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Digital Practices Workshop

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Digital Practices Workshop

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L'atelier a été conçu dans le cadre d'une école d'été destinée à de jeunes chercheurs en histoire ancienne, archéologie, histoire des religions. Il s'agit d'une introduction aux pratiques numériques à destination d'un public de non spécialistes.

1.- Introduction

1.1.- A short history of the Digital Humanities (DH) birth

All stories, like the foundation myths, need a beginning, a starting event.

In the case of the creation/the birth of Digital Humanities, you mostly find one project:

- The *Index Thomisticus*, on Thomas Aquinas' writings.
- The project was carried out by Josephine Miles (an English professor) and Roberto Busa (a Jesuit scholar). = a tool for text searches.
- It is a tool for text searches in the massive work of Thomas Aquinas.

1946: Roberto Busa thought about this project and understood the importance and effectiveness of the computer (a visionary man, when we think about what was a computer at this time!)

1949: Roberto Busa met the founder of IBM, Thomas J. Watson. IBM sponsors the project.

It is a 30 years' project. Thanks to the informatics tool, R. Busa and his team published 56 printed volumes of the Index. In 1989, a CD-ROM version was produced. In the beginning of 2000s a web version and a new project, *The Index Thomisticus Treebank*, started.

It is a nice story, and Roberto Busa is a real pioneer. But he isn't the inventor of the Digital Humanities.

The DH birth was not an event, but a slow, multiple process. If you go on internet, you are probably going to understand that the beginning of what we call DH is a series of projects that looked like the *Index Thomasticus* until the 1980s. At this time the digital boom proved the precursors right and the DH flourished.

In my opinion, it is only one part of the story. Indeed, DH would not develop without a deep change in the way of considering and treating data. Unfortunately, nobody on the web talks

about the scientific approaches that were essential in the process of DH creation, as the New Geography/History/Archaeology or the quantitative history. Most of them appeared in the USA (but we have European equivalents or parallel with the *École des Annales* for instance), from the 1950s.

Some scholars wanted to develop new approaches. They thought the way data were treated did not give satisfying results, a greater knowledge of the past societies. They wanted to put an end to the event history, to favor the history of societies, processes, systems, cultures. Note that it is not a coincidence that the History and the Anthropology are close disciplines in USA.

These kind of new movements, currents then have turned to digital tools to classify, count, cross all the new data.

1.2.- Definition

“Digital humanities (DH) is an area of scholarly activity at the intersection of computing or digital technologies and the disciplines of the humanities. It includes the systematic use of digital resources in the humanities, as well as the reflection on their application. DH can be defined as new ways of doing scholarship that involve collaborative, transdisciplinary, and computationally engaged research, teaching, and publishing. It brings digital tools and methods to the study of the humanities with the recognition that the printed word is no longer the main medium for knowledge production and distribution.”

In this definition, there is one key expression and one problem.

- Key expression: area of scholarly activity. This expression perfectly says the hugeness of this field (scholarly = all the humanities fields!), and that is not a specialty but more an experimentation space.
- The problem: in this definition there are two different things: the crossover between digital technologies and humanities, first, and then the reflection on their application. They are very different from each other.

To understand, we can take an example: to be a DH specialist is as to be a chemistry specialist: you can work on a chemical weapon program for a government or create a new lipstick shade of red for Dior, you can also be a cellular chemistry specialist. All these specialists use the same tools (formulas, properties, chemical reactions) but they cannot help each other.

If you have ever been to a DH conference, you know I am right. You listen very different communications about very different tools (database, digitalization, 3D reconstruction...). So, there is a big difference between a scholar using digital tools and a DH specialist who is, most of the time, a technical expert helping historians/archaeologists/anthropologists... or a specialist of the research sociology and history, analysing the research practices.

1.3.- Digital Humanities in practice

We talk about DH, when we talk about digital storage solution, accessibility of data (most of the time thanks to digitalization projects) and digital tools to analyse them.

I would like to give you several concrete examples about the DH today.

Now, many universities, around the world, offer degrees entitled “DH”. They are difficult to set up because they welcome student from different background (sciences, humanities...). They offer methodological courses, technical training, but with specialties (3D reconstruction, specific computer tools...). Cf. links:

- <https://www.digitalantiquity.org/grants/2012-grants/#why-use-tdar>
- https://www.lemonde.fr/campus/article/2019/01/30/a-quoi-menent-les-masters-en-humanites-numeriques_5416520_4401467.html
- <http://eadh.org/education/digital-humanities-centres>

Students from this type of degree have valuable skills that they can use immediately in the world of research.

Several scientific foundations or associations are “labelled” DH. Most of the time they organise scientific events or training. For instance, the EADH: European Association for Digital Humanities. <https://eadh.org/>

Peer review journals are specialised in DH. It means that they only publish articles that present digital tools or research investigations using digital tools. For instance, the DSH from Oxford: *Digital Scholarship in the Humanities*. <https://academic.oup.com/dsh>

1.4.- Ancient history and digital practices

So, I am going to present you some considerations about digital practices in the field of the history of Antiquity.

First, I would like to emphasize that the digital practices were more common in the field of protohistory and archaeology. Indeed, archaeologists, especially those working on very old periods or cultures with few written traces, quickly saw the potential of digital tools and adapted them for their research subjects (because of the links between archaeology and geography and anthropology in the US. These disciplines are close and they easily adapted tools from one to each other). For instance, they adopt digital practices for:

- Identifying settlements patterns during the prehistory and antiquity.
- Analysing the land use and its evolution in the protohistoric societies.
- Making statistics and quantitative analysis in archeo-anthropology (in necropolis).
- The clustering of data (pottery, human material like bones, etc.)

Examples:

- Archaeomedes project (one of the first European project that developed very innovative ways of studying ancient territories.
- Bevan and Wilson about the Bronze Age Cretan occupation.

Thanks to the growing interest of historians and archaeologists in agricultural and territorial issues, digital tools have also been introduced to the fields of Greek and Roman studies. In Ancient history, there was a delay in the adoption and implementation of digital tools and even more in the Near East Ancient history, except the Biblical studies! But important projects have been developing tools to study ancient texts since the 1980s:

- The computer language XML adapted to the ancient texts: the TEI, The Text Encoding Initiative, for instance. https://en.wikipedia.org/wiki/Text_Encoding_Initiative.

Nowadays, a great part of the DH projects are about digitalisation and accessibility to the ancient sources: digital libraries, online databases, etc.

The MAP project develops both aspects of the DH, because it:

- Makes data and tools to study them accessible. Open access database, open access publications...
- Uses new digital tools to study huge corpus of data. Adaptation to ancient history of the notions of Big Data and Data mining. We will talk about it later.

In a nutshell, as there is not only one definition of the DH, and as DH are a convergent set of practices, we are going to talk about Digital Practices.

The workshop is made to share with the students MAP theoretical knowledge and practical experience. It will not make students experts at the end of the week, but they will discover new efficient digital tools or new way to use familiar digital tools that help them in their future researches. They are going to use these tools and methodologies on their own data and corpus, to think about the good and efficient ways to study their ancient sources.

gram is linked with the MAP project and competences. It is obviously not exhaustive. It is more like a first discovering step.

At the end of this summer school, the students will be able to:

- Adapt a methodology to their own research topic.
- Choose a digital tool adapted to their research topic and their level of knowledge.
- Design a simple database.
- Use the basic functions of a GIS.

2.- Organise your data

This workshop is to understand when the students have data's in bulk:

- Why organising your data.
- How to organise them.

At the end of this workshop, they will be able to:

- Find an adapted way/tool to work with their own corpus.
- Understand how a database works.
- Design a simple database.

2.1.- Some definitions

- **Data:** an elementary description, what is known, a starting point for a reasoning. The raw data is without any reasoning, supposition. Data is not information.

For example: Ramon J., *et alii*, “Deux nouvelles inscriptions puniques découvertes à Ibiza”, in A Ferjaoui (dir.), *Carthage et les autochtones de son empire du temps de Zama. Colloque en hommage à M. H. Fantar*, Tunis, 2004, Tunis, 2010, p. 231 (article in French, in the file Bibliography).

Data (in bold types):

L.1 l'dn lmlqrt 'l hsr s(ml)	To the lord, to Melqart the Master of Sour (a statue)
L.2 hrs dl hktrt šlm (ndr)	in gold with capitals, has fulfilled (a wish)
L.3 b'm tg'lbm kš (m' ql')	with the city of tg'lbm because he heard his voice.

- **Metadata:** a data that define or describe other data.

For example: language: Punic. Location: Ibiza. Support of the inscription: base of statue in black/blue stone. Etc.

- **Information:** after the data collection, information is what we obtain, by organizing these data, structuring them to make sense of them.

For example: it is dated from the 3rd or 2nd c. BC (because of the context of discovering and the similarities with inscriptions from Cartago).

Useful links:

- Abiteboul S., “Sciences des données : de la logique du premier ordre à la Toile”, leçon inaugurale prononcée le jeudi 8 mars 2012. Chaire d’Informatique et sciences numériques, <https://books.openedition.org/cdf/529> (text in French).
- Definition of data: <https://en.wikipedia.org/wiki/Data>.
- Definition of metadata: <https://en.wikipedia.org/wiki/Metadata>.

2.2.- Why learning to organise your data?

As we saw in the introduction, the development of the digital technologies is quite recent. It created an explosion of the number of datasets. This number grew so fast that the human brain is not able to treat these data sets anymore. That is what we call the *Big Data*.

Big Data: data sets that have become so large that they go beyond the intuition and human analytical capacities; data sets characterized by such a high volume, velocity and variety to require specific technology and analytical methods for its transformation into value/information.

To manage big data, to study them and identify patterns, regularities or particularities, people use the **data mining**, that is to say an interdisciplinary process involving methods from statistics, machine learning and database systems to extract information and knowledge from these huge datasets.

Useful link:

- Definition and history of the Big Data notion: https://en.wikipedia.org/wiki/Big_data.
- Definition and history of the data mining: https://en.wikipedia.org/wiki/Data_mining.

What about the classics in this context?

One example:

- In the second half of the 19th century, several European explorers and travellers discovered the archaeological site of Bosra (South of Syria), one of the most important city in the Roman Empire. After the World War 2, the Syrian government began to organise an archaeological exploration of the site. From the 1980s, a French

archaeological mission excavated the site. They published some monographs and an article in the *Syria* journal that reviews the results of the excavations between 1981 and 2002.

Fournet T., Blanc P.-M., Dentzer J.-M., “Le développement urbain de Bosra del’ époque nabatéenne à l’ époque byzantine : bilan des recherches françaises 1981-2002”, *Syria*, 2002, pp.75-154 (Text in French. Online: <https://halshs.archives-ouvertes.fr/halshs-00367062/document>).

- In 2000s, F. Balty, a specialist in the ancient history of Syria, sets up a new research project with several European and Syrian teams: the study of the complete area of Bosra, named the Hauran in the Hellenistic and Roman times. She introduces new working methods: an online database and a GIS, to resolve difficulties. Indeed, how to collect on the same place the results of several surveys and excavations organised by different teams from different countries? How to compare the old data (from previous research programs and 18th and 19th centuries, travel stories) and the new ones? How to produce meaning from thousands of different data (archaeological, epigraphical, topographical... from old stories, surveys, excavations, etc.)?

Actually, this example shows us that we are faced with a kind of Big Data from ancient sources today. That is why we have to use a kind of data mining to manage them: collecting and organizing data with the help of digital tools, then to make (qualitative) comparisons and (quantitative) analysis possible.

Of course, as specialists, we know how to collect and analyse epigraphic, literary, archaeological sources or data. But the way of study these sources is changing because:

- For more than one century, more and more archaeological sites have been discovered;
- The world of research has grown up (increasing number of universities and specialists, development of new sciences and methodologies to study materials from Antiquity);
- The digital development is making more and more accessible more and more data. It is one of the causes of the development of digital humanities, as we saw in the introduction.

Briefly: organise your data when:

- You have too many sources to be analysed by yourself.
- You have different kinds of sources to be compared.
- You want to save time to identify quickly the patterns, the possible answers to your hypothesis.

2.3.- How to organise your data?

2.3.1. - Evaluation of needs and level of competence

- How many sources do you have to study? How much data is this?
- Can you collect them and study them yourself (2 or 3, yes. More, probably not).

And

- Do you know how to use a database software or another type of data management software?
- Will you save time by learning how to use this kind of software OR will you save time by using a simpler tool (Excel for instance)?

We cannot answer to these questions. They are a first personal step.

2.3.2. – Advices

- Use a table even if it is a basic one, like an Excel table.
- Think in *tables* and *fields*:
 - o A table (database) is a dataset organised in a table where the columns are categories of information and the rows are records.

Example:

Archaeological site	Archaeological structures	Artefacts
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The first table is to register all information about the archaeological site (location, site extent, date, duration of occupation...).

The second one concerns all the architectural structures on the site, like the houses, temples... (Location on the site, date, architectural technic, surface...).

The third one is about all the artefacts found in the structures (pottery, mosaics...).

Epigraphic document	Inscriptions	Images
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The first table is to register the epigraphical documents, like stela, altar, etc. (location, date, language, type of writing...)

The second one is to register all information on the inscription (size, translation...).

The last one is about the images that are sometimes found with the epigraphic text (position on the support, patterns, presence of colours, description...)

- A field is a characteristic of an object. In an Excel table, a cell represents a field.

Archaeological site	Archaeological structures	Artefacts
Name	Type of structure	Type of artefacts
Location	Surface	Material
Site extent	Location in the site	Size
Date	Date	Date
Duration of occupation	Architectural technic	Location in the structure
...

Dark blue: the tables.

Light blue: the fields.

Epigraphic document	Inscriptions	Images
Type of document	Type of inscription	Type of image
Location	Size	Patterns
Date	Position on the document	Position on the document
Language	Translation	Presence of colours
Type of writing	Commentary	Description

Dark blue: the tables.

Light blue: the fields.

- Define your fields. How do you want to register your data in each field? Text, numbers, yes/no, list...

Example: Type of structure => list (house, temple, public space, street, uncertain...)
 Size of an artefact => numbers, centimeters
 Size of an inscription => number of lines, size of the letters (millemeters)
 Presence of colours in an image => yes/no.

- Think about the links between your tables: an archaeological site may contain one or several structure(s) which may contain one or several artefacts. You must express theses

links in the natural language. If you can do it, then your links are logical and your table well organised.

Useful links:

- Definition of a relational database: https://en.wikipedia.org/wiki/Relational_database.
- Definition of a table (database): [https://en.wikipedia.org/wiki/Table_\(database\)](https://en.wikipedia.org/wiki/Table_(database)).
- Definition of a field (database): [https://en.wikipedia.org/wiki/Field_\(computer_science\)](https://en.wikipedia.org/wiki/Field_(computer_science)).

2.3.3.- Creating a table

- Make choices. This is the first simple idea, the base of the research. With or without a table, you know how to select and collect your sources to build your corpus.
- Explain the goals, the issues of your research. It helps to define criteria to choose the sources.
- Choose a list of criteria describing your sources (it will become the fields of your table).

For instance: would you work with published or unpublished data? If you have a majority of published data and one unpublished file, what would you like to do? Do you want to put everything in a table? Or do you want to register the published data to compare them and only in a second step compare your results with the unpublished data? Etc.

For literary sources: would you like to work with “complete” texts or with fragments too?

Another example: is the precision of the dating important to you?

2.3.4. - Harmonize the registration

All the points sound familiar to us, because we know how to make our research. But, using a digital tool is quite different:

- Because it requires us to clarify our methods, our choices.
- Because the computer tool does not have the same “language” as us.
- Because the place in the field is limited. We cannot express ourselves as in natural language.

Organise a corpus wants to say define rules of registration:

- Location: always the same way to locate something. For instance: one field *longitude* and one field *latitude*. If you have only old geographical indication, you can choose to write the old name of the sites/cities/states you study.
- Dating: numbers is the more easy way to register dates. Find a solution to translate expressions as “the middle”, “the beginning”, and “the end” of this century/period...
- The level of precision of data: what to choose to register the same level of information and make possible comparisons between our data?

For instance: if you have a corpus with 30 archaeological sites identified by surveys and two known by excavations:

- o You may choose only the comparable information: date, surface, supposed typology of the site...
- o Or you may register all the data, even if they would probably be so more detailed for the excavated sites. You will compare only few fields.

Another example: the old and new data. Excavations reports are very different according to the periods of the excavations. Excavations methods and ceramic typologies have evolved considerably. How to take into account similar data, but presented in such a different way? For instance, for the pottery, today, most of the time, we use the Minimum number of individuals, or MNI, or other statistic methods. But, especially in the case of local non Greek or Roman pottery, we can find indications as “a lot of”, “few local vases” and so on. In a table or a database, you have to find a solution to indicate the quantity and compare it from one site to another (for instance a list with numbers: 1-few, 2-several, 3-many, 4-very great number).

To harmonize the registration, the best way is the creation of lists. List of typologies, objects, periods, colours, genders, size.

Several tools exist. They give generic lists of adapted vocabulary for epigraphy or archaeology:

- EAGLE: <https://www.eagle-network.eu/resources/search-inscriptions/>
- The PACTOL-FRANTIQU thesaurus: <https://pactols.frantiq.fr/opentheso/>

An example (one of the lists in the MAP database):

1,Hébreu,Hebrew	15,Perse,Persian
2,Moabite,Moabite	16,Égyptien,Egyptian
3,Ammonite,Ammonite	17,Louvite,Luwian
4,Édomite,Edomite	18,Lycien,Lycian
5,Phénicien,Phoenician	19,Lydien,Lydian
6,Punique,Punic	20,Carien,Carian
7,Araméen,Aramaic	21,Phrygien,Phrygian
8,Syriaque,Syriac	22,Pisidien,Pisidian
9,Mandéen,Mandaean	23,Latin,Latin
10,Hatréen,Hatraean	24,Libyque,Libyan
11,Palmyrénien,Palmyrene	25,Grec ,Greek
12,Nabatéen,Nabataean	26,Étrusque,Etruscan
13,Babylonien,Babylonian	27,Ibérique,Iberian
14,Assyrien ,Assyrian	28,Celtique,Celtic

2.4.- Practical Applications. Organise your corpus and design a database

The students have to try to organise their data/one part of their data in a table, as if they would create a database, and then present to us their table, insisting on their choices, questions and problems they found. If they already have adopted a way to classify their data, they have to compare the MAP method with their own one and then, they present the difference or the similarities between them.

2.5.- Design a database. The example of the MAP database

The MAP database is complex, but its “logic” is quite simple: a source may contains one or several testimony (ies) (parts of the text including the name of a god) which may contain one or several element(s) (parts of the name of the god). It is a complex one, because of the great number of the metadata. Every source is located and dated (most of the time). Testimonies may refer to another place or another date (for a celebration for instance). Moreover, sources and testimonies have been made by human beings. Elements may refer to a place too (the mountain, a city, a landscape...). So we added to the first three central tables other tables: location, dating, agents. We added a table for the bibliography too. As the whole team register the data, we add a table for the follow up. And as the whole team register the data, we have many rules of registration, and many predefined word lists. For technical reason, the lists must have been converted in fields.

3.- Using Spatial Data

Objectives:

- Understand what spatial data is.
- Use a GIS software.
- Represent spatial data by creating a map.

3.1.- The spatial data

To define the spatial data, we can say that it is an information about a physical object that can be represented by numerical values in a geographic coordinate system, in a given time. Thus, spatial data represents the location, size and shape of an object (and the relationship between these geographical features) on planet Earth like a building, lake, mountain or township for instance. Spatial data may also include attributes that provide more information about this object.

We can also talk about geospatial data and geographic data and information, spatial information, etc.

Useful links:

https://en.wikipedia.org/wiki/Geographic_data_and_information

<https://www.safe.com/what-is/spatial-data/>

3.2.- What is a GIS?

“Today it would be inconceivable to work with spatial data without using GIS”, Baena Presler *et al.* 1999, p. 133 (cf. bibliography).

3.2.1.- Definition

A GIS is a “geographic information system”. It is a digital tool for storing, managing and analysing spatial data.

A complete definition could be D. Pumain’s one: “concretely, [the GIS] is a computer instrument for storing, analysing and communicating geospatial information. It is generally organized into layers of information, each one referring to a particular theme or data acquisition mode or form of recording. The entire system contains geocoded databases, software for updating these databases and calculations to combine different layers of information and spatial analysis processing as well as hardware and software for cartographic representation.

In other words, it is a set linking the semantics of the object to the geography of the object, bringing together four main basic functions: the collection of geographical data, their management, their exploitation (with spatial analysis) and their editing, without forgetting that of their processing in various forms.”

3.2.2.- GIS and Ancient Archaeology/History

In the 1960s and 1970s, the combination of different tools and projects gave birth to GIS. At this time, computer-aided cartography and design (CAD) developed, as well as urban databases, often thanks to local initiatives. In the 1980s, in a context of spatial planning reflection and the Government’s competencies decentralization, GIS projects were launched in large urban areas. In the 1990s, GIS evolved dramatically, thanks to the development of microcomputing, graphical interfaces and computer peripherals. Costs were decreasing, when performance was increasing: the access to this type of technology became easier. Projects including GIS have become more diversified, according to people choices in their use; they were no longer the prerogative of urban space study and management. Their decision-making tool status (for local authorities) now includes that of supporting scientific research in various fields.

GIS have thus contributed to the evolution of geographical thinking, in exact parallel to computer evolution, towards greater theorisation and therefore greater use of spatial modelling. At the same time, the interest of archaeologists and historians in the territorial and environmental dimensions (the “context”) of the sites they were excavating or studying has increased in their field approach and the formulation of their research problems. Spatial, territorial and environmental archaeology developed intersecting with the geography. Indeed, they share the study of the cultural and non-cultural (or “natural”) environment of human communities and thus the historical and naturalistic dimensions.

Once the geographical dimension of their discipline had been accepted by archaeologists, they proceeded to a “reasoned assimilation of the heuristic virtues of the approach and the operating means” from this disciplinary field; the GIS thus integrated the panel of archaeological tools. First, they facilitated or even accelerated research, then they modified the archaeologists approach to documentation and the problems they faced with. Often, archaeologists and historians used to introduce the spatial issue at the end of their reasoning, to illustrate and/or confirm it, promoting the “routine mapping of archaeological classifications”. Now GIS users are trying to open up the questioning and apprehend, from the beginning, the site in its

environment, in its space. Prehistorians and protohistorians, the first, have seen the contributions of the use of GIS in problems of implantation and diffusion of habitat, occupation and control of a territory. For Antiquity and the so-called historical periods, GIS initiatives still struggle to find their place. However, P. Garmy points out that ancient cities are both “capital” cities and geopolitical territories. The spatial dimension is therefore essential. And a GIS, by linking information, location (or even temporality), is capable of producing a complex and structured image of territories (past or present) and their dynamics.

From É. Guillon, *Les arrière-pays des cités phéniciennes à l'époque hellénistique (IV^e – I^{er} s. av. J.-C.). Approches historiques et spatiales d'une aire géoculturelle* (text in French), accepted for publishing.

As a GIS helps us to visualise and analyse spatial data, it can be used to represent our historical and archaeological data: distribution of material artefacts, archaeological sites, spatial modelling of trade networks, people migrations...

I talk about representation because making maps with a GIS (and without a GIS!) is presenting a model, a simplified and interpreted representation of reality. Mapping means making choices.

3.3.- What is a spatial projection?

A map projection is a systematic transformation of the latitudes and longitudes of locations from the surface of a sphere or an ellipsoid into locations on a plane. Maps cannot be created without map projections. All map projections necessarily distort the surface in some manners. Depending on the purpose of the map, some distortions are acceptable and others are not; therefore, different map projections exist in order to preserve some properties of the sphere-like body at the expense of other properties. There is no limit to the number of possible map projections.

Today, we will use one of them: the (ESPG) => WGS 84. It is a world geodetic system, which is used by the satellite navigation including GPS.

Useful links:

https://en.wikipedia.org/wiki/Map_projection.

https://en.wikipedia.org/wiki/Web_Mercator_projection.

https://fr.wikipedia.org/wiki/WGS_84 (The French version is more detailed).

3.4.- Practical Application: Making a Map

Presentation of QGIS with a step-by-step exercise to create and export a thematic map.

4.- Bibliography

About Digital Humanities

Bouzidi L. and Boulesnane S., “Les Humanités Numériques. L’évolution des usages et des pratiques, *Les Cahiers du numérique* 13/3, 2017, p. 19-38.

Burdick A., *et alii*, *Digital Humanities*, Cambridge, London, 2012.

Phillips P., and Willey G. R., “Method and Theory in American Archaeology: an Operational Basis for Culture-Historical Integration”, *AA* 55, 1953, p. 615-633.

Contat O., *et alii*, “Gestion des données de la recherche. Quelques pistes pour démarrer, comprendre et se former”, site collaboratif *Correspondants IST-SHS*, 2018, http://corist-shs.cnrs.fr/gestion_donnees_recherche_guideetformation_11.

Magué P., *et alii*, *Introduction aux Humanités Numériques*, carnet de recherche, <https://www.openedition.org/11453>.

“Luhmann’s Zettelkasten”, in *Taking Notes. A blog on the nature of note-taking*, December 2007, <http://takingnotenow.blogspot.com/2007/12/luhmanns-zettelkasten.html>.

Projects using Digital Practices

Favory F., *et alii*, *Archaeomedes. Des oppida aux métropoles : archéologues et géographes en vallée du Rhône*, Paris, Anthropos, 1998.

Garmy P., *Villes, réseaux et systèmes de ville*, Paris 2012.

Guillon É., Porzia F. “Ancient Gods going Digital. On the first steps of the on-going ERC Project “Mapping Ancient Polytheisms””, in V. Bigot Juloux and R.W. Younker (dir.), *Acts of ASOR/EPHE-PSL European symposium. Paris, La Sorbonne, September 4-6, 2018* (forthcoming).

About Spatial Data and Approaches in Ancient History/Archaeology

Bevan A. and Wilson A., “Models of settlement hierarchy based on partial evidence”, *Journal of Archaeological Science* 40/5, mai 2013, p. 2415-2427 (On ResearchGate: https://www.researchgate.net/publication/257154745_Models_of_settlement_hierarchy_based_on_partial_evidence).

Devillers R., *et alii*, “Thirty Years of Research on Spatial Data Quality: Achievements, Failures, and Opportunities”, *Transactions in GIS*, 14/44, 2010, p. 387–400 (PDF in this file).

Evans T.S., Rivers R.J. and Knappett C., “Interactions In Space For Archaeological Models”, conference ‘Cultural Evolution in Spatially Structured Populations’, UCL September 2010.

Gillings M., Mattingly D. J. and Dalen J. V. (dir.), *Geographical Information Systems and Landscape Archaeology*, Oxford, 1999, especially the following contributions:

- Baena Preysler J., *et alii*, “Geographical Information Systems and Archaeology : Methodological Aspects and Display of Results”, p. 133-137.
- Fisher P. F., “Geographical Information Systems : Today and Tomorrow”, p. 5-11.
- Witcher R. E., “GIS and Landscapes of Perception”, p. 13-22.

Kohler T.A., “Complex Systems and Archaeology”, in I. Hodder, *Archaeological Theory Today*, Malden, 2012, p. 93-123.

Nuninger L. and Bertoncello F., “Modéliser et analyser”, in X. Rodier (dir.), *Information Spatiale et Archéologie*, Paris, 2011, p. 127-161.

Sanders L. (dir.), *Modèles en analyse spatiale*, Paris, 2001.

Wheatley D. and Gillings M., *Spatial Technology and Archaeology. The Archaeological Applications of GIS*, London, 2002.

Researches using spatial data and approaches

Favory F., *et alii.*, *Des oppida aux métropoles : archéologues et géographes en vallée du Rhône*, Paris, Anthropos, 1998.

Favory F., Ouriachi M.-J. and Nuninger L., “The Transformation of Rural Structures in Southern Gaul between the 1st Century BC and the 1st Century AD. The Case of Eastern Languedoc”, *Osnabrücker Forschungen zu Altertum und Antike-Rezeption* band 14, 2009, p. 157-184.

Favory, F. and Van der Leeuw, S.E., *Archaeomedes, la dynamique spatio-temporelle de l'habitat antique dans la vallée du Rhône : bilan et perspectives*, *Revue archéologique de Narbonnaise*, 31, 1998.

Giraud J., *Restitution d'un espace géographique ancien : la province du Ja'alan à l'âge du Bronze (Sultanat d'Oman)*, Thèse de Doctorat, Université de Paris 1 Pantéon-Sorbonne, Paris, 2007.

Online ressources (maps, advices...)

Bond S., “Blog: Mapping and Teaching the Classical World” <https://classicalstudies.org/scs-blog/ionic007/blog-mapping-and-teaching-classical-world>.

Quantitative Tools in Humanities and Social Sciences

Les outils du quanti en sciences humaines et sociales. Carnet du cycle de rencontres et d'échanges autour du traitement et de l'analyse quantitative de données en SHS, <https://outiquanti.hypotheses.org/>.

About the French school *Les Annales*

Burguière A., “Histoire d'une histoire : la naissance des Annales”, *Annales. Économies, sociétés, civilisations* 34/6, 1979. p. 1347-1359.

Dosse F., “ À l'École des Annales, une règle : l'ouverture disciplinaire”, *Hermès, La revue* 67/3, 2013, p. 106-112).

Forster R., “Achievements of the Annales School”, *The Journal of Economic History* 38/1, 1978, p. 58-76.

Harsgor M., “Total History: The Annales School”, *Journal of Contemporary History*, 13/1, 1978, p. 1-13.