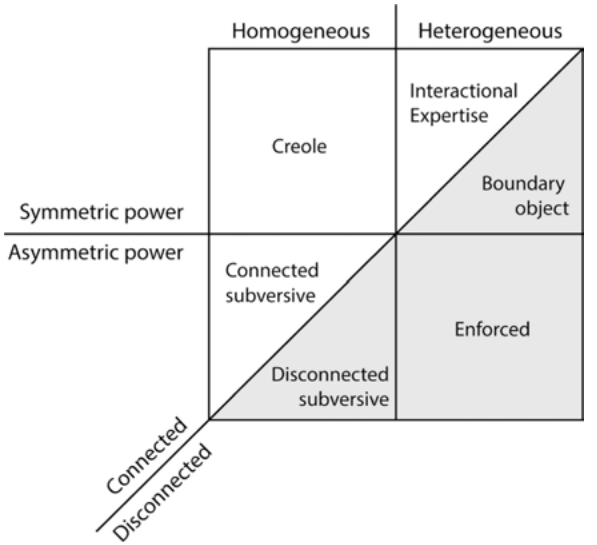

Figure 2: Three-dimensional overview of trading zones. The first dimension of changing practices (homogeneous-heterogeneous) is represented by the left and right halves of the figure. The second dimension of power relations (symmetric-asymmetric) is represented by the upper and lower halves of the figure. The third dimension of engagement (connected-disconnected) is represented by the white and grey halves of the figure.

Table 1: Typology of trading zones according to the three dimensions.

TITLE	ENGAGEMENT	POWER RELATIONS	CHANGING PRACTICES
Creole	Connected	Symmetric	Homogeneous
Interactional Expertise	Connected	Symmetric	Heterogeneous
Connected subversive	Connected	Asymmetric	Homogeneous
Disconnected subversive	Disconnected	Asymmetric	Homogeneous
Boundary object	Disconnected	Symmetric	Heterogeneous
Enforced	Disconnected	Asymmetric	Heterogeneous

a letter might serve as a source on which to build a narrative for a historian yet be a data point to train a language model for a computational linguist.

In contrast, in a connected fractioned trading zone, the culturally separated sides of the collaboration engage with one another through one or more interactional experts who are able to broker between the two communities. Brokers learn enough about the interacting communities to be able to understand their practices, and can discuss in the language of each community, while not becoming contributing experts. For example, a historian might learn to read and discuss

publications from computer science, without the ability to publish computer science work themselves. According to Collins et al., fractioned trading zones, and especially interactional expertise, are the most common type of trading zones.

Two types of trading zones are not shown in this model, since I do not consider these compatible with the literature. First, disconnected-symmetric-homogeneous trading zones. This would constitute a creole community of scholars not engaging with one another. However, without engagement, there is no opportunity to develop such an inter-language.[229] Without mutual engagement, a community of practice cannot be sustained.[230] The second type not in the model is the exact opposite; connected-asymmetric-heterogeneous trading zones. This would constitute what Collins et al. called an "enforced" trading zone, yet with scholars actively engaging with one another. However, this type was described to lack cultural exchanges, thus without true engagement.[231] I consequently do not consider these to be possible trading zones and have left them out of the model.

The Digital Humanities Trading Zone

The literature on digital humanities offers a broad range of characterisations of the interactions between humanists and computational experts. In some cases, these refer explicitly to trading zones, while in others the characterisation may be fit into one of the types of trading zones. This section thus serves a double purpose. First, it elaborates the model by considering what each trading zone type looks like. Second, it reflects on characterisations of digital humanities in terms of the model. Note that this discussion does not include the dimension of engagement, since the literature tends to discuss digital humanities as a global phenomenon of existing engagement.

The upper-left quadrant, symmetric-homogeneous (creole) trading zone, describes the situation where two communities have become deliberately homogeneous. The communities that started the trading zones do not preserve their cultures, but instead establish a new disciplinary culture. Some scholars have argued that digital humanities constitutes such a community, as a discipline separate from computer science or any specific humanities discipline. Digital humanities would have its own practices, resources and discourse serving as creole. Scholars that have argued for this include Willard McCarty, who described

229 Olson et al., "The (Currently) Unique Advantages of Collocated Work"; Siemens, "'It's a Team If You Use "Reply All"': An Exploration of Research Teams in Digital Humanities Environments."
230 Wenger, *Communities of Practice*.
231 Collins, Evans and Gorman, "Trading Zones and Interactional Expertise."

"humanities computing" as a third space, neither one culture nor the other, and Melissa Terras who argued digital humanities is a discipline in its own right.[232]

The upper-right quadrant, symmetric-heterogeneous (fractioned) trading zone, describes the situation where two communities deliberately remain distinct while interacting. The communities that started the trading zones preserve their cultures, so that a continuous coordination is necessary to establish a pidgin to enable exchanges. Collins et al. stated that this is the most common type of trading zone, which is reflected in the literature on digital humanities. Most authors refer to Patrik Svensson, who described digital humanities as a meeting place, an "in-between" the two cultures of humanities and computational research.[233] In this line, Andrea Hunter described digital humanities as a bridge or translation between two cultures.[234] Bernhard Rieder and Theo Röhle argued that not the language in terminology should be coordinated, but the practices in methods.[235] Finally, Joris van Zundert questioned whether the formation of methodological creole truly happens.[236] In his study of a digital humanities collaboration he found scholars and computational experts exchanged jargon only superficially. While he observed scholars appropriating technology in their existing practices, he did not find a deeper exchange of theoretical concepts, indicating the collaboration constituted a fractioned rather than a creole trading zone.

The lower-left quadrant, asymmetric-homogeneous (subversive) trading zone, describes the situation where two communities become homogeneous through one community shaping the practices of the other. This means that one-sided convergence takes place, where one community becomes more like the other, yet without acquiring the expertise of the dominant community. For example, historians might adopt methods from computer science, without acquiring the expertise to understand and influence these methods. Several authors point to the use of ready-made tools as such a trading zone. When a historian uses a digital tool for research, the user interface prescribes how the software should be used and how an object

232 Willard McCarty, *Humanities Computing* (Palgrave Macmillan, 2005); Melissa Terras, "Disciplined: Using Educational Studies to Analyse 'Humanities Computing,'" *Literary and Linguistic Computing* 21, no. 2 (2006): 229–46, https://doi.org/10.1093/llc/fql022.

233 Svensson, "The Digital Humanities as a Humanities Project."

234 Andrea Hunter, "Digital Humanities as Third Culture," *MedieKultur: Journal of Media and Communication Research* 30, no. 57 (2014): 18–33.

235 Bernhard Rieder and Theo Röhle, "Digital Methods: Five Challenges," in *Understanding Digital Humanities*, ed. David Berry (Palgrave Macmillan, 2012), 67–84.

236 Joris van Zundert, "The Case of the Bold Button: Social Shaping of Technology and the Digital Scholarly Edition," *Digital Scholarship in the Humanities* 31, no. 4 (2016): 898–910, https://doi.org/10.1093/llc/fqw012.

should be understood.[237] When the software generates certain results, a historian needs to trust that these results are adequate.[238] A historian as end-user thereby has no power to change the user interface or options to fit their needs.[239] Johanna Drucker in this context writes about graphical tools as trojan horses.[240] Pierre Mounier furthermore suggested that digital humanities brings research in the form of projects and short-term competitive funding to the humanities.[241] He later added the characterisation of digital humanities as contaminating humanistic attitudes toward research objects, methods and labour.[242] E-Science more broadly, and the spread of digital technologies in research, has similarly been characterised as computer science "invading" other disciplines.[243] Moreover, it could be argued that the many warnings to humanities scholars to adapt or become marginalised, as discussed in the previous chapter, would fit in this quadrant as arguments that historians need to adopt the methods from digital humanities or computer science, whether they want to or not.

Finally, the lower-right quadrant, asymmetric-heterogeneous (enforced) trading zone, describes the situation where the two communities remain distinct, while one community shapes the practices of the other. This may occur when the dominant community protects its expertise against the subordinate community and does not want to learn from the latter either.[244] For example, computer scientists might dictate how a tool will work and what the goal of a digital humanities project should be, without teaching historians anything about the internal workings, nor trying to understand how historians would want to use the tool. Or vice versa, historians might demand certain features to be developed by computer scientists, without informing computer scientists about the tacit knowledge of historical practice or trying to understand what software development entails. Such a power struggle of respectively technology-push or technology-pull strategies is not

237 Mel Stanfill, "The Interface as Discourse: The Production of Norms through Web Design," *New Media & Society* 17, no. 7 (2014): 1059–74, https://doi.org/10.1177/1461444814520873.

238 Rebecca Sutton Koeser, "Trusting Others to 'Do the Math,'" *Interdisciplinary Science Reviews* 40, no. 4 (2016): 376–92, https://doi.org/10.1080/03080188.2016.1165454.

239 Lev Manovich, *Software Takes Command* (Bloomsbury Academic, 2013).

240 Johanna Drucker, "Humanities Approaches to Graphical Display," *Digital Humanities Quarterly* 5, no. 1 (2011): 1–21.

241 Pierre Mounier, "Une «utopie Politique» Pour Les Humanités Numériques?," *Socio* 4 (2015): 97–112, https://doi.org/10.4000/socio.1338.

242 Pierre Mounier, *Les humanités numériques: Une histoire critique*, online (Éditions de la Maison des sciences de l'homme, 2018), https://doi.org/10.4000/books.editionsmsh.12006.

243 Meyer and Schroeder, *Knowledge Machines*, 207.

244 Collins, Evans and Gorman, "Trading Zones and Interactional Expertise."

uncommon in software development.[245] Yet, within digital humanities this would usually be seen as a worst-case scenario of a failed collaboration. I consequently did not encounter authors that characterised digital humanities as such. However, digital humanities collaborations regularly include software engineers rather than computational researchers, as participants who do not have their own research agenda and do not appropriate the expertise of historians. Such cases, as well as collaborations that are multidisciplinary rather than interdisciplinary, arguably constitute asymmetric-heterogenous trading zones.[246]

As noted above, it is of interest that in discussing digital humanities as a trading zone, the literature seems to describe the digital humanities as a unitary trading zone that acts as a global coordination.[247] This goes against the original description of trading zones as local coordination, exactly because of global incommensurability. Furthermore, coordination and becoming a homogeneous community is a long-term process. A trading zone is thus not a static state of being, but collaborations can change over time and switch from one type to another. By investigating digital history projects as local and temporal trading zones, this book provides insights into how different practices of coordination lead to different trading zones and thereby to different outcomes.

Method

To approach the question of how historians interact in and are affected by digital history collaborations, I need to unpack the collaborations and untangle the interactions among participants. I am, therefore, mostly interested in the people practising the negotiation of digital history. Focusing on practitioners allows me to move beyond the common scholarly debates between proponents and opponents of digital history. This problem of untangling practices from debates was previously described by the anthropologist Clifford Geertz.[248] Analogous to his study of religion, digital history has its preachers, those scholars who claim that without digital history the profession shall be lost, and its "atheists" (or "Luddites"), those scholars who oppose digital history as dangerous to the values of

245 Jan van den Ende and Wilfred Dolfsma, "Technology-Push, Demand-Pull and the Shaping of Technological Paradigms – Patterns in the Development of Computing Technology," *Journal of Evolutionary Economics* 15, no. 1 (2005): 83–99, https://doi.org/10.1007/s00191-004-0220-1.

246 Collins, Evans and Gorman, "Trading Zones Revisited."

247 This same assumption of digital humanities as a global monolithic community arguably underlies much of the controversy around defining the field as well.

248 Geertz, *The Interpretation of Cultures*.

historical discipline. If I were to limit my investigation to such debates, it would be easy to follow conclusions to one end of the spectrum that digital history is a necessity for otherwise historians will not be taken seriously anymore, or to the other end that digital history is a neo-liberal enterprise that endangers scholarly values.[249] Yet my aim is not to make claims about whether digital history is good or bad, but to come to an understanding of how it is performed and experienced.

Furthermore, my interest is mainly in how historians are affected by digital history. Above I characterise digital history as the meeting between the digital and the history. Yet my focus of attention lies on how the digital affects the history; how computational practices affect historical practices. This focus follows existing debates around digital humanities. The literature discussed thus far has mainly originated from humanities scholars reflecting on the digitalisation of their profession. For this reason, Julie Thompson Klein described methodological interdisciplinarity in digital humanities as importing computational methods into the humanities.[250] The digital humanist Patrik Svensson moreover characterised "digital humanities as a humanities project."[251] In one study, the computer scientist Stefan Jänicke and his collaborators followed the diffusion of a digital humanities concept back into the computer science community.[252] They reviewed literature on distant reading visualisations and compared growth in the digital humanities and computer science communities between 2005 and 2015. While the topic grew steadily within digital humanities, from two papers in 2005 to 23 in 2015, the topic remained stable in the computer science domain at two to four papers per year. This suggests that trading of practices in digital humanities is mainly in the direction from the computational to the humanistic, rather than vice versa.

Fitting with my focus, my heuristic for selecting case studies was the participation of academic historians, with a PhD in history or at a history department, who collaborate with computational experts. Moreover, I conducted this research as a member of a history department myself. My results are therefore biased towards the perspectives of historians and consider the direction of shifting practices from the computational to the historical.

249 As argued by respectively Boonstra, Breure and Doorn, "Past, Present and Future of Historical Information Science"; Mounier, "Une «utopie Politique» Pour Les Humanités Numériques?"

250 Klein, *Interdisciplining Digital Humanities*.

251 Svensson, "The Digital Humanities as a Humanities Project."

252 Stefan Jänicke et al., "Visual Text Analysis in Digital Humanities: Visual Text Analysis in Digital Humanities," *Computer Graphics Forum* 36, no. 6 (2017): 226–50, https://doi.org/10.1111/cgf.12873.

My approach to these practices is that of ethnographic research, as has been defined in the work of Clifford Geertz.[253] He described ethnography not as a set of methods, like interviews or observations, but as thick description. Whereas "thin description" is the mere description of what someone is doing, thick description aims to describe the structures in which those actions take place and have meaning. For example, in my study of a digital history collaboration, I am not just interested in observing that a computational expert delivered a technology and that a historian responds in a positive or negative way. Instead, I aim to uncover the cultural structures that lead to tensions of how computational experts design technology or how historians build up particular expectations of technology.

To this epistemology of thick description, the anthropologist Michael Agar added that ethnography works in an iterative and recursive way.[254] The investigation of a different culture leads to so called "rich points", where the ethnographer does not understand what the participant says or does. Here the ethnographer must assume coherence, that the point of confusion makes sense in the context of the participant's culture. For example, I might observe a historian criticising digital history on grounds that could be dismissed as "Luddite". Yet it is far more enlightening to investigate how this criticism is coherent within the context of the epistemic culture of that historian. This way I can pursue how such criticisms play a role in the alignment of computational methods with historical values. My approach is thereby influenced by the approaches related to social studies of science, investigating scholarship as social practices. My emphasis on local observations of social practices is hence inspired from the seminal work in lab studies.[255]

Yet a criticism of local studies is that, while they reveal certain mechanisms, they obscure others, particularly mechanisms that lie outside the local scope but shape it from "outside".[256] I therefore employ triangulation to collect observations of digital history practices at different sites and scales.[257] This

253 Geertz, *The Interpretation of Cultures*.

254 Michael Agar, "An Ethnography By Any Other Name . . . , " *Forum Qualitative Sozialforschung / Forum: Qualitative Social Research* 7, no. 4 (2006), https://doi.org/10.17169/fqs-7.4.177; Michael Agar, "Ethnography," in *Culture and Language Use*, ed. Gunter Senft, Jan-Ola Östman and Jef Verschueren (John Benjamins Publishing Company, 2009), 110–20.

255 Knorr Cetina, *Epistemic Cultures*; Bruno Latour, *Science in Action* (Harvard University Press, 1987); Latour and Woolgar, *Laboratory Life*.

256 Peter Galison, "Limits of Localism: The Scale of Sight," in *What Reason Promises*, ed. Wendy Doniger, Peter Galison and Susan Neiman (Berlin, Boston: De Gruyter, 2016), 155–70, https://doi.org/10.1515/9783110455113-020.

257 Helena Karasti and Jeanette Blomberg, "Studying Infrastructuring Ethnographically," *Computer Supported Cooperative Work* 27, no. 2 (2018): 233–65, https://doi.org/10.1007/s10606-017-9296-7.

triangulation of perspectives is conducted by juxtaposing the views and practices of historians and computational experts, and by comparing between a number of collaborations that serve as case studies. I moreover contextualise these case studies in studies with a wider selection of scholars. I thus adopt a "multi-sited ethnography" approach to study multiple trading zones of digital history and find differences and similarities.[258] Through this strategy, I aim to generalise my findings of the case studies and gain not just a local understanding of an observed trading zone, but a view of trading zones in digital history more broadly.

In the next chapter, I start with my ethnographic observations at a single site, the University of Luxembourg, and examine the first dimension of trading zones, namely how participants of digital history collaborations engage with one another across disciplinary and institutional boundaries.

258 George E. Marcus, "Ethnography in/of the World System: The Emergence of Multi-Sited Ethnography," *Annual Review of Anthropology* 24 (1995): 95–117.