

A Brief Presentation of the Knowledge Paths for Semiotics (KPS) Project: Creating Digital Research Tools

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Received: March 1, 2022

Accepted: April 20, 2022

Online Published: April 29, 2022

doi:10.5539/cis.v15n2p2

URL: <https://doi.org/10.5539/cis.v15n2p2>

Abstract

This paper provides an outline for a proposed project entitled ‘Knowledge Paths for Semiotics (KPS): Creating Digital Research Tools.’ The object of the paper is to show how a printed dictionary can be transformed into modular digital research tools. Although it is an ad hoc proposal on an analytical dictionary of semiotics it can be used as a model for creating related works. In general, it can be said that the proposed tools assist in the retrieval of information (linguistic and semantic), the acquisition of knowledge, and the extraction of new knowledge. In this context, three categories of tools are proposed: (i) terminology tools, (ii) learning tools, and (iii) tools for the discovery of new knowledge. In the conclusion of this paper, special emphasis is placed on the impact that will result from the implementation of this KPS project.

Keywords: dictionary, digital research tools, information transformation, semiotics

1. Introduction

The dictionary is a resource that can be used to enhance knowledge in a field of knowledge or more generally when a reference inquiry is carried out. In librarian terms, the dictionary is a reference book (Feather & Sturges, 2003) that is a valued and condensed source of information. A dictionary is organized alphabetically or thematically, and thus, it does not require sequential reading, considering that knowledge is provided in autonomous content blocks. Nowadays, many reference books, apart from the traditional printed form, are also available in digital forms (Myridis, 2011). The benefit of such a transition is a given, but also a vital choice that is closely linked to the needs of the present and future. Indeed, although information requirements remain constant, the digital era has changed the form and organization of information (Feather & Sturges, 2003). In fact, research shows that the use of online language resources can help, for example, either in solving learning problems (Ambarwati & Mandasari, 2020) or in the translation process (Fuentes-Olivera, 2013). On the other, a key issue for switching from conventional (paper) products to online resources is production cost (Widmann & Buchanan, 2017), as well as their quality (Kwary, 2012). However, this fact should not be hindered the development of innovative features in reference sources, as information science technologies have opened up entirely new horizons in lexicography (Tarp, 2012) and beyond.

2. The Necessity of the Proposed Project

Within the above context, the analytical dictionary of semiotics is a basic scientific source for semiotics studies. This reference book is a fundamental text of the semiotic European tradition, which above all reflects the views of the semiotic school of Paris. Views of this school connects semiotics with language theory. This dictionary could therefore be described as a basic encyclopedia of the French semiotic tradition. Furthermore, it could very well be considered as a part of the world's scientific heritage in this field. In this sense, this intangible asset is an important and unique bequest to future generations. Therefore, an immediate priority of the contemporary generation is the digital preservation of this dictionary's content. This preservation incorporates various processes such as storage, access, dissemination, representation, organization, etc.

Moreover, nowadays, due to technological progress, the study of the aforementioned dictionary requires the utilization of digital technologies, to make it visible and functionally accessible, as well as scientifically and educationally usable—mainly through the creation of new forms of representation and organization of information and knowledge. Furthermore, this perspective of modernization requires an interdisciplinary

approach, which utilizes techniques and methods of three scientific fields, i.e., linguistics, computer science, and mathematics. Moreover, this interdisciplinarity concerns the following specific areas: semantics, knowledge management, and statistics, respectively. In the next section, will take place a brief outline of the project *Knowledge Paths for Semiotics* (briefly, KPS Project).

3. Presentation of the KPS Project

3.1 The Object of the Project

The KPS Project has as its object of work the transformation of the dictionary “*Sémiotique: dictionnaire raisonné de la théorie du langage*” (henceforth, *analytical dictionary of semiotics* or even, *dictionary*) by A. J. Greimas and J. Courtés into modular digital research tools. These tools can assist researchers—here, *semioticians*—to search for and retrieve linguistic information, understand more deeply the specialized scientific knowledge, as well as discover new knowledge. In this context, we propose to use the English translation of the dictionary (Greimas & Courtés, 1982) for the implementation of this project, in as much as the tools are addressed to an international audience.

3.2 The Main Goals of the Project

The KPS Project has the following main goals:

- 1) to make semiotic information and knowledge openly visible
- 2) to make the retrieval of semiotic information more effective
- 3) to address the problem of multilingualism in scientific publications
- 4) to support semiotic research with new services (e.g., annotation of terms, visualization of semiotic knowledge)

3.3 General Methodological Perspective

Based on the main objectives set out in the above, Table 1 presents the possibilities that can be achieved by the transformation of the analytical semiotic dictionary, as well as the means that contribute to this transformation.

Table 1. Possibilities and means of modernization of Geimas dictionary

Modernization possibilities	Modernization means
Visibility	Internet
Functional accessibility	Digital technologies, Meta-knowledge annotation
Scientific and educational utilization	Expert annotation, Knowledge mapping, Knowledge repositories, Meta-knowledge annotation, Statistical analyses, Terminological resources

Apart from the modernization of Greimas dictionary which concerns the use of digital technologies (such as systems for annotating a document, systems of digital storage, database management systems), the rapid retrieval of information, the representation, and organization of knowledge in traditional (such as glossaries, thesauri, terminological dictionaries) and modern forms (such as terminological databases, knowledge databases, graphs), additionally an equally important role is played by dictionary’s international promotion, which is necessarily associated with the use of the English language. Yet, the latter also includes the vision for local adaptation of the terms, while many researchers, in addition to the English language, sometimes publish in their native language. Finally, we introduce, as a case study, the translation of semiotic terms into Greek, in order to enhance the uniformity of terminology at the local level, i.e., regarding the Greek semiotic community.

3.4 Work Packages

The KPS project consists of eleven Work Packages (WP), each involving the development of a distinct digital research tool. Each WP, in turn, has clearly defined tasks—although we will not analyze them in this paper—and deliverables (i.e. the aforementioned digital tools), which serve specific needs related to the overall goals of the KPS project. Specifically, transformation of the analytical semiotic dictionary under consideration attempts to meet three basic needs: (1) the need for common terminology, (2) the need for innovative learning, and (3) the need for discovery of new knowledge. Therefore, we can categorize digital research tools based on their basic function into three categories: terminology tools, learning tools, and tools for the discovery of new knowledge, without, of course, ignoring the primary requirement for open scientific data, which is the cornerstone of this effort. The suggested digital tools for this project are as follows.

(i) Terminological Tools:

Digital Tool #1. Trilingual (English-French-Greek) Glossary of Basic Semiotic Terms

Digital Tool #2. Bilingual (English-Greek) Glossary of Secondary Semiotic Terms

Digital Tool #3. Bilingual (English-Greek) Glossary of Semiotic Phraseology

Digital Tool #4. Bilingual (English-Greek) Thesaurus of Basic Semiotic Terms

(ii) Learning Tools:

Digital Tool #5. Bilingual (English-Greek) Brief Dictionary of Basic Semiotic Terms

Digital Tool #6. Bilingual (English-Greek) Terminology Database with Annotation

Digital Tool #7. Relationships Graph of Basic Terms (English)

Digital tool # 8. Controlled Study Path Graph of Semiotic Knowledge (English)

(iii) Tools for discovery of new knowledge:

Digital Tool #9. Analytics of Semiotic Terms

Digital Tool #10. Knowledge Base for Semiotic Basic Terms

Digital Tool #11. Knowledge Graph for Semiotic Basic Terms

It is also worth mentioning that, for practical reasons, we distinguish three basic categories regarding linguistic material, i.e., the basic terms, the secondary terms, and the content of the basic terms. The basic terms refer to the 647 terms described in the dictionary; the secondary terms refer to other semiotics terms that will be extracted using methodological selection; finally, the content of the basic terms concerns texts of the dictionary. Table 2 embodies digital research tools based on the category of material used to develop them.

Table 2. Grouping digital tools by linguistic material category

Linguistic Material category	Digital research tools
Basic terms	Digital Tool #1, Digital Tool #4, Digital Tool #5, Digital Tool #6, Digital Tool #7, Digital tool #8, Digital Tool #9
Secondary terms	Digital Tool #2, Digital Tool #9
Content of basic terms	Digital Tool #3, Digital Tool #10, Digital Tool #11

3.5 Technical Specifications

In the context presented herein, the main technical specifications that have been introduced are: (a) the online availability of digital tools, as well as (b) the modular design of systems that will host them. The latter has the functional advantage that concerns subdivisions into modules, which are created and modified except the other individual parts of the overall system. This means that the proposed design provides several degrees of freedom such as for instance hosting new modules, removing them, or improving them. Table 3 lists possible technological implementations (e.g., technologies, languages, software) which can be used to implement the above proposed digital tools.

Table 3. Grouping digital tools by technological implementations

Technological implementations	Digital research tools
HTML / XML	Digital Tool #1, Digital Tool #2, Digital Tool #3, Digital Tool #5
OWL (e.g., Protégé)	Digital Tool #4, Digital Tool #10
RDBMS (e.g., MySQL)	Digital Tool #6
Graph Data Platform (e.g., Neo4j)	Digital Tool #7, Digital Tool #8, Digital Tool #11
Statistical algorithms (e.g. SPSS)	Digital Tool #9

4. Discussion

Concluding this brief description of KPS project, we focus in this section on its impacts. In detail, these impacts are as follows:

- *Contribution to Open Science*

The KPS Project supports access to open scientific content, according to the FAIR Principles for scientific data management. Specifically, this content is findable, accessible, interoperable, and reusable.

- *Accessibility of semiotic information*

The KPS Project provides functional access to semiotic information; indeed, it makes use of digital technologies (for example, databases) so that users can directly interact with information, that is, quickly access various information access points, a feature not provided by printed material.

- *Delimitation of semiotic terminology*

The KPS Project addresses issues related to the language appropriateness of semiotic terms in order to achieve uniformity in terminology.

- *Reconsideration of semiotic knowledge*

The KPS Project provides expert annotations on the reconsideration of semiotic knowledge in the context of current scientific developments.

- *Creating study paths of Greimas dictionary*

The KPS Project provides alternative paths for studying the dictionary, which paths have emerged dependent on the impact factor of a single term (i.e., the degree of occurrence of a term) and on the system of cross-references proposed by the authors of the dictionary.

- *Representation and organization of semiotic information and knowledge*

The KPS Project restructures semiotic information and knowledge into new forms of representation and organization (e.g. graphs, databases, tables), so that on the one hand, researchers get a global insight of a term, while on the other hand, they become able to understand a term based on broader conceptual fields related to this term.

- *Discovery of new knowledge*

The KPS Project enables the discovery of new knowledge through the utilization of the knowledge base (digital tool #10) which enables reasoning, or, in other terms, the discovery of new (invisible) links between data.

- *(Re)connection of sciences with Semiotics*

The KPS Project helps to understand the diversity of semiotic theories, definitions, models, practices, etc. Finally, it helps to promote diversity in Semiotics and other scientific fields.

In conclusion, it could be said that the herein proposed digital tools give access to entirely new aspects of language data, which are multilinguality, semantics, visualization, taxonomy, statistics, reasoning.

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