ÍNDICE HISTÓRICO ESPAÑOL

*Tr*adigital Humanities: Experiences in a context of change

Humanidades tradigitales: experiencias en un contexto de cambio

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Abstract

Assuming one of Seneca's proverbs — while we teach, we learn — we must understand the historian's trade as a profession in continuous renewal, nurturing ourselves with new aspects that improve the methodology and techniques of science, while discarding those that become obsolete. For three decades, the provision of methodologies originating from other disciplines, such as computer science and Humanities studies, have been converging into the discipline known as Digital Humanities.

Although these computational techniques have introduced new methods for the identification of patterns in data and promise to accelerate the processes of analysing the growing mass of data, they diverge from the traditional narrative and its methods. In this sense, recent experiences allow us to discuss the benefits and limits of the link between traditional methods and techniques on the one hand, and those that are computational on the other, when preparing scientific results. Thus, we believe that without losing sight of the historian's basic essence of continually immersing themselves in the reading and analysis of sources, the paradigm shifts of science can be assumed adopting this new technique.

Now, with perspective, we look at the limits that convergence itself offers, and here present our most recent experience to improve its performance.

*Keywords: Tra*digital humanities, Téchne, Ancient History, Archaeology, Rome.

Resumen

Asumiendo un proverbio de Séneca —mientras enseñamos, aprendemos— debemos entender el oficio del historiador como una profesión en continua renovación, nutriéndonos de nuevos aspectos que mejoren la metodología y las técnicas de la ciencia, descartando aquellos que quedan obsoletos. Desde hace tres décadas, la aportación de metodologías provenientes de otras disciplinas, como la informática y los estudios de Humanidades han ido convergiendo en la disciplina conocida como Humanidades Digitales.

Aunque estas técnicas computacionales han introducido nuevos métodos para la identificación de patrones en los datos y prometen acelerar los procesos de análisis de la creciente masa de datos, divergen de la narrativa tradicional y sus métodos. En este sentido, experiencias recientes permiten discutir los beneficios y límites del vínculo entre métodos y técnicas tradicionales, por un lado, aquellas que son computacionales, por otro, a la hora de preparar resultados científicos. Así, creemos que sin perder de vista la esencia básica del historiador de sumergirse continuamente en la lectura y análisis de las fuentes, los cambios de paradigma de la ciencia pueden asumirse adoptando esta nueva técnica.

Ahora, con perspectiva, miramos los límites que la propia convergencia ofrece y aquí presentamos nuestra experiencia más reciente para mejorar su desempeño.

Palabras clave: Humanidades *tra*digitales, Téchne, Historia antigua, Arqueología, Roma.

Resum

Assumint un proverbi de Sèneca —mentre ensenyem, aprenem— hem d'entendre l'ofici de l'historiador com una professió en contínua renovació, nodrint-nos de nous aspectes que millorin la metodologia i les tècniques de la ciència, descartant aquells que queden obsolets. Des de fa tres dècades, l'aportació de metodologies provinents d'altres disciplines, com ara la informàtica i els estudis d'Humanitats, han anat convergint en la disciplina coneguda com a Humanitats Digitals.

Tot i que aquestes tècniques computacionals han introduït nous mètodes per a la identificació de patrons a les dades i prometen accelerar els processos d'anàlisi de la creixent massa de dades, divergeixen de la narrativa tradicional i els seus mètodes. En aquest sentit, experiències recents permeten discutir els beneficis i els límits de l'enllaç entre mètodes i tècniques tradicionals, d'una banda, aquelles que són computacionals, de l'altra, a l'hora de preparar resultats científics. Així, creiem que sense perdre de vista l'essència bàsica de l'historiador de submergir-se contínuament en la

lectura i l'anàlisi de les fonts, els canvis de paradigma de la ciència es poden assumir adoptant aquesta nova tècnica.

Ara, amb perspectiva, mirem els límits que la pròpia convergència ofereix i aquí presentem la nostra experiència més recent per millorar-ne l'exercici.

Paraules clau: Humanitats tradigitals, Téchne, Història antiga, Arqueologia, Roma.

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Introduction

In the early 1990s, Judith Moncrieff coined the term 'Tradigital art' for the first time to describe the artistic processes that combine traditional and computational techniques to create an image (whether physical or digital) (Gragg, 1995; Wray, 2011). From then on, Moncrieff encouraged the use of this technique in her students, who used both traditional and digital media to combine everything from photographs of costumes to stills from videotapes of performing dancers, giving rise to an emerging movement, "tradigitalism".

Today, our universities are experiencing a paradoxical scenario: while the first generations of true digital natives arrive — fruit of the success of the Digital Revolution, which has given way to a Digital Era — the majority of the academic world continues to investigate and teach classes from their pre—technological knowledge, adopting in small doses the necessary instruction to familiarise themselves with the basic digital tools needed to speed up data analysis and avoid, as far as possible, transferring human errors to their studies. Thus, it is common to find in our educational system the existence of projects in continuous transformation, where our educational authorities urge the teaching staff and research team to digitise through continuously updating their training — recycling — while repeating that it is necessary to combat the digital *gap* from this great academic majority. There are many teaching plans, research groups and departments that are strongly committed to digital competence, discovering the centre of our decision—making in digital support and new information technologies. The perverse vice of nostalgia — which paralyses and yearns for ever better humanities, with continuous litanies of "before scientific studies were more significant and had greater impact", "before one was better prepared", "before it was written better", etc. — must be fought. We must adopt the novelties that improve our profession, at the pace that our reflexes allow us to take on these changes in a society that has changed at a dizzying pace, while nonetheless preserving what it is necessary to preserve, without falling for the obligation to innovate for the sake of innovating, and ensure that the contents (data), the continents (paper books), or the didactics (master classes), etc., are not discarded. (García Sánchez 2022, p. 93)

We find ourselves, then, at a crossroads, with an increasingly demanding system for access to the profession and the subsequent internal control of scientific production where, however, the pace of computational development, its free access or technological democratisation, has turned digital tools into one more extension of our daily work. And it is only after the effervescent growth and development of this digital transformation that we can become aware of what has happened — and is happening — to examine what we really are. In this way, we see how the tradition, in this case, the methods and techniques used for the elaboration of scientific studies in the humanities, have not been frozen in time, but are active dynamic procedures, subject to all kinds of improvements. Thus, the old and the new coexist, and the traditional exists in a new way.

It is increasingly common to find groups of people with a spirit to reflect on their past, those who, even knowing that things have changed — for the better — are inspired by 'yesterday' to recover or replicate certain 'ways of doing' from a current perspective. A very popular trend in Seoul is 'NewTro', a portmanteau of New and Retro, which is seen by the younger generation as a way of rediscovering the values of the past and interpreting them in a modern light (Fusell, 2019). One example is the growing cottage industry of *makgeolli*, almost abandoned but now revived in an attempt to preserve the traditional method of making this Korean drink.

In the same spirit, below we will highlight a series of new techniques used with increasing frequency in the field of Humanities, and whose Computational Turn towards the use of new techniques has led to the success of Digital Humanities (Silva, Bermúdez, Pérez 2022).

Methods

Although these computational techniques introduce new methods for the identification of patterns in the data and promise to speed up the analysis processes of the growing mass of data, they diverge from the traditional narrative and its methods from the outset. In this sense, recent experiences allow us to discuss the benefits and limits of the link between traditional methods and techniques and computational ones when preparing scientific works. Thus, we believe that without losing sight of the basic essence of the historian, of continuously immersing himself in the reading and analysis of the sources, the paradigm changes in science can be assumed through the assumption of this new téchne. An example is the use of the Perseus Digital Library (*http://www.perseus.tufts.edu/hopper*; Crane, 2012) which, through its unitary system of massive searches on all classic works, allows us to instantly access Latin and Greek texts without the need to consult hundreds of works in person in a bookstore, where you may battle with an endless number of thematic indices.

Consequently, among our main objectives are: first, to analyse the expert figure of the Data science or Chief Data Officer (cdo) within the organisation chart of research development; second, to detail the processes of Data Cleaning and Data Quality of the databases data analysed; and finally, to summarize the use of new tools such as Carto, Tableau, Flourish, etc. that serve to empower researchers in the decision—making of their analysis processes (On the general concepts of the figure of a cdo, see Carruthers, Jackson 2017. Regarding Data cleaning processes, see Osborne 2013. In Milligan 2022 you can follow the basic aspects of a Tableau Full Course).

As far as the world of the Humanities is concerned, we should behave like many companies in the private sector, which configure their business plans by establishing data as the centre of their decision—making process. To give us an idea: today, the collection

and sale of digital data has become the fastest growing sector of the economy, generating more money than even the sale of oil. If we transfer this to the world of the Humanities, then data appears in the form of an epigraph, literary source, coins, etc. and it is these "traditional" databases, originating at the dawn of the Digital Age, that have accumulated thousands of data over the previous decades, and are the first to be able to give new focus to their investigations through the analysis of Big Data. It is worth mentioning several projects here — those that are already completed, like EAGLE (part of Europeana) (Orlandi, Santucci, Casarosa, & Liuzzo, 2015) and EPNet (Remesal & Pérez, 2022), or those in progress such as ARIADNE plus (Niccolucci & Richards, 2019) and FAIR Epigraphy (Heřmánková, Horster, & Prag, 2022). The first, a multilingual online collection of millions of digitised items from European museums, libraries, archives and multimedia collections, and the second, an original CEIPAC project that intends to establish an innovative framework to investigate the political and economic mechanisms that characterised the dynamics of the commercial system during the Roman Empire (Berni & Aguilera, 2000; 2001; Remesal, Aguilera, García, Martín-Arroyo, Pérez, & Revilla, 2015). The other two ongoing projects seek to digitise, connect and make accessible dozens of databases, containing millions of pieces of data, within the same ontological or epigraphic context.

Results

I believe that the concession of the EPNet project has opened a new stage (Remesal, Díaz-Guilera, Rondelli, Rubio, Aguilera, Martín-Arroyo, Mosca, & Rull, 2015; Remesal & Pérez, 2022). I know that the world around us is constantly changing, and that the information age has changed the way we think and communicate (Pons & Pérez 2018; forthcoming). The same goes for our data. Although, over the years, researchers in ancient history, archaeologists and epigraphers have been hoarding data with scientific motivations (Elliot, 2015; Martín-Arroyo & Remesal, 2017; Pérez 2018; Bermúdez, 2021; Orlandi, 2021; Heřmánková, Kaše, & Sobotkova, 2021), such has been the volume collected that, without realizing it, they have been transformed into Big Data (Remesal, 2012; Remesal et al., 2015; Pérez, 2021; Heřmánková et al., 2022). To the data generated and studied in a traditional way since ancient history, we now add information technology, computational modelling systems and simulations, applied theory in network science, and big data visualization programs (on information systems, computational modelling and simulations, see: Bentley & Maschner, 2003; Romanowska 2015; Brughmans, Hanson, Mandich, Romanowska, Rubio-Campillo, Carrignon, Collins-Elliott, Crawford, Daems, Fulminante, de Haas, Kelly, Moreno Escobar, Paliou, Prignano, & Ritondale, 2019; Verhagen, Joyce, & Groenhuijzen, 2019; Romanowska, Wren, & Cabtree, 2021; Romanowska, Carrignon, Coto-Sarmiento, & Montanier, 2022; Assael Sommerschield, Shillingford, Bordbar Pav-

lopoulos, Chatzipanagiotou, Androutsopoulos Prag, & Freitas, 2022; Brughmans, 2021; Brughmans & Wilson 2022. For several overviews of network approaches to archaeology and Roman economy studies: Ahnert, Ahnert, Nicole Coleman, & Weingart, 2021; Ayllón & Pérez 2014; Ayllón, Pérez, & Remesal 2019; Brughmans, Collar, & Coward, 2016; Brughmans, Keay, & Earl, 2014; Brughmans & Peeples, 2017; 2018; 2020; 2023; Brughmans & Poblome, 2016; Caldarelli, Cristelli, Gabrielli, Pietronero, Scala, & Tacchella, 2012; Cini, 1994; Necklace, 2013; Necklace, Coward, Brughmans, & Mills, 2015; Donnellan, 2020; Fenn & Romer-Strehl, 2013; Flückiger, Hornung, Larch, Ludwig, & Mees, 2021; Fulminante, Prignano, Morer, & Lozano, 2017; Graham, 2006; 2016; Graham & Weingart, 2015; Hill, Peeples, Huntley, & Carmack, 2015; Knappett, 2011; 2013; 2021; Martín-Arroyo, Prignano, Morer, Rull, García, Díaz-Guilera, & Remesal, 2017; Mills, Peeples, Haas, Borck, Clark, & Roberts, 2015; Peeples, 2019; 2020; Pérez, Lario, & Remesal 2023; Prignano & Lozano, 2020; Prignano, Morer, & Diaz-Guilera, 2017; 2022; Prignano, Morer, Fulminante, & Lozano, 2019; Prignano, Morer, Lozano, Pérez, Fulminante & Díaz-Guilera, 2017; Preiser-Kapeller & Werther, 2018; Schafer, 2014; Scheidel, 2014; Seland 2013; 2016; and on the recognition of complex systems, see: Daems, 2018; 2019; 2021; Haklai, 2021; Verboven, 2020; Willett, 2021).

At this point, it is already impossible for a single person to rationally reflect on these data simultaneously. The instruments provided by the digital humanities help us: a review of the data using new methods of analysis allows us to approach it at a lower level of granulation (and more quickly), as well as being able to analyse the abundance of data in its entirety. For this, it is essential to obtain correct visualizations of our information. In this way, we gain perspective, understand the information better, and are more effective as scientists.

In parallel, and in order to avoid —as far as possible— criticism from colleagues with a more traditional methodology, we allow ourselves to refer to a quote from Umberto Eco, who reminds us that computers do not think for themselves (although we certainly know that each day they do it more and better) but rather need the assistance of the human who directs them; and another from Karl Popper, who reflects on the fact that a problem can encompass different disciplines and, thus, so can its resolution. Within the framework of the EPNet project we have tried to ask intelligent questions to computers, but also to work in an intense, interdisciplinary framework (with physicists, computer scientists and mathematicians) and in a blue skies research context. These reflections have guided our participation in the EPNet project (on the ontological adaptation process, see: Calvanese, Mosca, Remesal, Rezk, & Rull, 2015; Calvanese, Liuzzo, Mosca, Remesal, Rezk, & Rull, 2016; Mosca, Remesal, Rull, & Rezk, 2015; other examples of Linked Open Data in Archaeology studies and the application of the FAIR open data policy, can be found in: Geser, 2016; Wilkinson, Dumontier, Aalbersberg, Appleton, Axton, Baak, Blomberg, Boiten... & 2016; Tupman, 2021. For some of the results obtained in the EPNet project through

a proper visualisation of the data, see: Martín—Arroyo & Romanowska, 2022, Martín, Palacín, & Pérez, 2022; Palacín, Pérez, & Revilla, 2021; Pérez, Morvan, Prignano, Morer, Díaz Guilera, Bermúdez, & Remesal, 2018; Pons & Pérez, 2018; Remesal, Pons, Pérez, & Bermúdez, 2019; Rubio-Campillo, Coto, Pérez, & Remesal, 2017; Rubio-Campillo, Bermúdez, Montanier, Moros, Pérez, Rull, & Remesal, 2018; Rubio-Campillo, Montanier, Rull, Bermúdez, Moros, Pérez, & Remesal, 2018. In parallel, an open data visualisation interface has been developed, and is accessible at: *http://www.romanopendata.eu*. Concerning this, see: Palacín, Pérez, & Rull, 2020; Remesal & Rull, 2021; Perez & Bermudez 2021; Pérez, Bermúdez, & Aguilera, 2021; Bermúdez, Pérez, Rull, & Aguilera, 2022; Giménez, Mosca, Rondelli, & Rull, 2022). This is the entry of the digital humanities in the history of the economy of the Roman Empire.

> "*Il computer non è una macchina intelligente che aiuta le persone stupide, anzi, è una macchina stupida che funziona solo nelle mani delle persone intelligenti*" —
> Umberto Eco, Prefazione a Cl. Pozzoli, *Come scrivere una tesi di laurea con il personal computer*, BUR, Milano, 1986, pp. 6-7.

> "*We are not students of some subject matter, but students of problems.*
> *And problems may cut right across the borders of any subject matter or discipline*" —
> Karl Popper, *Conjectures and Refutations. The growth of scientific knowledge*, Routledge and Kegan Paul, London, 1963, p. 88.

To develop this new paradigm, it is highly useful to be accompanied by a Data Scientist or a Chief Data Officer (CDO), one who appears to be an expert in terms of data processing and structuring processes, but who sometimes it shows as an exogenous figure the content and/or meaning of the data, and is therefore unable to assume which are the appropriate questions to solve. For this reason, there is a growing need for the user who does not work within a highly technological culture, and who sometimes acts as a simple spectator, to make decisions and draw conclusions from simple data processing processes, without the need to become an expert developer of these processing tools. Thus, there are more and more sporadic users who try to avoid the bottleneck that these specialists usually generate between the data and, let's say, their 'analytical consumer'. Therefore, as in the business world, the world of data is divided into those who know how to work and analyse data — Data Science — and those who only ask for their treatment to obtain results with which to reach conclusions, accustomed to making decisions but unaware of the creation and use of data processing tools.

Based on our most recent experience, I believe that a solution that can help simplify these processes stems from the use of database analysis and visualisation software that is standardised for its ease of use and accessible from anywhere, as well as digital support

that is capable of taking on all kinds of data with particular, but not unique, characteristics. This would avoid instructing in the operation of complex tools that are sometimes developed for specific projects or existing tools, but are adapted to a specific application case and whose results, after all, do not they differ greatly from those that could be obtained with any of this software. They serve as an example: surpassing the classic Excel table, we would have Power BI (a software developed by Microsoft — we could say that it is a doped Excel, as it has muscle!); then we would have the various software specialised in the processing and visualisation of data, among which we would highlight, Qlick Sense, Tableau Software, Oracle, Google Data Studio, Looker, Carto, Flourish, etc. For the preparation of network analysis and visualisation, we could highlight the free software Gephi, or The Victorian. And finally, at another stage, we would find several tools to create visual stories and generate online communication experiences in the new generation of Presentations, Infographics, Dossiers, Video-Presentations, and ePosters; here we can highlight platforms such as Genially, Piktochart, Infogram, etc.

A recent example of the attempt to simplify these intermediate processes can be seen in the new Tableau Software 2019.3 update and the built-in 'Ask Data' option, which includes a search bar with which to ask direct questions with the dataset(s), whose data has previously been hierarchised for categorisation, thus simplifying the interaction with the data and making the user independent. However, during data control we must not underestimate the data cleaning and validation efforts (Data cleaning / Data quality), which in some cases takes 80 or 90% of the time, whether due to cleaning nulls, containerisation, changing data types, debugging, outlier handling, data normalization, data balancing, etc. In parallel, the use of many of these tools allows us to quickly locate the duplicate or erroneous data in our datasets, while reducing human error to a minimum.

Today we know that the rise of data science opens the door for all types of structured information to be subject to the application of a variety of statistical and machine learning techniques that allow patterns to be extracted and classifications to be proposed in order to select the peculiarities of the data. Thus, a correct visualisation of the data as a whole allows us to easily observe patterns that help us understand certain historical processes, which we should not confuse with apophenia or pareidolia. Once again, the new version of Tableau Software offers an interesting option that informs us of the atypical values that are shown in the visualisations, through the 'Explain data' option, a tool that can prepare reports that present the reasons for possible anomalies or singularities within an overall statistical model.

Finally, there has also been an increase in recent years in hybrid profiles or bridging profiles in the field of Humanities, today represented by a small number of people who are capable of combining a mixed curricular profile, are knowledgeable of the methods and techniques for historical studies, and at the same time are experts in the preparation of data analysis tools. By assuming both 'languages', if not in an equitable way, then at least minimally balanced, these profiles could be understood to function as mediators

in transdisciplinarity, or in a persistent interdisciplinarity (e.g. Coltofean-Arizancu, Diaz-Andreu 2021). In this way, even knowing that multidisciplinary teams are not high performance, they would work under the same umbrella.

The main problems with avoiding staying in the middle and encouraging the formation of these profiles, lies first in the time dedicated to the instruction of these profiles, sometimes with a double academic degree or with the addition of a postgraduate, master's degree dedicated to the Digital Humanities. The second problem lies in the small number and brevity of the projects to which they could be ascribed (Brughmans et al., 2019)

However, there is a growing trend to include the figure of an IT specialist for these digital projects. One example is the response given by the 14 projects that adhere to FAIR Epigraphy, where nearly two—thirds of respondents confirm the availability of an IT specialist, mostly part—time, and full—time on occasion (only 8% FTE), where the maintenance of these figures at an economic level is one of the biggest problems, claiming the need for greater institutional support (Heřmánková et al., 2022, pp. 8—9, 16). In this line, digital or double degree training for Humanities researchers is even more interesting, where many projects will require the collaboration of this type of expert, preferably educated in both specialties.

In summary, the time to adopt these new tools must be respected, without losing the focus of our investigations, and clearly defining the issues to be resolved. After all, tools like Carto (*https://carto.com*), Tableau (*https://www.tableau.com*), Flourish (*https://flourish.studio*), etc. are still just that — a tool. Of course, they can serve to streamline our analysis processes, offer peace of mind, improve data management and ease of use. Consequently, the knowledge of these tools empowers researchers, at the same time as it helps them to make decisions in the analysis processes. To this we can add that a proper visualisation of the information, through tools such as Tableau, Genially (*https://www.genial.ly*), Visitorian (*https://visitorian.net*), becomes more essential every day in order to gain insight into intertwined data and thus be more efficient for today's and tomorrow's researchers.

Thus, thanks to our experience, we could propose a methodological conclusion, where collaboration with the so-called "pure" sciences, far from the traditional vision of ancient history and its auxiliary disciplines, is both desirable and necessary for the simple fact that the data accumulated over several centuries can only be studied in an integrated way through their collaboration. Studies that feature the economy and society in antiquity through analysing amphorae epigraphy are paradigmatic, but other themes of the social and economic history of antiquity can also be studied through this prism (Caro, Díaz-de la Fuente, Ahedo, Zurro, Madella, Galán, Izquierdo, Santos, & del Olmo, 2020; Champion, 2021; Djindjian & Moscati, 2021; Kathryn, 2020; Velázquez & Espinosa, 2021).

Finally, returning to the beginning, once we have assumed the new paradigm resulting from the use of these new tools to speed up our investigations, we cannot lose sight of the essence of the historian, which lies in reading the sources. Although, my proposal is not intended to be a missionary proclamation to those who still resist the new technologies of the digital society to use this new paradigm in their research, rather, I only intend to show, through practical cases, some of the benefits and limits of this methodological duality in the Humanities (on the consequences and effects on education: Harari, 2018 and Desmurget, 2020). An example of slow research (Berg & Seeber 2017), outside the culture of academic speed, is the work of Aguilera (2020), whose epigraphic experience allowed him to theorize about the family *stemma* of the *Lucius Vibius Polyanthus*, a food merchant that appears in the β positions of the *tituli picti* of the Dressel 20 olive oil amphorae. A sample of how to meet the objectives of the EPNet project without the need to add novel analysis methods. This is a clear example of how tradition and experience are equally relevant to the new methodological principles and how, without a prior knowledge base on the subject, the study of it is meaningless.

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