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Representing and creating surrogates of heritage objects: the attributive function of curatorial work in digital collections

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Abstract

Digital collections from heritage institutions are becoming more widely available online. Creating digital surrogates of objects is a complex task. This research analyzes the process of representing and creating digital surrogates of heritage objects within the context of curating digital heritage collections published on the web. It focusses on the attributive function of properties to the objects described. Two theoretical frameworks are used: Peirce's semiotics; formal ontology and Searle's ontology on the construction of social reality. The construction of surrogates is an intentional process. This involves attributing cultural properties to an object, which gives an ordinary object an additional ontological nature, turning it into a cultural (digital) heritage object. The aim of this process is to provide an expanded context and finding aids for information discovery.

Keywords: digital heritage records, representation, digital curation, metadata, semiotic, formal ontology

1.0 Introduction

Digital collections of archives, libraries, and museums are increasingly available through the Web. Such collections have additional features that physical collections do not have. They have (1) an increased range, i.e., can be accessed from everywhere, by everyone, at any time; and (2) plasticity, i.e., their digital objects may be largely reused, integrated, combined, and mixed up with other digital resources available throughout the web, such as representations of authors, themes, events, historical periods, and places, thus generating new, original and unpredictable resources.

The curatorial work of creation of digital surrogates of objects is nowadays a complex task for curators and institutions. This complexity is due to the digital environment where every digital object may be interlinked with others, to technological standards such as the adoption of the FAIR Principles (GO FAIR n.d.).

This complexity is due to the very nature of heritage objects and the process of creation of their digital surrogates. The digital collection is another collection that needs additional and specialized expertise, far different from the curatorial work with physical collections. The curatorial process becomes even more complex in the context of publishing digital objects on the web using Linked Open Data (LOD) technologies (Bizer et al. 2011).

Representation is a cognitive activity that characterizes humanity. The representation of reality, its symbolic processing in our minds, and the exchange of these representations through language are remarkable characteristics of human beings (Searle 2006, 19–20).

This research proposes an analysis of the process of representing and creating of digital surrogates of heritage objects within the context of the curatorial work of digital heritage collections to be published on the web. It focuses on the attributive function of digital curators in assigning properties beyond the ontological nature and identity of the object being described, attributes of a cultural nature.

Representing and creating of digital surrogates of heritage objects - the attributive function within the tradition of Library, Information Science and Knowledge Organization (LIS/KO) - is as part of a complex curatorial process. Methodologically it is analysed within the context of two frameworks: - Peirce's Semiotic as an intentional function of assigning meaning and context, in order to provide access points; and - Formal Ontology and Searle's ontology on the construction of social reality are used to analyse the ontological nature of primary objects and of their corresponding secondary objects, or surrogates. Such frameworks are intended to shed light to the empirical process of creating surrogates of objects, a usual practice within LIS/KO.

This article is organized as follows. After this Introduction, section 2 describes the complexity of the environment for publishing digital collections formed by technologies of the semantic web and LOD. Section 3 proposes an analysis of the process of representing and creating of digital surrogates of heritage objects within the context of Peirce's Semiotic, Formal ontology and Searle's ontology on the construction of social reality. Section 4 presents and discusses the results, revising the theoretical contributions and practices of representing surrogates for heritage objects developed by LIS/KO and relating them to the analysis presented. Section 5 presents remarks and future research directions.

2.0 Publishing digital heritage collections over the web

Actually, digital heritage objects (DHO) published over the web have expanded their importance. They are now relevant in their own rights. In addition to enabling relevance decisions, DHO are, planned to be reused. They constitute a new collection, which demands special curatorial activities.

The cultural, scientific and educational potential of heritage digital collections has also increased with their publication over the web as LOD and the use of 3D images. DHO are also epistemic objects (Tybjerg 2017, 270), those that "afford particular display possibilities that draw on their potential to generate knowledge", they have educational, cultural and citizenship potential. Digital collections are one of the most important inputs to Digital Humanities (Padilla and Higgins 2014, 324-326; Terras 2022, 255-257).

LOD enables heritage institutions to publish their content in an interoperable, machine-actionable way (Wilkinson et al. 2016) and interlinked with other digital resources, creating a network of digital resources that provide users with a broad context and richer

experience. A Heritage object published as LOD is directly accessed through an IRI, regardless of the provenance institution. 3D images also have additional potential in comparison to conventional digital images; they can be rotated to be seen from different angles, zoomed in and out. Such digital twins provide an even richer experience with additional functionalities experience to user than the presential observation of the object in a heritage institution (Niccolucci, Felicetti and Hermon 2022).

The attributive function of the assignment of keywords and access points in digital collections is becoming increasingly automated (Zeng 2019), (Europeana Pro n.d.).

3.0 Analysis of the representing and creation of digital surrogates of heritage objects

How can the attributing metadata to heritage objects be explained considering semiotic, formal ontology and Searle's ontology of social reality theories? According to Peirce's semiosis, the process of representation involves creating something that replaces and functions as another entity. This representation is then converted into a socially constructed sign that can be exchanged within a culture and community, according to Searle's ontology of social reality. Meanwhile, formal ontology provides analytical tools with which to identify the categorical nature of an entity — such as a heritage object and its digital representation — and determine whether it is a natural or socially created object.

3.1 The semiotics of representation

For Peirce, to represent is: "To stand for, that is, to be in such a relation to another that for certain purposes it is treated by some mind as if it were that other." (Peirce 1931-1958, CP 2.273, 276). Peirce details this relation and specifies their relata:

"A sign, or Representamen, is a First which stands in such a genuine triadic relation to a Second, called its Object, as to be capable of determining a Third, called its Interpretant, to assume the same triadic relation to its Object in which it stand itself to the same Object." (Peirce 1931-1958, CP 2.274, 276).

Peirce defines representation as a process—semiosis—that involves a relationship between three elements, a triadic relationship. In this relationship, a representamen takes the place of, or substitutes for, an object, affecting an interpreter and creating in it an interpretant as if it were that object itself. Semiosis is, therefore, a so-called triadic relationship, always involving a representamen, an object, and an interpretant.

A representation, sign, or representamen, is something that stands in place of something else, that substitutes for it for many practical purposes. In this definition, Peirce draws attention to the limitations of the sign and even of the process of representation, inherent to the agents involved in it: the sender or proposer (not creator) of the sign to represent a given object in a given circumstance, and the receiver of this sign, also in a given circumstance.

Representation has another aspect, which is the intentionality of the one who represents when creating the representation, i.e., the effect of meaning that the sender of a message wants to create in the receiver of the message.

In communication contexts (Eco 2007), representation, therefore, is an intentional process of creating a message, a representation, that takes the place of another, that functions like that other, that refers to that other, even in the absence of that other object.

The representation, the message, is thus an artifact, a cognitive tool, intentionally created to represent, replace, stand in for another; think of a record in a bibliographic database. A heritage digital object is a sign to the heritage object. Nowadays it substitutes the heritage object, which can only be experienced by visiting the institution that holds it.

3.2 Ontological analysis and representation of heritage objects

Ontological analysis is one of the main foundations for conceptual ontology modelling. Guarino and Welty (2000, 2009) propose a methodology for validating the ontological consistency of taxonomies. OntoClean methodology proposes 4 metaproperties of unary properties, through which taxonomies are organized – Identity, Unity, Rigidity and Dependence. Taxonomies in ontologies organized on the bases of such metaproperties are also called sortal-type taxonomies (Freund and Grandy 2025). Each of such metaproperties imposes ontological restrictions on instances of unary properties – sortal-type properties, like PERSON – used to organize taxonomies in ontologies.

Such a unary property implies Identity, Rigidity, and non-Dependence criteria for its instances. If an instance is a PERSON, each individual instance of the class PERSON has Identity, that is, it can be identified and distinguished from other PERSONs, for example by unique DNA or fingerprints. The property PERSON also imposes Rigidity and non-Dependence criteria on its instances: once an instance is a PERSON, it never ceases to be one. A PERSON's existence does not depend on the existence of another instance, unlike, for example, a PERSON's hair colour, which depends on that specific instance.

Gene Ontology (GO) is the major bioinformatics initiative worldwide to represent the scientific knowledge about genes and gene sequences as a computational model. It is used to annotate gene records within genetic databases of gene sequences (Gene Ontology n.d.).

GO is compatible with the top-level ontology Basic Formal Ontology (BFO). BFO is the basis of the ontologies of the Open Biomedical Ontologies (OBO) consortium and serves as a tool to promote scientific consistency, complementarity and interoperability among the ontologies of the OBO consortium (Smith et al. 2007).

As a computational model, the Gene Ontology (GO) is a tool to provide automatic inferences over gene data. The construction of GO terms adheres strictly to what Smith and Ceusters (2010) refer to as 'ontological realism' and should be observed when constructing scientific ontologies which incorporate hierarchies of 'types or universals'.

The properties that define sortals or imply identity criteria are the essential properties. They are observer-independent (Searle 2006), inherent to the object. When creating a digital record to represent an object, these properties must be assigned.

In turn John Searle (2006) develops a theory of the construction of social reality to answer to the central question of how can there be an objective social reality if it is created by human beings? According to him there are objects that exist solely by virtue of social conventions. A piece of paper is a twenty-dollar bill in virtue of a social "assignment of function" as money.

4.0 Results and discussion

This section revises the theoretical contributions and practices of representing surrogates for heritage objects developed by LIS/KO and relates them to the analysis presented.

The creation of surrogates is a topic of interest within the area of information retrieval. Representing, cataloguing and indexing within LIS/KO have been addressed for a long time. Their focus was the construction of catalogs as finding aids to provide access to library collections. Within such scope over time many different guidelines and standards were developed. Although many of such contributions are of a practical, operational and "ad hoc" character there are also contributions of a theoretical character (Beghtol 1985; Svenonius 2000; Hjørland 2008).

As archives, libraries and museums became public institutions, their interest in developing catalogs grew. Documents are semiotic objects, aimed to transmit messages; they have content, subjects, as intrinsic properties; however, for a document be considered a heritage object special cataloging rules were developed (Association of College and Research Libraries n.d.). Physical objects do not speak for themselves. They must be turned into heritage objects, i.e., documents (Briet 2006).

Being a heritage object is a cultural and value-added process that selects and separates objects from their original physical, functional, and cultural context and inserts them in a curatorial context – an archive, library, or museum. Within this new context, heritage objects are now witnesses and documents, representing or recording those aspects of the reality they came from (Van Mensch 1992, 106), (Stránský 1985, 98). The curatorial team, guided by an institutional policy, thus performs an evaluation and decision-making process when carrying out the patrimonialization of a heritage object (Marcondes 2024a).

The 1970s and 1980s marked the increasing use of databases to catalog heritage objects, especially in libraries. Within LIS/KO, continuing a tradition dating back to the 19th century, cataloguing and indexing standards were created and consolidated, as ISBD, AACR2, MARC and, more recently, RDA. According to Lancaster (1993, 1), "The main purpose of creating indexes and abstracts is to construct representations of published documents in a way that lends itself to their inclusion in some type of database." The records of such databases, digital surrogates, serve the purpose of enabling users to evaluate the relevance of the object described, to decide whether it was worth accessing the physical

object. According to Gilliland (2008, 2) metadata are 'the value-added information that they create to arrange, describe, track, and otherwise enhance access to information objects and the physical collections related to those objects'.

To face the Big Data phenomenon, there is a global effort to develop public policies and guidelines for the reuse of digital objects. Initiatives such as FAIR develop technological principles aimed at making digital objects, in particular, objects of interest to scientific research "Findable, Accessible, Interoperable and Reusable". There are also proposals to format heritage digital objects according to FAIR principles (Marcondes 2024b).

The text Cataloging cultural objects: A guide to describing cultural works and their images (Baca et al. 2006) is largely used as a guideline to describe and create metadata for heritage objects. It recommends the assignment of metadata to heritage objects concerning "Object Naming", "Creator Information", "Physical Characteristics", "Stylistic, Cultural, and Chronological Information", "Subject", "Description", among others.

Most such information is not explicit in the object itself. It originates from museum research (Desvallées and Mairesse 2010, 73) and curatorial policies. An object's style or artistic movement to which a work of art belongs, its assignment to a historical or cultural period, its connection to historical figures or events, all of them are cultural values or cultural entities. Such assigned attributes are the result of an interpretation of the objects. They are the result of a collective assignment of cultural value (Searle 2006, 17), based on social agreement, museum research, and curatorial policy.

One of the main contributions of LIS/KO to questions about the attributive function is facet classification. Although Ranganathan's (1967, 88) primary interest when proposing the concept of facets was the identification of the components of complex subjects through which a book should be stored and retrieved, he exemplified several types of facets, not related to the essential properties of an entity, as 'Literary form', 'Religion facet', 'Social Group facet' and even 'point of view' (103). Such facets are intended to the creation of access points for the retrieval of books, despite of their ontological nature. Other LIS/KO authors expand on the concept of facets. Soergel (1985, 258) claims that 'facets are aspects or viewpoints from ...'. Hjørland (1998) suggested that the ontological, epistemological and sociological dimensions of a domain should be used as facets in KOS. A detailed discussion of the ontological nature of facets can be found in Marcondes and Dias (2020).

Unlike the 'sortal-type' properties or 'necessary/essential properties' (Dahlberg 1978, 16), those permanent, structural or taxonomic relations within a domain, they are derived from the '3) functional-syntagmatic relations' (18) of an object, those *ad hoc*, *a posteiori* or transient relationships (Khoo and Na 2006, 164). They are the elements of a "descriptive ontology" of interest to users (Giunchiglia et al. 2014, 53).

A good example is the identification of an object, its appellation; it may not be unique and is the result of the object's history and of a social agreement between art historians and curators. In the CIDOC CRM, the E41 Appellation class supports the recording of the history

and use of appellations so that the identity of objects can be traced over time (CIDOC CRM n.d.).

Another example from the CIDOC CRM model (Stead 2008, slide 14); a religious object, a Holy Bread Basket, is classified both as a Canister type and as an Ecclesiastical item. Classification and taxonomic schemas serve as retrieval rather than reasoning aids.

The Europeana (2013, 9) also provides a similar example. There are two records about Da Vinci's Mona Lisa. In the Joconde database it has title "PORTRAIT DE MONA LISA (1479-1528) DITE LA JOCONDE"; in the Louvre database it has title "Portrait de Lisa Gherardini, épouse de Francesco del Giocondo, dit La Joconde ou Monna Lisa".

As the result of an epistemic process in which selected characteristics are identified, interpreted, and encoded, and supported by a museological research and the institution's collection policy, the curators attribute metadata, thus complementing the very nature of an object as a heritage object, as a document.

Heritage objects have properties that go beyond essential, ontological properties. A heritage object and its corresponding DHO can induce semiosis both in (digital) curators and end-users of IRS. The interpretants of such semiosis are context broad information attributed by curators as additional access-points and to users to gain a general and context-rich understanding of the heritage object.

The web is a desintermediated environment. Users navigating the web and exploring DHO repositories do not know in advance what content and facilities these repositories interfaces offer. DHO must provide users with as much rich contextual information and interpretative information as possible. In such IRS environments each attribute assigned to a heritage object creates another potential access point and adds contextual and interpretative information.

5.0 Final remarks

The attributive function by digital curators when creating digital surrogates of heritage objects is part of a complex process through which an object is turned into a heritage object and linked to a DHO.

Metadata assigned to DHOs are constitutive of nature of such objects. They are ontologically subjective (Searle 2006), i.e., depend on cultural values. They are assigned by collective intentionality as curatorial policies. Due to its dual nature, as an object in itself, and a heritage object, through a social/cultural constitution process, the final ontological nature of a heritage object is created by the curatorial work. An object's ontological status changes as it is constituted as a heritage object. After its ontological constitution as an object, a curator attributes additional properties that are not their essential properties as an object. Such properties are assigned within a representational or interpretive framework. The curatorial work of creating digital surrogates of heritage objects deepens

and emphasises this process because these surrogates have their own identity, which is related to, but goes beyond, that of the original patrimonial object itself.

Heritage objects have a complex nature that goes beyond their own ontological nature (Sanfilippo 2021). Surrogates of heritage objects are secondary objects — 'secondary documents' (Briet 2006, 11) — in relation to the original object. While the Information Artefact Ontology (Smith and Ceusters 2015, 2) claims that such objects depend on the objects they represent, it is more accurate to say that information artefacts *originate* from the objects they represent as they have an existence in their own. Heritage objects have an additional ontological nature beyond their essential identity attributes. They are intentional objects, documents. They are objects within the Culture realm.

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