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INFORMATION DESIGN AND DATA VISUALIZATION IN THE ITSERR PROJECT.

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ABSTRACT | Resilience, as the first European research infrastructure for Religious Sciences, establishes its foundational framework through the collaborative efforts of the ITSERR research team – Italian Strengthening of the ESFRI RI Resilience. The objective of this project is to develop new visualization tools and systems aimed at providing support to the scientific community engaged in Digital Humanities for Religious Studies. Employing an experimental and interdisciplinary design approach within the ITSERR ecosystem, the research explores visual strategies in Information Design and Data Visualization. The aim is to preserve both tangible and intangible religious corpora's heritage. To analyze visualization systems created by Christian and Islamic scholars in theological, historiographical, scientific, and graphic-visual contexts, it is necessary to study several infographic representations and their evolution over time. According to the academic perspective, *De Christiana Doctrina* by St. Augustine emphasizes the necessity of combining exegetical examination of sacred texts with historiographical and scientific pursuits (Brotton, 2017). An essential tool for providing support and guidance through the phases of research and graphic design is a multidisciplinary glossary that can be established as a collaborative space accommodating various disciplines.

Within the multidisciplinary milieu of ITSERR, the integration of qualitative techniques in the design process is deemed essential for an exhaustive comprehension of individuals' activities and the influence of environmental factors, as articulated by Norman (2019). Methodologies such as structured interviews, focus groups, and VARK questionnaires serve as guiding tools, steering designers toward creating designs that facilitate a more congenial learning experience for users through dynamic and multichannel audio-visual modalities. As a result, the ITSERR project's amalgamation of concepts from history, theology, and science creates a complex network of data and information. The translation of this intricate web requires the use of strategic communication design methodologies.

1. Introduction

1.1 ITSERR: a Transdisciplinary Research Platform

Within the ESFRI, the European Strategic Forum on Research Infrastructures, ITSERR has emerged as a strategic instrument fostering scientific research in Europe and fortifying the diffusion and internationalization of Religious Studies. Within ITSERR, the convergence of memory and science preserves the past through memory reconstruction and new interpretations, particularly within religious corpora, where sacred texts become "places of memory." In the religious corpora, the word becomes "omnipresent": the sacred texts, as timeless "places of memory," are mnestic archives that connect the history of both God and man (Assmann, 1997). A transdisciplinary design approach is a means to develop innovative visual strategies for the preservation of both material and immaterial heritage described within the narrative space of the corpora and their linguistic toponyms.

The ITSERR's research ecosystem is paramount for the Resilience project, involving different disciplines, departments, and Italian universities as project collaborators (the University of Modena and Reggio Emilia, Turin, Naples L'Orientale, the University of Palermo with Departments of Architecture, Culture and Society, Law, Engineering, Mathematics, and Computer Science). The core of this framework is the amalgamation of knowledge and expertise to support comparative studies and advance scientific research. In this context, a specialized team of designers comprised of an associate professor, a researcher, and a Ph.D. student is working in the field of Religious Studies to connect Information Design, Data Visualization, and Digital Humanities.

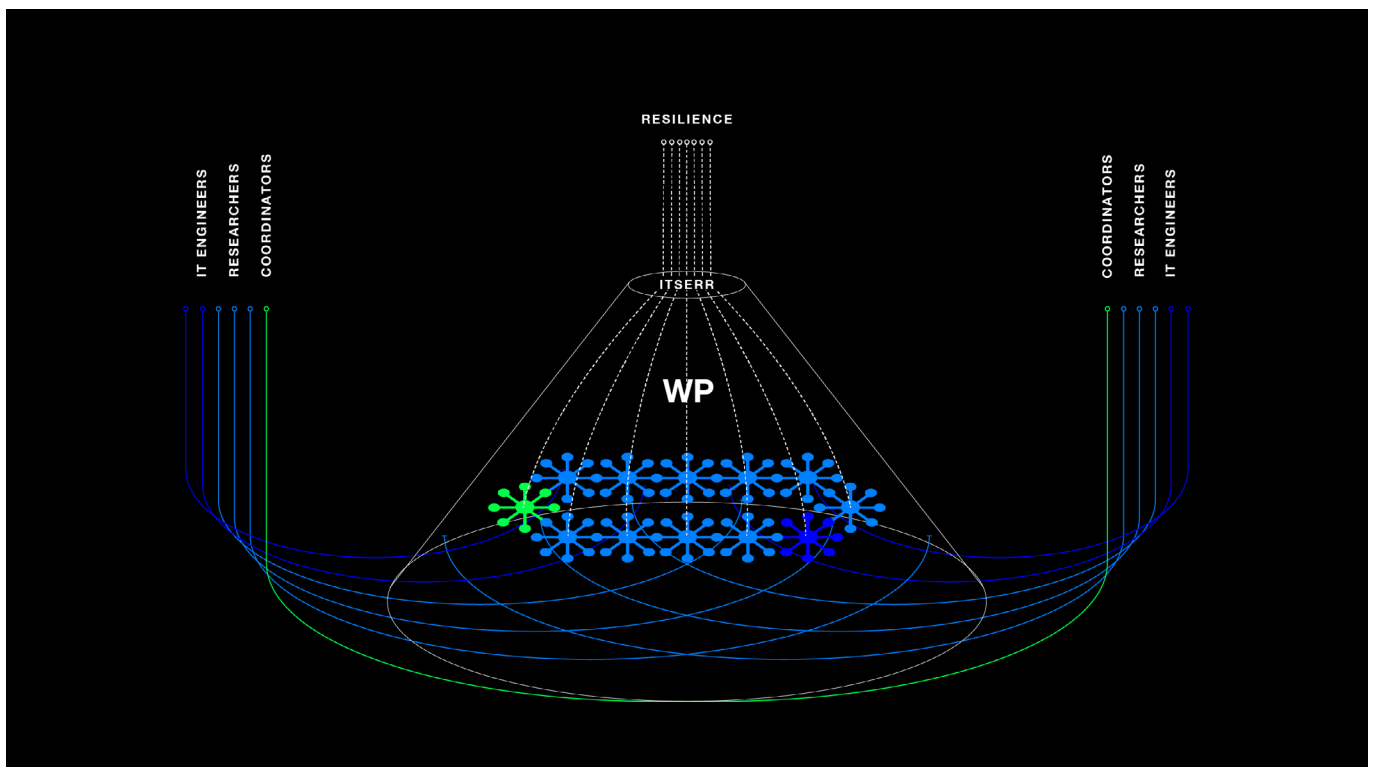


Figure 1. ITSERR ecosystem.

1.2 Research Questions and Objectives

To devise more effective visualization systems and conserve the material and immaterial heritage embedded in religious corpora, the research aims to explore new visual strategies within Data Visualization. The primary focus is enhancing the processes of consultation, archiving, and data utilization

within the humanistic discipline of Digital Humanities. Key questions include selecting, designing, and creating tools to construct a multidisciplinary design language. Integral queries involve identifying, designing, and generating tools to create a comprehensive multidisciplinary design language. In addition, the study explores the intricate dynamics of how design contributes to the realms of communication and content dissemination, allowing for the visualization of new semantic, syntactic, and morphological configurations.

2. Methodology

2.1 Anthropocentric Design

To ensure the seamless integration of scientific knowledge into the design process, it is essential to establish a methodological framework that is meticulously tailored to various research and project phases (Maldonado, 2015). Ubiquity's scope encompasses a defined methodological approach that incorporates techniques from allied disciplines in harmony with the project's transdisciplinary nature. In a collaborative setting, philologists, historians, computer scientists, engineers, and designers work together to develop new methodologies and tools.

The influence of Human Factors (Sinico, 2012) in the design process requires the implementation of interdisciplinary methodologies, pushing research into novel realms and elevating communication design to unprecedented heights. According to Human-Centered Design (Norman, 2019) and Humanity Design-Centered (Norman, 2023), qualitative research methodologies prioritize understanding human needs, capabilities, and behaviors as a guideline for adaptive design strategies. Anthropocentric design is emerging as a means of tracking a design trajectory, with observation as the primary method for collecting data on non-verbal behavior (Corbetta, 2015). Acquiring knowledge requires listening, and the user is both a researcher and a consumer of content. The design process is enhanced by the researcher/user's active involvement throughout the project phases, which ensures that the resulting products are authentic, comprehensible, and user-friendly (Norman, 2019).

2.2 Researcher's Work: An Inquiry into Methods and Tools for Humanities Research

Structured interviews and focus groups are essential in qualitative anthropological-social research, as they help to understand the analyzed environments and contexts and provide insights into the characteristics of representative interviews.

The use of a tool like Google Form, which was intended for structured interviews, is utilized to gather information from ITSEER researchers in humanistic disciplines. The interview format, which is broken down into four thematic groups (Spaces, Tools, Time, and Knowledge) and uses both open-ended and closed-ended questions, allows for capturing the expressed needs, requirements, and desires of the scientific community. Notably, the incorporation of open-ended questions enables the detailed documentation of the intricate aspects of the researchers' activities. After being collected, the results were reworked and standardized in an Excel matrix. This has resulted in the creation of a first representative sample and the attainment of valid qualitative results, which can be utilized to extrapolate new research ideas.

Furthermore, a retrospective review of previous studies demonstrates the distinct cognitive modalities employed by each individual in information assimilation (Claxton & Murrell, 1987). The different ways in which individuals acquire, process, interpret, and elaborate on information are delineated by cognitive-personal, info-processual, socio-interactive, and didactic-preferential models (Curry, 1983).

Analyzing individual learning styles is essential for recognizing diverse cognitive approaches in information acquisition and processing. The VARK system, conceptualized by Fleming (1987) – an acronym for Visual, Aural, Read, and Kinesthetic – facilitates the identification of preferred didactic patterns utilized by individuals. This encompasses four sensory learning modalities: non-verbal visual, auditory, verbal-visual, and kinesthetic. Through these modalities, information is acquired using non-verbal visual aids like

diagrams and graphic visualizations, auditory aids such as recordings, verbal-visual aids encompassing texts, annotations, and writing, and kinesthetic aids involving practical and laboratory activities. The VARK model, introduced by Fleming to enhance the learning experiences of his students, aims to scrutinize the ways and strategies through which data and information are recorded and processed. To achieve this, a questionnaire based on Fleming's framework (1992) was devised to comprehend the learning styles employed most frequently and the channels through which researchers acquire new knowledge.

3. Results

3.1 Learning Styles: Methods and Strategies in the Acquisition and Personal Elaboration of Information

The observations and collected data underscore the necessity of designing more effective and intuitive tools to enhance data and content utilization in scientific research. According to the Vark questionnaires (figure 2-3), humanist researchers are more likely to use visual channels (verbal and non-verbal) for annotation and information acquisition. Notes, annotations, lists, definitions, and customizable signs can be useful tools for the user/researcher to enhance the use and dissemination of textual and paratextual data and information. This prompts new questions about the subject being investigated and demonstrates how analog tools can aid in the better organization of information by utilizing personal visual codes. The obtained data not only uncover novel inquiries relevant to the investigated theme but also affirm the indispensable nature of dialogue and collaboration among researchers and industry professionals as tools for knowledge enrichment.

From this, it emerges how it is essential to design more efficient and intuitive tools that can improve the use of data and content in the scientific research of Digital Humanities.

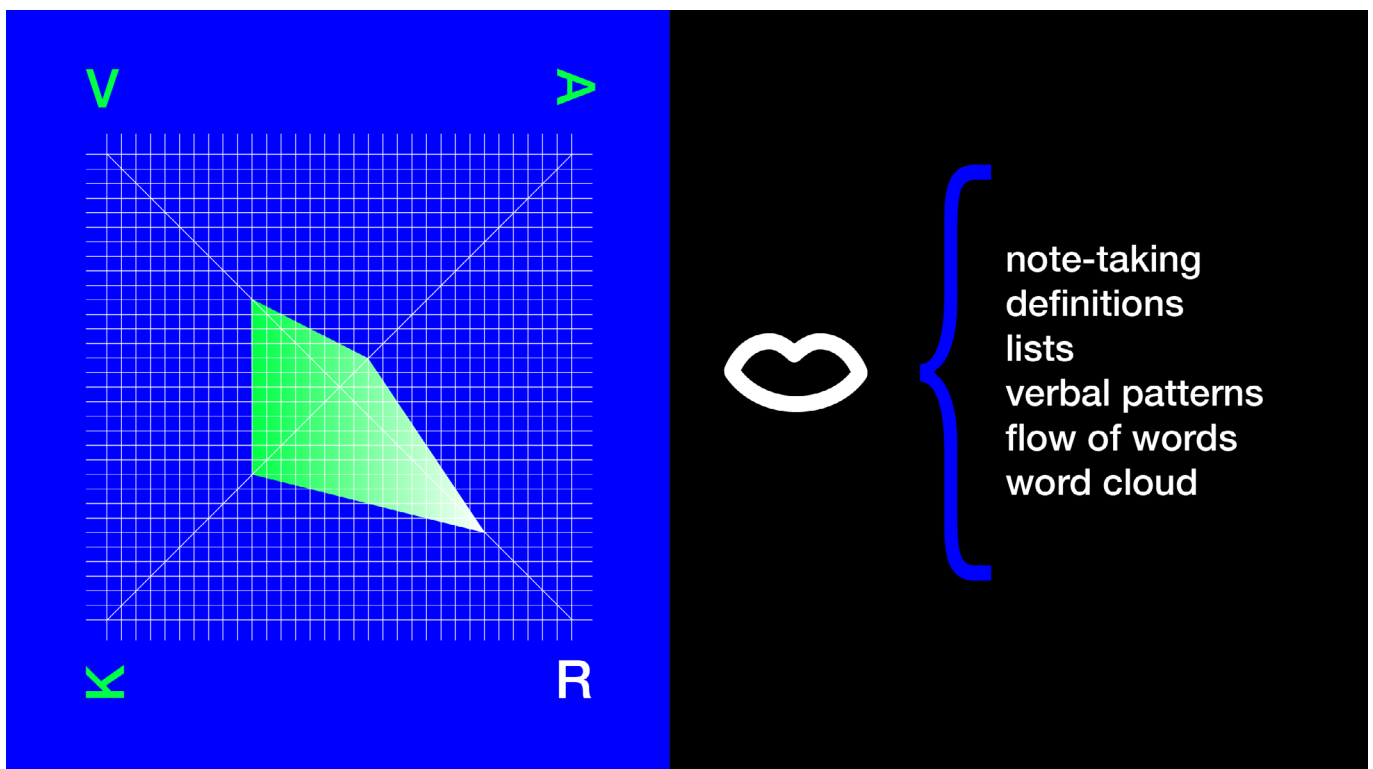


Figure 2. The graph illustrates the learning strategies employed by humanist researchers to acquire data and information: verbal strategies such as creating word lists, using definitions to clarify concepts, word streams, and annotations are preferred by researchers who have identified significant responses in the visual verb channel (R=read and write).

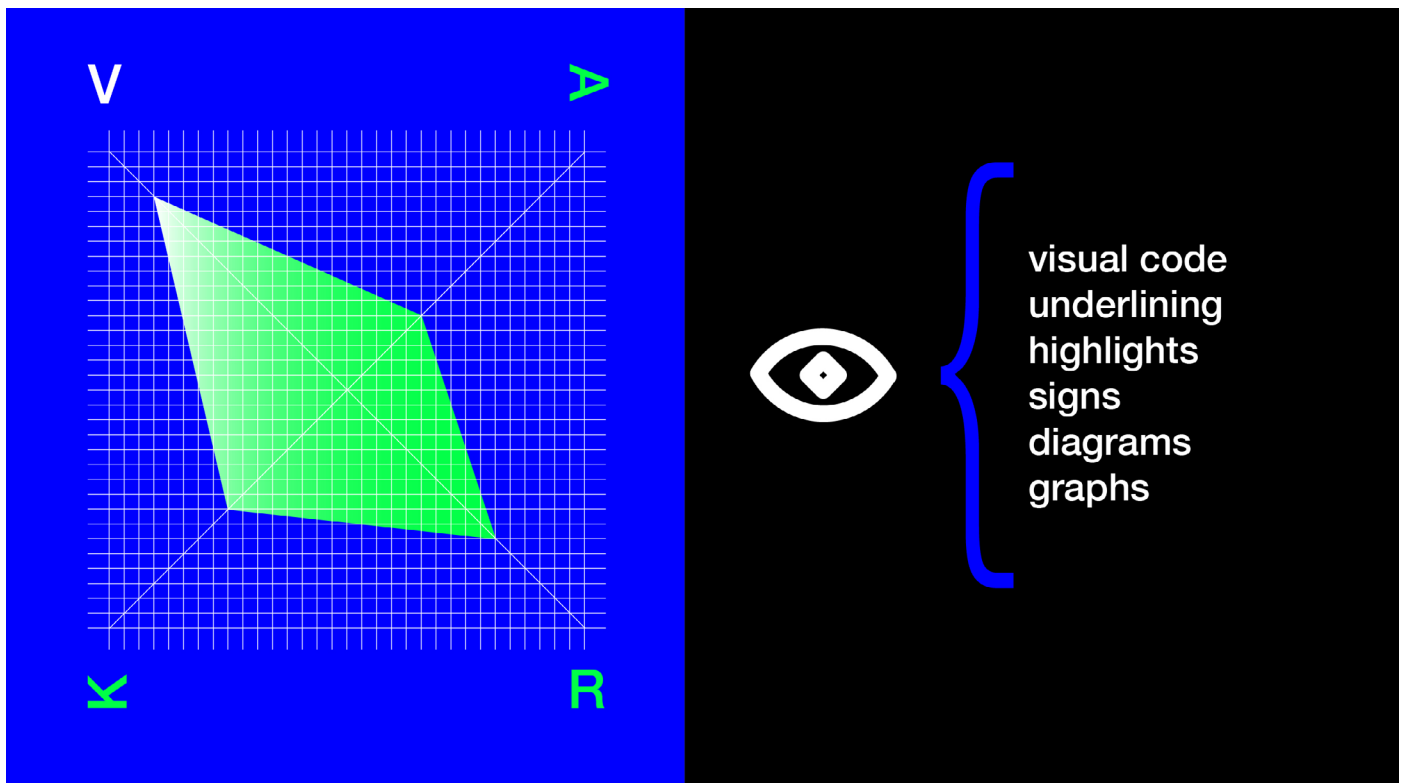


Figure 3. The graph illustrates the learning strategies employed by humanist researchers to acquire data and information: verbal strategies, such as creating visual code using underlining signs and highlights, are preferred by researchers who have identified significant responses in the visual nonverb channel (V=visual).

Analysis of the documented responses reveals a predilection among researchers for recording qualitative and quantitative data using personalized visual-verbal codes and analog annotation methods. Subsequently, these acquired insights undergo processing through digital annotation tools. Digital tools contribute to a hierarchical and structured organization of concepts, thereby accelerating document production and significantly curtailing compilation time. The mechanization of processes, coupled with data and metadata storage, in conjunction with the potential for multi-spatial and instrumental pole connections, ensures the production of complex, precise, and easily disseminable documents.

On the other hand, analog tools retain a pivotal role in transcribing acquired information. The capacity to craft visual-verbal visualizations inherent in writing is limited by the deficiency of mechanically annotating data through digital devices, such as computers. Perondi and Romei (2010) pointed out that computerized writing has reintroduced a linearist bias, making it more difficult to compose non-rigidly sequential texts. The inability to incorporate characters beyond the basic set, coupled with the inability to dynamically organize text in space, results in semantic impoverishment. The reevaluation of data and information through visual-verbal connections, encompassing arrangement, orientation, size, etc., bestows an enhanced value and meaning to the written word, with space emerging as "one of the central dimensions of writing [...] that could allow for the most interesting developments" (Perondi, 2023).

Furthermore, the inherent flexibility of analog writing tools (pen, pencil, etc.) and the swift, fluid gestures inherent to the act of writing position calligraphic writing as a particularly apt means for the transcription of thought. However, in a novel rendition, contemporary devices like the iPad Pro offer an experience closely mirroring analog writing. This experience is characterized by "allowing the spatial organization of writing and a user experience that captures the text as a whole," surpassing the capabilities of digital platforms utilizing AI systems for the spatial organization of content (Perondi & Romei, 2010). The enhanced ability to trace data within text and reprocess extracted information utilizing customizable visualization tools persists as a central and unavoidable concern for accurate design. To transform this into a novel source of knowledge, it is necessary to develop more adaptable writing tools to ensure an improved approach to the written text (Perondi, 2023).

4. Conclusions

4.1 Future Scenarios for Religious Studies

Mapping information involves simplification and abstraction and uses graphic configurations derived from cultural and social conventions, which vary across different cultures. According to Barthes, images have significant expressive value as a sign or element of a communication system (quoted by Polano, 2018, p.10). Using visualization through images, specific concepts can be communicated using iconographic models that are shared within collective memories and knowledge. However, Polano introduces the caveat that “unlike writing or language, the image presents itself globally, making it difficult to determine the context. Thus, what the image gains in expressiveness, it often loses clarity.” Images are always accompanied by words, whether they are in the form of captions, comments, or detailed explanations. Sinsemic relationships established between text and image within a specific context, defined as the graphic space of representation, influence the meaning attributed to the elements they reference. Data visualization through images and visual analogies can emerge as an influential tool for generating and communicating new meanings (Perondi, 2023).

At the same time, the design of spatial and temporal visualization systems incorporating multiple graphic representations, such as iconography and typography, culminates in outcomes that, when translated into interactive and hypertextual systems, unveil novel visual configurations.

This exploration goes beyond the realm of knowledge:

- **Space:** The primary dimension discussed pertains to spatiality, delving into different visualization systems that consider synthetic relationships between text and image as tools for knowledge and semantic enrichment.
- **Time:** After spatial considerations, the fourth dimension of knowledge, temporality, is examined through timeline construction. This facilitates the visualization of a dense network of relationships that intertwines the history of terrestrial and celestial locations with figures from biblical and Quranic contexts, Church Fathers, and theologians within commentaries and religious texts.
- **Knowledge:** The dimension of scientific knowledge is meticulously constructed using established tools and methods, some well-established in design and others bespoke to cater to multidisciplinary teams. Creating a shared glossary within the Ubiquity team transforms it into a research tool, facilitating the study and connection of terms across diverse disciplines. The process involves defining diverse domains that can be further broken down into disciplinary subdomains: design, religious studies, and computer science.

Graphically visualizing concepts, content, and words and capturing logical-transversal connections significantly enhances research efficacy. By utilizing customizable graphic configurations and the ability to trace direct and indirect information hierarchically across multiple reading levels, research can be elevated by facilitating text comparisons and expediting meticulous analysis. The exploration of novel visualization strategies within the domain of data visualization and information design for Religious Studies, aligned with the adoption of transdisciplinary methodologies, steers design efforts toward crafting profound multimedia and immersive narrative systems. According to this approach, infographics are invaluable memory aids and powerful tools for exploring and constructing new knowledge (Yates & Gombrich, 2007).

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