Original Research

An Ontology of Semiotic Activity and Epistemic Figuration of Heritage, Memory and Identity Practices on Social Network Sites

Kęstas Kirtiklis[1] , **Rimvydas Laužikas**[1], **Ingrida Kelpšienė**[1], and **Costis Dallas**[1,2]

Abstract

This study presents the construction and validation of a formal conceptual model, or domain ontology, useful for the formal representation and analysis of conversations on heritage, memory and identity (HMI) on social network sites (SNS), of interviews with participants in such conversations, and of scholarly works engaging with such phenomena. The ontology provides for the first time a conceptual framework for HM interactions on SNS addressing the semiotic and discursive nature of such interactions in the context of cultural-historical activity theory and semiosphere theory. Part of the Connective Digital Memory in the Borderlands research project, it is developed using an evidence-based knowledge elicitation and domain modeling approach. The study presents the three components of the ontology: an event-centric core conceptual model, an inductively derived concept taxonomy, and a meta-theoretical conceptual scheme, based on a combination of conceptual analysis and lexical analysis of relevant scholarly literature. To validate the ontology, it then provides an example of how it can be used to represent an actual HMI-related SNS conversation and scholarly intervention using knowledge graphs, a quantitative analysis of the occurrence of taxonomy terms in different subfields of HMI on SNS studies, a qualitative analysis of concepts used in studies on non-professional, archeological, and institutional heritage communication on SNS, and a meta-theoretical account of studies of HMI on SNS. The ontology can be used as a framework for theorization and for the development of data models, questionnaire protocols, thematic analysis vocabularies, and analysis queries relevant to HMI on SNS research.

Introduction

Communication on social network sites (SNS) emerged recently as an important new field for practices related to heritage, memory, and identity (HMI). The meteoric rise of social media platforms such as Facebook, Instagram, Twitter, and YouTube in the 2010s made them a relevant domain of inquiry for broader research communities and fields, whose diverse epistemic orientation and theoretical arsenal becomes consequential for researchers interested in HMI practices on SNS. Research on HMI-related practices on SNS draw from diverse theorizations of material and intangible heritage in the context of heritage studies (Harrison, 2013, 2020; Kirshenblatt-Gimblett, 1995; MacDonald, 2009; Meskell, 2015; Roued-Cunliffe & Copeland, 2017; Smith, 2006; Waterton & Watson, 2015), but also from the historical field of memory studies

and its recent shift toward mediated practices (Hoskins, 2018; Olick & Robbins, 1998; Roediger & Wertsch, 2008), as well from communication and media theory (Hall, 1993; Livingstone, 2005) and the focus on participation, social networking and the logic of platforms within digital media studies (Boyd, 2007; Jenkins et al., 2015; Van Dijck et al., 2018).

Several hundred publications of HMI on SNS, authored by researchers in fields as diverse as history,

[1]Vilnius University, Lithuania
[2]University of Toronto, Canada

Corresponding Author:
Kęstas Kirtiklis, Faculty of Communication, Vilnius University, Saulėtekio al. 9 (1st building), Vilnius 10222, Lithuania.
Email: kestutis.kirtiklis@fsf.vu.lt

museum studies, communication and media studies, geography, political science, sociology, anthropology, archeology, psychology, information studies, tourism studies, and marketing, have been published in the last decade. Some scholars focus on how SNS operate on online platforms endowed with algorithmic mechanisms of datafication, commodification and selection (Van Dijck et al., 2018), and support their members with identity, presence, relationships, reputation, group membership, conversations, and content sharing functions (Kietzmann et al., 2011). Others show how HMI practices emerge in diverse contexts and institutional-community negotiations surrounding digital heritage (Cameron & Kenderdine, 2007; Drotner & Schrøder, 2013; Giaccardi, 2012; Kalay et al., 2007; Parry, 2010). More recently, Chiara Bonacchi leveraged the power of big data to demonstrate the relevance of HMI-related SNS practices in contexts such as Brexit, Donald Trump's demonization of immigrants, and the rise of populism and nationalism in Italy (Bonacchi, 2022). At the intersection between heritage and digital social media communication, research on HMI on SNS practices addresses issues as diverse as Holocaust commemoration (Manca, 2021; Wight, 2020), the "memory wars" of Eastern and Central Europe (Rutten et al., 2013), heritage preservation (Sedlacik, 2015), community engagement with local history (Hood & Reid, 2018), archeological communication (Colley, 2014) between professionals (Richardson, 2015) and with mateur communities (Kelpsiene, 2019), institutional museum communication (Kidd, 2014), education (Charitonos et al., 2012), and marketing (Chung et al., 2014). These phenomena are distinct in their simultaneous dependence on the logic of social media platforms (Van Dijck et al., 2018), and on a process of translation across different—historical versus contemporary, scholarly and institutional versus grassroots—semiotic communities (Y. M. Lotman, 1990).

This markedly transdisciplinary literature on HMI-related practices on SNS ranges from advocacy paers suggesting why SNS are useful for institutional heritage communication or community activism, to evidence-based investigations on the properties, motivations, and effects of empirically-attested SNS interactions related to HMI, including qualitative, quantitative, and mixed-methods studies. Recent systematic literature reviews account for scholarship on loosely related themes such as participation in online communities (Malinen, 2015), social media and activism (Allsop., 2016) and social media in tourism (Zarezadeh et al., 2018), or on narrower topics such as social media in museums and heritage (Vassiliadis & Belenioti, 2017), Holocaust-related social media memory and education practices (Manca,

2021), and difficult heritage on SNS (Kelpšienė et al., 2022). Yet the underlying structure of HMI on SNS, viewed both as a field of practice and a field of knowledge, is not addressed by any of these studies. To our knowledge, no published theoretical synthesis or individual study from those we examined presents a holistic conceptualization of the diverse range of manifestations, factors, motivations, causes, and effects of the particular kinds of SNS memory work which engage with heritage and involve identity construction and representation.

Processes of conceptualization and operationalization, broadly recognized as constituent parts of social research, entail the mapping of selected dimensions of objects of inquiry into structures of indicators (variabls) amenable to observation and data representation (Babbie, 2015)—in other words, the definition of the main entities and relationships that capture salient aspects of a domain of inquiry, that is, its *ontology* (Crotty, 1998). In this light, an ontological framework on how memory practices on social media engage with heritage and the past to shape conversations on contemporary identities and values based on an explicit conceptual model, understood as a kind of proto-theory suitable for elucidation and validation (Bates, 2005), can be useful for theory building and operationalization in the transdisciplinary field of HMI-related practices on SNS. To serve this purpose, the objective of this study is to *establish, and validate, a formal conceptual model, or ontology* (Guarino et al., 2009), *suitable for the systematic, evidence-based representation and study of referential and discursive aspects of conversations on HMI on SNS, of interviews with participants in such conversations, and of scholarly works engaging with such phenomena.*

In doing so, the study addresses the following research questions:

> RQ1. What is a conceptualization of the *activity structure* of semiotic interactions on SNS adequate to account for their referential and discursive aspects, and how can it be expressed in the form of a core (upper and middle layer) ontology?
>
> RQ2. What is a conceptualization of the *semiotic content* of HMI-related interactions on SNS adequate to account for their thematic and meta-theoretical dimensions, and how can it be expressed in the form of a concept taxonomy (constituting the lower level of the ontology)?
>
> RQ3. How can the ontology defined in RQ1 and RQ2 be *validated* in the context of data constitution and systematic analysis challenges encountered in scholarly research on HMI-related semiotic practices on SNS?

Theoretical Framework

Two theoretical approaches are particularly relevant as intellectual foundations for conceptualizing HMI on SNS work, viewed as a specifically semiotic kind of mediated action. The first, cultural-historical activity theory, considers domains of social action as *activity systems* composed of a hierarchy of purposeful, interconnected *activities*, performed by individual or collective *actors* in the context of some *division of labor*; each activity is directed toward some *object*, that is, physical or conceptual entities which may embody the fulfillment of some actor *goal*, or intended to meet some actor need by means of *tool mediation*, involving both physical and/or cognitive *mediating tools* (Engeström, 1999; Leont'ev, 1978). The second, cultural semiotics, posits that cultures are communicative systems consisting of a relatively stable set of *rules* in tandem with an aggregate of *texts* that both realize these rules and have the capacity to generate them (Y. M. Lotman et al., 1978), and operating within variably structured semiotic spaces, or *semiospheres* exhibiting processes of *creolization* at their *boundaries* (J. Lotman, 2005).

Both activity theory and cultural semiotics are theoretical constructs that may be represented in the form of a conceptual model. Models differ according to discipline, subject-matter, or purpose or research (Burke et al., 2011), and may range from quite informal schematizations to *ontologies*, defined as formal specifications of a shared conceptualization of some domain (Gruber, 1995; Guarino et al., 2009). There are, in fact, several ontologies developed to account for interactions on social media, situated, for the most part, situated in the context of either semantic web engineering social media data analytics (Mika, 2004). They are focused on providing formalisms that aid the analysis of platform connectivity structures between SNS users (Golbeck & Rothstein, 2008), sentiment analysis (Kumar & Joshi, 2017; Thakor & Sasi, 2015), influence (Razis & Anagnostopoulos, 2014), social network analysis (Pankong et al., 2012), user activities (Rosenberger et al., 2015) and product recommendations on SNS (Villanueva et al., 2016). Additionally, different ontologies draw from practical argumentation theories (e.g., Mann & Thompson, 1988; Toulmin, 1958; Walton, 2006) to account for the argumentation structure in social media conversations (for a survey, see Schneider et al., 2013). For example, SIOC (Lange et al., 2008) seeks to model argumentative discussions on SNS by incorporating the DILIGENT ontology argumentation module to model Arguments, Issues and Positions leading to some Decision by way of Challenges, Justifications and Argumentation (Tempich et al., 2005), further elaborating the influential gIBIS argumentation model (Conklin & Begeman, 1988; Shum et al., 2006). Despite specific strengths, no single ontology among these can account for the cultural-historical, meaning-laden, semiotic activity related to HMI on SNS work and scholarly investigation.

On the other hand, we employ CIDOC CRM—"… a theoretical and practical tool for information integration in the field of cultural heritage… <…> achieves this by providing definitions and a formal structure for describing the implicit and explicit concepts and relationships used in cultural heritage documentation and of general interest for the querying and exploration of such data. Such models are also known as formal ontologies. These formal descriptions allow the integration of data from multiple sources in a software and schema agnostic fashion…" (CIDOC-CRM, 2022). CIDOC CRM, also ISO standard 21127 for the integration, mediation and interchange of heterogeneous cultural heritage information (Bekiari et al., 2021) is a widely established core ontology which fits remarkably within activity theory's interactionist orientation and relational conceptualization of activities in fundamental relationship to actors, objects, and mediating tools (Engeström, 2000). CIDOC CRM considers cultural objects from the viewpoint of *events* and *activities*, broadly defined as "meetings" between (human) *actors*, *physical things* and (often related) *conceptual objects*, *timespans* and *places*. In preference to alternative activity theoretical ontologies such as the CSCL collaborative learning ontology (Barros et al., 2002), CRM demonstrates a high degree of maturity, wide adoption, rigor, and extensibility. Among its formal extensions, CRMinf provides a detailed structure for representing the production of inferences and adoption of beliefs, but it is oriented toward representing the provenance of scientific knowledge in the light of scientific observation, rather than the wide range of communicative action manifested in the HMI on SMS field (Doerr et al., 2016; cf. Stead & Doerr, 2015). The earlier KP Lab Ontology aims "to support the planning, supervision, and monitoring of knowledge creation and knowledge mediation activities and their products" across heterogeneous contexts (Doerr et al., 2012), while Scholarly Ontology (Pertsas & Constantopoulos, 2017), a generalization of the NeMO digital humanities methods ontology (Hughes et al., 2015), aims to model scholarly process across disciplines. While both are closely related to CIDOC CRM, neither provides for the range and specificity of HMI on SNS. The MIDM ontology (Van Ruymbeke et al., 2018) extends CIDOC CRM to account for multiple interpretations of the same observable (archeological) reality, and introduces, usefully, an explicit distinction between "content" and "discourse," but covers a narrower field than our domain of diverse semiotic activities related to HMI practices on SNS. In a different approach, the CHARM ontology (Gonzalez-Perez et al., 2012, p. 191), intended to provide a model

Table 1. Ontology Building and Validation Research Workflow.

Ontology definition	Formal analysis of SNS data structures based on an examination of SNS conversations and user data exposed (a) on the web interface, and (b) through the Application Programming Interfaces of Facebook, Instagram, and Twitter.
	Expert elicitation workshops on aspects of the HMI on SNS domain relevant to diverse research interests and backgrounds, involving the study co-authors and five additional researchers whose collective expertise and interests lie on cultural heritage studies, museum studies, communication and media studies, cinema studies, linguistics, philosophy, and digital heritage.
	Computer-assisted lexical analysis of a convenience corpus of published works in heritage studies, memory studies, social media studies, and digital heritage, in whose intersection most HMI on SNS research lies, and researcher-driven appraisal and thematic organization of theoretical and substantive concepts into taxonomies.
	Iterative ontology building workshops, applying CIDOC CRM in a convenience sample of examples of HMI on SNS conversation threads and research papers, identifying relevant CRM classes and relationships, and creating new subclasses and relationships as necessary until a stable shared version of the middle ontology was approved.
Ontology validation	Iterative development of a knowledge graph representing an instance of semiotic activity related to HMI on SNS, and its interpretation in scholarly work, until a stable approved version was reached.
	Computer-assisted lexical analysis of a corpus of published works in the target domain of HMI on SNS research, and validation of the lower ontology through matching of taxonomy terms derived in step 3 in the corpus.
	Researcher-driven validation of the relevance of taxonomy terms through critical analysis of research contributions in the corpus in the target domain.
	Researcher-driven validation of the usefulness of the ontology for theory building through critical examination of the use of *mediacentric, culturalist*, and *ineractionist* taxonomy terms in published HMI on SNS research.

for representing multiple viewpoints in heritage knowledge work, introduces the notion of *valorization* to makes explicit an important relationship between "primary" and "secondary" knowledge activities. While insightful, CHARM adopts a very different upper ontology layer than CIDOC CRM, and therefore it cannot benefit from its significant expressive advantages and activity-centric orientation.

Methodology

In this study, we followed an ontology engineering approach which prioritizes epistemic validity in the domain of HMI on SNS research over technical applicability for computation (Akkermans & Gordijn, 2006). To ensure that the ontology constitutes a useful and valid representation of data and knowledge in the application domain, we combined expert knowledge elicitation with formal analysis of SNS data structures, and lexical analysis. Because of its maturity, extensibility, completeness and clear documentation, we chose to adopt CIDOC CRM as the foundation for building our domain specific ontology, covering the scope of HMI on SNS semiotic practice and related scholarly activity, drawing from alternative ontologies for insights on addressing aspects of the domain that are not covered by the core CRM model.

The task of ontology building was distinguished in terms of a three-layer structure:

1. The upper layer, borrowed from CIDOC CRM, and providing entities and relationships that represent fundamental dimensions of physical and social reality.
2. The middle layer, or our core ontology, aiming to capture the conceptual structure of entities and relationships representing semiotic activity on social media, and epistemic activity in scholarly work that accounts for and is introduced to such semiotic activity.
3. The lower layer, accounting for more fine-grained aspects, represented as taxonomies of concepts from the perspective of heritage studies, memory studies, and social media studies.

The research workflow adopted (Table 1) represents the sequence of activities of ontology definition and validation in the study.

In what follows, we adopt the definitions of key concepts and terminological conventions in CIDOC CRM (Bekiari et al., 2021). CRM entity names such as E7 Activity are capitalized and prefixed by En, while CRM relationship names, such as P2 has_type, are in small letters and prefixed by Pn. Names of entities in our

Figure 1. Core ontology representing the main entities and relationships of semiotic and scholarly activity on SNS.

ontology are shown in *Inner Capitalization Italics*. Taxonomy terms are presented in SMALL CAPITALS.

Ontology Definition

The following ontology aims to model semiotic activities related to SNS and their epistemic uptake in scholarly work. Its scope includes communicative activities of platform users such as posting, sharing, commenting, tagging and reacting, but also scholarly activities of researchers engaging with SNS, as well as activities linking the two domains of social media communication and scholarly work. The intellectual framework shaping the ontology draws from activity theory, and cultural semiotics.

The ontology aims to be as compatible as possible to CIDOC CRM. It does not aim, however, to be a formal extension of CIDOC CRM, but rather a specialization created for the pragmatic purposes of supporting representation, analysis, and formulation of scholarly propositions and questions in a specific domain, trading compatibility for expressiveness.

Core Ontology

Based on conceptual modeling of HMI on SNS practices, the core ontology represents entities and relationships relevant to the representation of semiotic activity on SNS and related scholarly activity (Figure 1). Ontology

entities (shown capitalized in italics) are defined as equivalent classes or subclasses of CIDOC CRM entities and inherit their properties (identified by prefixes E and P). The central notion is *Semiotic Activity*, representing communicative or meaning-bearing activities on (or related to) SNS, and defined as a subclass of E58 Creation by adding properties for modification, type and property assignment of conceptual objects involved in SNS or related scholarly activities. A *Semiotic Activity* may P9 consist_of other *Semiotic Activities;* it can be as broad as someone's overall communicative activity history on Facebook, and as granular as a single reaction to a Facebook post; as broad as the overall scholarly activity of a researcher, and as granular as an annotation, or identification of some property, of a single tweet. In addition, a *Semiotic Activity* may P134i be_continued_by additional *Semiotic Activities*. A *Semiotic Activity* may P16 use_specific_object *Affordance or Tool*, a subclass of E29 Design or Procedure representing some media or system affordance, corresponding to the activity-theoretical notion of mediating tool. An *Affordance or Tool* may P148 have_as_component some more granular *Affordances or Tools*, and thus may represent from the entire set of functionalities of a social media platform such as Facebook to the minimal affordance of providing a "like" button in the same platform.

A *Semiotic Activity* P108 produces or P31 modifies some *Expression*, a subclass of E31 Document, E33

Linguistic Object, and E36 Visual Item, representing some object with a fixed, recognizable form which acts as a carrier of meaning. An *Expression* can have_as_component other *Expressions;* it can be as broad as a monograph, a Facebook message thread including comments and media, or a list of hashtag query results, and as narrow as a word in a post, an Instagram photo, or a sentence in an article. Each *Expression* P67 refers, P129 is_about, or P138 represents one or more instances of *Meaning*, a subclass of E89 Propositional Object with identifiable meaning in the form of a proposition, question, evaluation, affect, motivation, etc. An *Expression* may also P67 refer_to, P129 be_about, or represent any *Referent*, an equivalent class to E1 CRM Entity representing anything that the *Expression* refers to; for instance, a Facebook post may refer to some historical event (an instance of *Event*, an equivalent class to E5 Event), or a historic place (an instance of *Place*, an equivalent class to E53 Place). In addition, a *Semiotic Activity* may be P15 influenced_by or motivated_by some *Meaning;* for example, "posting a comment in a commemorative Facebook group" may be motivated_by "nostalgia" (an instance of *Meaning*), or influenced_by a *Meaning* which a previous post on the same Facebook thread (an instance of *Expression*) P67 refers_to or P129 is_about.

Any *Semiotic Activity* is P14_carried_out_by a *Person*, an equivalent class to E21 Person, and may involve one or more instances of *Collectivity*, an equivalent class to E74 Group, through different sub-properties specializing of P11 has_participant: For example, *Semiotic Activity* is_addressed_to a *Collectivity*, to represent the situation of a social media activity of posting a comment on the timeline of a Facebook group, or a scholarly activity of presenting one's research results to a group representing an epistemic community. A *Person* may belong to one or more *Collectivities;* for example, a SNS researcher may belong to a *Collectivity* of researchers in social media studies, users that are members of a specific Facebook group, or Instagram users who have posted photos using a specific hashtag. A *Person* may assert, and a *Person or Collectivity* may have_belief_in or have_affect_for (sub-properties of P67i is_referred_to_by) some *Meaning*. Also, an *Expression* may P72 have_language, or P137_exemplify some *Semiotic Code*, a subclass of E56 Language and E28 Design or Procedure that refers to the possible expressions, vocabulary and rules of some shared semiotic code in which a *Collectivity* has_competence; *Semiotic Code* is related to the notion of semiosphere central to the Tartu school theory of cultural semiotics, but is also applicable to additional notions in different theories within communication studies.

Finally, *Concept*, an equivalent class to E55 Type, accounts for characterizations of entities which do not require the definition of additional properties; each *Concept* may P127 have_as_broader_term some other *Concept*, or P150 define_typical_parts of some other *Concept*. Subclasses of *Referent*, such as *Semiotic Activity, Expression, Collectivity, Meaning, Affordance or Tool*, etc., may P2 have_as_type some instance from a relevant sub-hierarchy of *Concept*. For example, an instance of *Semiotic Activity* such as "retweeting" a tweet P2 has_type "disseminating," an instance of *Concept* within a sub-hierarchy restricted to the characterization of *Activities;* on the other hand, the *Expression*"#idlenomore" P2 has_type "hashtag," an instance of *Concept* in a sub-hierarchy identifying different formats and genres of *Expression*. In CIDOC CRM terms, *Referent* P2 has_type *Concept* is a shortcut (Bekiari et al., 2021, p. 21), standing in place of a more extended *Activity* structure. We also use shortcuts to indicate, most notably, the relationship between an *Expression* and its *Meaning*, the connection between a *Person* and some *Collectivity*, the belief some *Person* or *Collectivity* has in some *Meaning*, and the competence of a *Collectivity* in a *Semiotic Code*. This is to enable common operations, which correspond to established conventions in the domain of HMI on SNS research.

The ontology may be applicable to a range of semiotic activity on social media communities, to scholarly work related to such activity, and to interactions thereof. Such interactions may be seen as processes of *retroduction*, involved in the production of knowledge when researchers re-express the terms of some reality in theoretical terms (Bhaskar, 1979). In the broader context of semiotic activity and digital curation "in the wild" (Dallas, 2016), such processes correspond closely to the notion of *translation*, occurring in the boundaries between non-professional and professional semiospheres engaged in cultural HMI practices (Laužikas et al., 2018).

Concept Taxonomy

To populate the concept taxonomy, we relied on a lexical analysis of a convenience sample of 220 English language scholarly publications, including introductions to major edited volumes and textbooks, literature reviews, and synthesis studies, from four research areas: cultural heritage studies (42 items), memory—including Holocaust—studies (44 items), social media studies (93 items), and digital heritage studies (41 items). We surmised that the vocabulary of canonical works from these fields will be highly relevant to the target field of HMI on SNS studies. We used the MaxQDA software to conduct frequency analysis of words and 2 to 5 word combinations, excluding common words. We manually excluded common words, and terms occurring <5 times, added relevant terms from a broader social science vocabulary, and
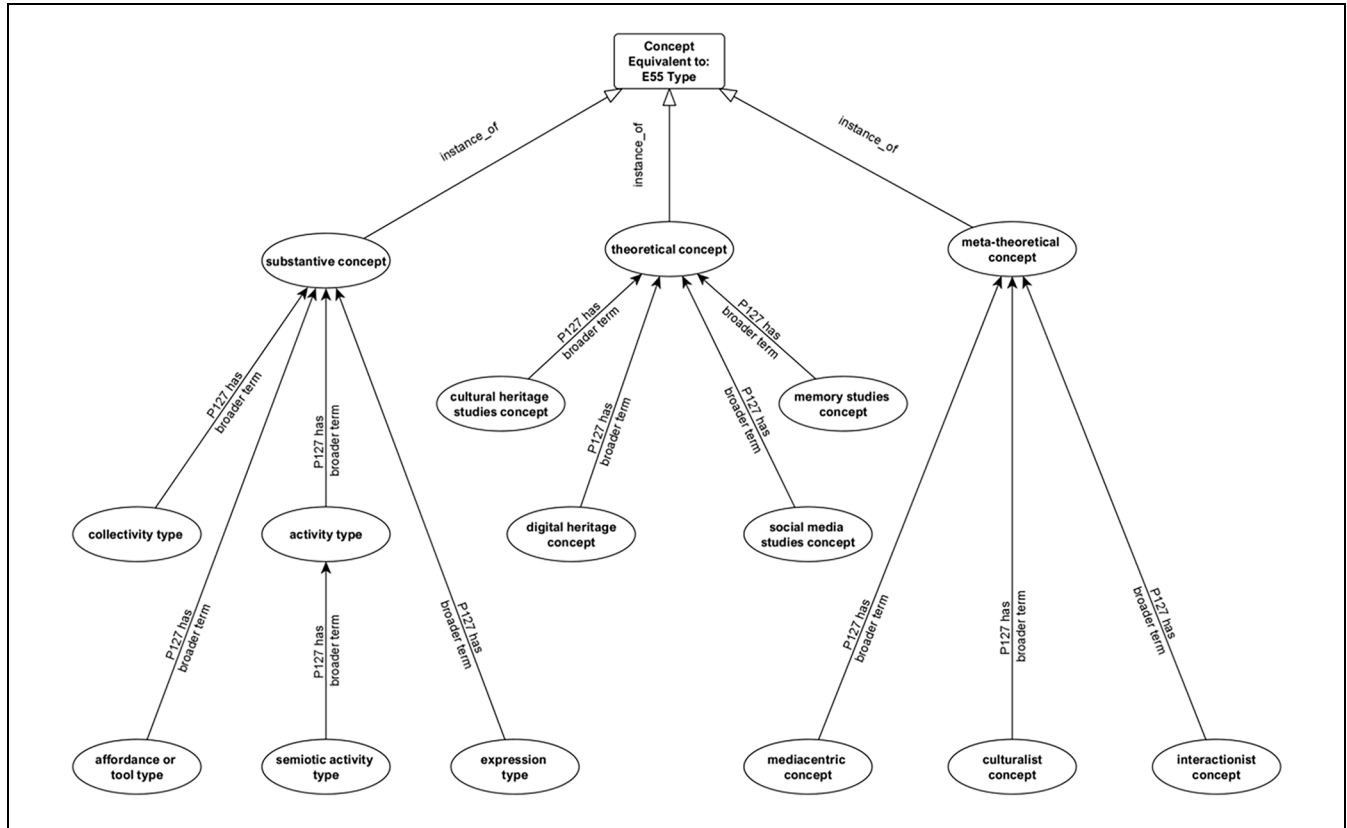
Figure 2. High-level structure of concept taxonomy.

ended up with 953 concepts. To these, we added 196 cited author references indicating interest in the theoretical work of major authors, resulting to 1,149 terms. The high-level structure of the taxonomy (Figure 2) is organized in three facets, or domains of concepts: (a) substantive, a container for terms defining the type of core ontology entities, that is, *Activity, Semiotic Activity, Collectivity, Affordance or Tool*, and *Expression*; (b) theoretical, a container for terms defining thematic and grounded theory concepts characterizing instances of *Meaning*; and, (c) meta-theoretical, a container for concepts related to meta-theoretical and epistemological dimensions of *Meaning*.

This structure is well-suited to accommodate terms in our frequency analysis. *Substantive* taxonomy concepts as diverse as THEMATIC ARCHAEOLOGIST, NATION-STATE, PERPETRATORS, TROLLS, and FACEBOOK GROUP MEMBER may be organized under faceted sub-hierarchies of *collectivity type*. Terms such as YOUTUBE, FACEBOOK WALL, and HASHTAG can be defined as P127 having_broader_term *affordance or tool type*. References to activities such as PILGRIMAGE, HOLOCAUST DENIAL, WITNESSING, and COLLECTING can be classified as *activity types*, while terms such as POSTING, RETWEETING and SHARING as *semiotic activity types*, while SELFIE, FACEBOOK PAGE, CASE STUDY,

and MONUMENT as *expression types*. In addition, thematic and theoretical concepts may be organized in one of the *theoretical domain* sub-hierarchies. For example, terms like DISSONANT HERITAGE, AUTHORIZED HERITAGE DISCOURSE, and DIALOGIC MUSEUM fit under *cultural heritage concept*, while references to USER-GENERATED CONTENT, DIGITAL EXHIBIT, or MUSEUM MEDIASCAPE under *digital heritage concept;* on the other hand, notions such as GLOBAL MEMORY, COUNTER-MEMORY, MULTITUDE, and ACTIVE FORGETTING can readily be classified as *memory studies concepts;* finally, terms such as DISINFORMATION, FILTER BUBBLE, AFFILIATIVE COMMUNITIES, TRANSCODING, and platform fit within the vocabulary of *social media studies concepts*.

Meta-Theoretical Dimensions

An underlying dimension within concept taxonomy terms goes beyond substantive, grounded and thematic classification, reflecting meta-theoretical orientations shared by specific thought collectives (Fleck, 1979), and providing the rationale for positing a *meta-theoretical domain* as part of the concept taxonomy, in addition to these *substantive* and *theoretical domains*. In this *meta-theoretical domain*, the SNS field of practice may be

observed from three perspectives or approaches which we term *mediacentric*, *culturalist*, and *interactionist*.

The range of *mediacentric* approach is broad and heterogeneous, including strands as diverse as classic media theory (TORONTO SCHOOL), new materialism (MANUEL DELANDA), new realism (MAURIZIO FERRARIS), and software studies (LEV MANOVICH). The centrality of media is asserted in audience studies approaches involving MESSAGE transmission through communication channels; in USES AND GRATIFICATIONS research, looking at motivations and needs media satisfy; or, in the AGENDA SETTING APPROACH, investigating how media shape collective agendas (including how HMI is framed in contemporary debates). Yet, media focus alone is an insufficient condition for a mediacentric approach. Some approaches—including GERMAN MEDIA THEORY, BRUNO LATOUR and ACTOR-NETWORK THEORY, or JEAN BAUDRILLARD and his SIMULACRA—even attribute a kind of primary AGENCY to media. Some degree of MEDIA DETERMINISM also underlies some studies pointing to (SOCIAL) MEDIA LOGIC or MEDIA ASSEMBLAGES, focusing on POSTHUMANIST dimensions of complex actions within SNS, or describing the latter in MEDIA ECOLOGY terms. Here, THE MEDIA SPHERE is predominantly seen as an APPARATUS, functioning according to CYBERNETIC or algorithm-based principles. Broader *mediacentric* approaches address the complex relations between people and media, involving collaboration, FIGURATIONS (involving humans, and technological arrangements), and HYBRID relations. Proponents also focus on MEDIATIZATION or DATAFICATION of the social, REMEDIATION, or TRANSMEDIA STORYTELLING.

The *culturalist* approach does not deny the importance of media, but avoids overemphasizing it. COMMUNICATION is posited as the way CULTURE is (re)produced. It provides the means not only for the PRODUCTION OF CULTURE, but also for its description—the CONSTITUTIVE MODEL serves as both a prescriptive and a descriptive model of communication. SYMBOLS, and SYMBOLIC FORMS serve as building blocks for culture, where culture is conceived by culturalists as a SEMIOTIC STRUCTURE, an interplay of NARRATIVE and DISCOURSE, MYTH and RITUAL, MEANING and METAPHOR, whereby MEDIA (including SOCIAL MEDIA) are perceived as an ENVIRONMENT where human culture takes its various shapes. Material objects attain meaningfulness here only through processes of SEMIOSIS (variably accounted for as part of a SEMIOSPHERE, described in terms of a CHRONOTOPE, etc.), or through FIGURATIONS in which, unlike other approaches, the social imaginary is emphasized more than human-media relations.

Within the culturalist approach, the CONSTITUTIVE MODEL leads to memory studies notions such as MILIEUX DE MÉMOIRE, COMMUNITY PARTICIPATION, and MEMORY COMMUNITY. Communities play a significant role,

pointing to phenomena such as COLLECTIVE NARRATIVE, COLLECTIVE IDENTITY, COLLECTIVE MEMORY and COLLECTIVE TRAUMA—the latter two assuming the possibility of CONTESTED MEMORY and MEMORY CONFLICTS between DOMINANT MEMORY NARRATIVES and various forms of counter-memory. People adopt, and adapt for their purposes, CLUSTERS OF IDENTITIES. Additional terms include PARTICIPATION (PARTICIPATORY HERITAGE, PARTICIPATORY CULTURE) and AFFILIATION (AFFILIATIVE IDENTITY, AFFILIATIVE COMMUNITY, AFFILIATIVE OBJECTS). The approach draws from diverse theoretical frameworks: SOCIOCULTURAL/ACTIVITY THEORY, (CULTURAL) SEMIOTICS, HERMENEUTICS, but also POST-STRUCTURALIST and POSTMODERN theorizing, and CRITICAL THEORY. Notions such as CULTURAL CAPITAL, BONDING and BRIDGING SOCIAL CAPITAL, and CULTURAL HEGEMONY, point to symbolic dimensions of SOCIAL DIFFERENTIATION, CITIZENSHIP, and STRUCTURES OF POWER.

The dominant notion of the SYMBOLIC, and SYMBOLIC FORMS, leads to the idea of SYMBOLIC INTERACTION, which brings us to the *interactionist* approach. While culturalists focus on the holistic interplay of various elements, the interactionist approach approaches the social from the perspective of individual agents and their interactions. The approach draws from frameworks such as SYMBOLIC INTERACTIONISM, RECEPTION STUDIES, STRUCTURATION THEORY, PRACTICE STUDIES, ETHNOMETHODOLOGY, and the DRAMATURGICAL THEORY of the self. While cultural reality is often reified in the culturalist approach, here it is conceptualized as constructed, giving rise to various forms of CONSTRUCTIVISM and CONSTRUCTIONISM. Personal identity is assumed to be constructed, and a matter of creation rather than merely interpretation. However, since the individual here is RELATIONAL rather than atomic, this is a matter of INTERPERSONAL not individual (*sensu stricto*) creation. Knowledge, too, is described as SITUATED (SITUATED KNOWLEDGE, SITUATED COGNITION), and is achieved by interaction, rather than as a result of the cartesian SUBJECT—OBJECT DIVIDE. Therefore, it is unsurprising that here interpersonal relations create IMAGINED COMMUNITIES, whereby COLLECTIVE REMEMBRANCE, EXPERIENCE and ACTION are perceived and conceptualized very differently to the culturalist approach.

Individual and SOCIAL CONSTRUCTION takes place also in the online realm. The digital, on the other hand, might also be a DIGITAL PUBLIC SPHERE, where, from the interactionist point of view, RATIONAL AGENCY intermingles with PERFORMANCE and HABITUS. Moreover, while some interactions are DELIBERATIVE, DIALOGIC, and PARTICIPATORY, others take the form of CONFLICT and DISSONANCE. SOCIAL CAPITAL accumulated online might be not only BRIDGING, but also leading to INEQUALITY, and thus inviting critical—at least in the theoretical level—interventions.
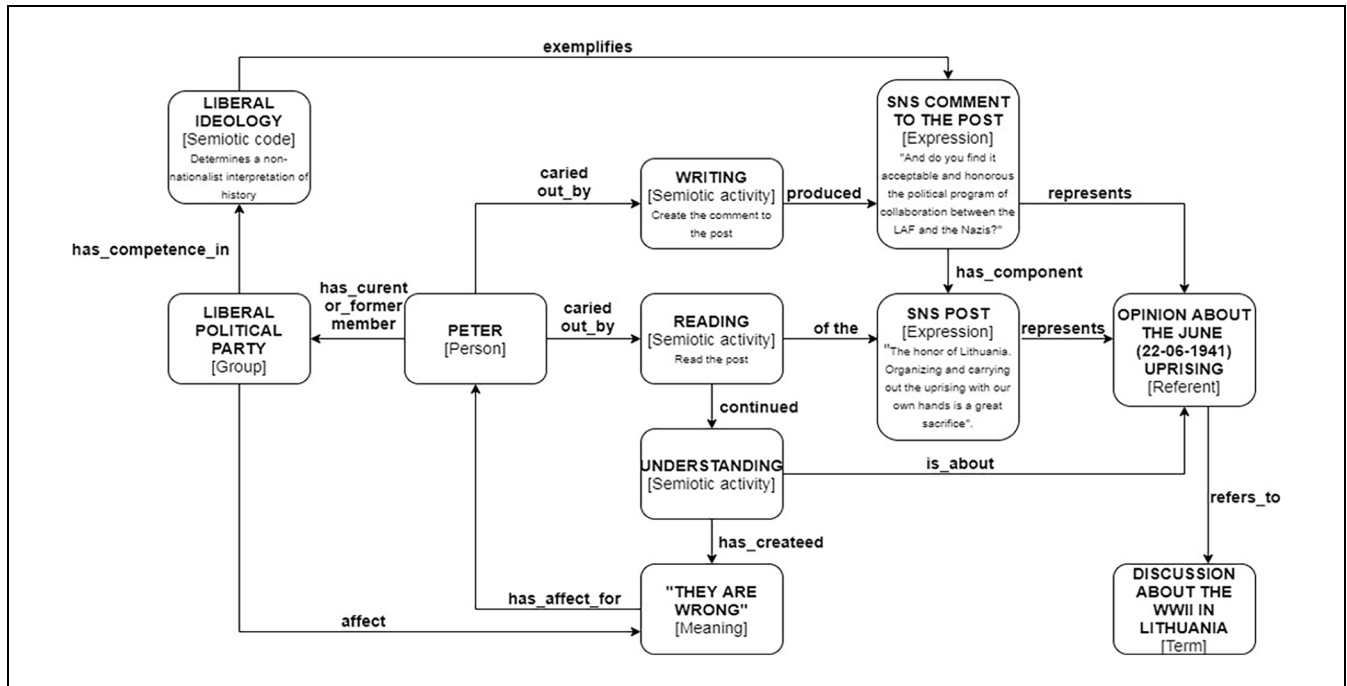
Figure 3. Knowledge graph representing a Facebook conversation on contested heritage.

Ontology Validation

We now turn to presenting four activities which use the ontology to address pragmatic research challenges, and thus validate it, in the target domain of HMI on SNS research.

Representing Semiotic Activity Structure

The first validation activity is intended to address the following challenge:

Challenge 1. Can the ontology be used to represent adequately instances of HMI-related semiotic and scholarly activities on SNS in practice?

Two knowledge graphs, based on the core ontology, are produced to address this question. The first instance (Figure 3) concerns a Facebook group conversation on the June 1941 Uprising in Lithuania. In this case, Peter (*Person*) reads (*Semiotic Activity*) a post (*Expression*) related to the 80th anniversary of the June uprising in Lithuania. The *Person* who carried_out the *Semiotic Activity* which produced this *Expression* represents the Uprising as an honorable action. But Peter, who belongs to the Liberal political party (*Collectivity*), employs a liberalist *Semiotic Code*) to decode the SNS message differently from the author. Peter evaluates (*Semiotic Activity*) the opinion of the post's author as wrong (*Meaning*),

and posts (*Semiotic Activity*) a comment (*Expression*) on the original post.

The second knowledge graph (Figure 4) addresses a more complex semiotic interaction, whereby a scholar uses SNS data as evidence to understanding online communities. Simon and Peter are members of different communities (*Collectivities*): Peter, in particular, belongs to a community of researchers studying contested heritage and memory (*Collectivity*). He uses SNS conversations (*Expressions*) as evidence for understanding Lithuanian commemorative communities. Peter's premise (a *Meaning*) is that SNS posts and comments (*Expressions*) exemplify different *Collectivities* related to diverse history- and heritage-based ideologies (*Meanings*) and modes of understanding the past (*Semiotic Codes*). Peter collects and analyzes (*Semiotic activities*) SNS conversations (*Expressions*) using established scholarly theories (*Semiotic Codes, Meanings*), and, on this basis, describes and provides explanations (*Semiotic Activity*) for research findings in the form of scholarly publications (*Expression*).

Knowledge graphs based on our ontology may be used to model knowledge creation processes (use, reuse, interchange) across HMI studies and social media scholarship to account for HMI-related SNS practice. The process bridges professional scholarly knowledge work to non-professional HMI practices (*Semiotic Activities*) involving researchers and SNS users (*Actors*) who are members of different scholarly and grassroots
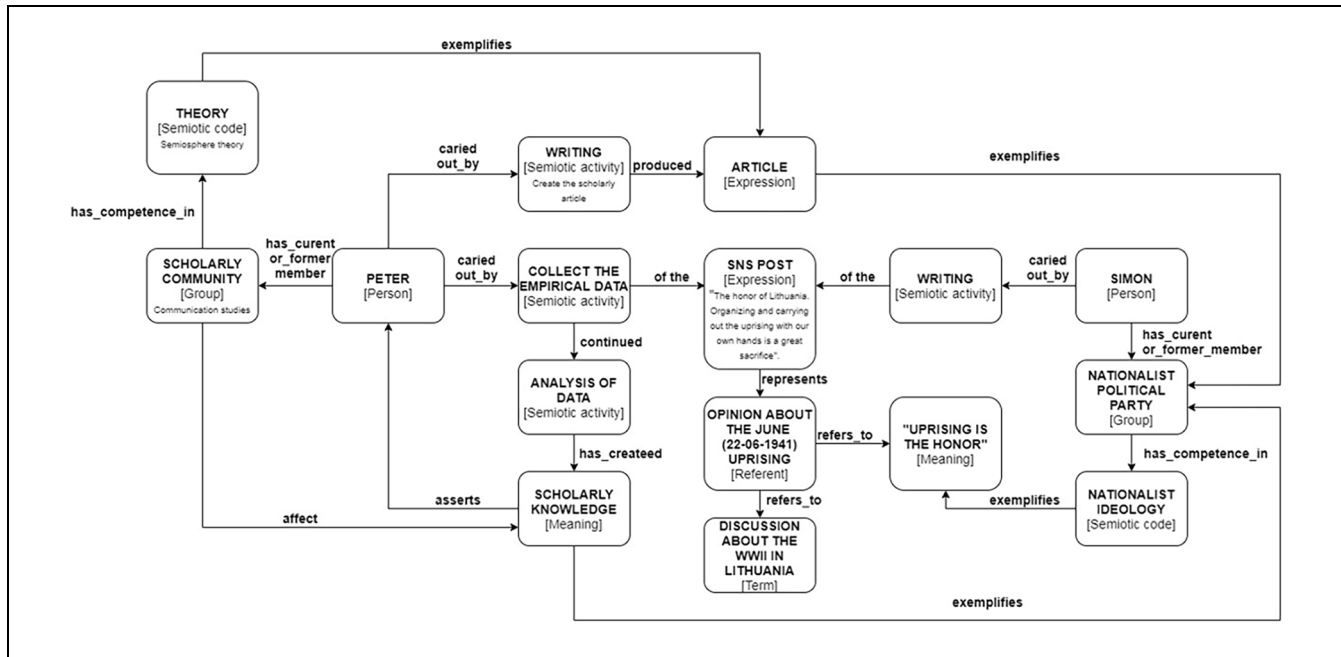
Figure 4. Knowledge graph representing scholarly engagement with the Facebook conversation of Figure 3.

communities *(Collectivities)*. It can account also for an inverse semiotic practice of translation between scholarly and vernacular (non-professional) knowledge, showing how *Meanings* in HMI and SNS scholarship expressed in scholarly publications using scholarly language *(Semiotic Code)* may be translated to vernacular *Expressions* employing non-professional "languages" *(Semiotic Codes)*, through interpretive *Semiotic Activities* involving the (re)use of pre-existing information and knowledge, and leading to the creation of new information and knowledge. Such processes, shared by non-professional community members participating in HMI practices, involve existing community knowledge, conceived as schemata of *Meanings* communicated through *Expressions* made intelligible through a *Semiotic Code*, which act as organizing frames to: (a) filter and reject scholarly knowledge unacceptable to the community; and, (b) interpret filtered scholarly knowledge to create expressions understandable among community members. These organizing structures are fundamental to the construction of identities, represented, in terms of our ontology, as ego-networks connecting a community *(Collectivity)* with a "language" *(Semiotic Code)* shared by its members *(Persons)*, SNS actions *(Semiotic Activities)* it engages with, messages *(Expressions)* produced by such activities, and new non-professional "knowledge" *(Meanings)* resulting from them. This process is conditioned by knowledge-related needs, motives, goals and aspirations *(Meanings)* of the members of the community, also by the algorithmic capabilities of social media platforms *(Affordances and Tools)*.

Frequency Analysis of Concepts in Scholarly Literature

The second challenge addresses the applicability of the concept taxonomy:

> Challenge 2. How can we use the ontology to make sense of the most relevant concepts employed by researchers for the study of different subfields of heritage-related SNS activity?

To address this question, we performed a frequency analysis of concept taxonomy terms in six subfields of HMI practice on SNS literature: (a) Holocaust on SNS, (b) difficult heritage on SNS, (c) memory and identity on SNS, (d) non-professional grassroots communities on SNS, I archeological professional communities on SNS, and (f) museum, institutional, and tourism communication on SNS (Table 2).

Corpus documents were imported to MaxQDA, and autocoding was performed using a term dictionary containing all concepts and author names in the taxonomy. Codings for common proper names, and ambiguous terms, were checked manually and false positives removed. We performed a frequency analysis of term occurrence and calculated the range and variance of occurrences of each term across documents. The analysis

Table 2. Thematic Subfield, Count and Method of Selection of Publications in Corpus of Literature on Heritage, Memory and Identity Practice on SNS.

Subfield	Publication count	Method of literature review
Holocaust on SNS	24	Critical, based on Google Scholar queries and citation hopping
Difficult heritage on SNS	81	Systematic
Cultural memory and identity on SNS	21	Critical, based on Google Scholar queries and citation hopping
Non-professional communities on SNS	36	Critical, based on Google Scholar queries and citation hopping
Institutional communication on SNS	87	Critical, based on Google Scholar queries and citation hopping
Archeological communities on SNS	25	Systematic
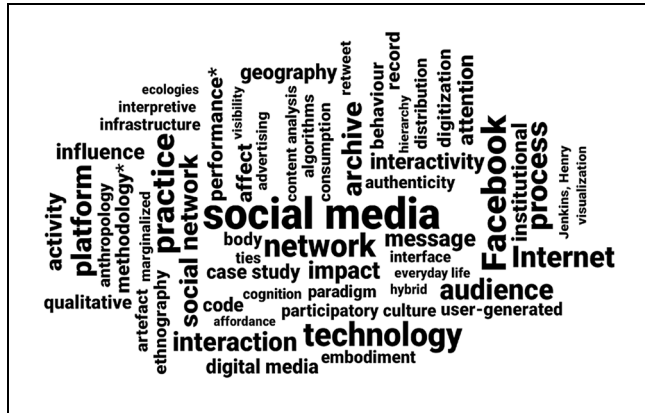
Figure 5. Frequent concepts (total occurrences >100) with the least variance across subfields.

Figure 6. Most frequent concepts in Holocaust on SNS publications.

yielded 44 concepts appearing in at least 50% of all documents, deemed to be *shared*, and characteristic of the whole corpus (Figure 5).

Terms from the concept hierarchy (Figure 2) appearing equally often across different literature subfields include AUDIENCE (a *collectivity type*) *activity types* such as ACTIVITY (*sic*), PROCESS, DISTRIBUTION, and DIGITIZATION, *affordance or tool types* such as INTERNET, FACEBOOK and ALGORITHMS, and *expression types* such as MESSAGE and ARCHIVE. Most, however, belong to the vocabulary of either *theoretical concepts*, being related to research themes and grounded theory notions SUCH AS ATTENTION, AFFECT, INFLUENCE, EMBODIMENT, AUTHENTICITY, ECOLOGIES, and MARGINALIZED, the work of media scholar HENRY JENKINS, and methodological concepts such as QUALITATIVE, ETHNOGRAPHY, and INTERPRETIVE, or *meta-theoretical concepts* such as PARADIGM and INTERACTION. by virtue of their frequency across subfields, such concepts can be said to characterize the broader field of HMI on SNS.

To identify how concept frequency differs across subfields (Table 1), we calculated separately the frequencies and produced wordcloud diagrams representing up to 100 most frequent concepts in publications within each
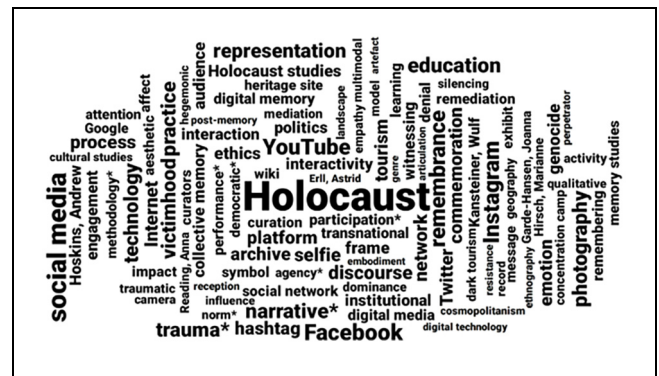
subfield, excluding terms that occurred less that 10 times on average per document (Figures 6–11).

Some *substantive concepts* are unevenly distributed between subfields. Among *affordance or tool types*, INSTAGRAM is more frequent in holocaust-related studies, wiki among memory and identity on SNS works, TWITTER among archeological communities on SNS publications, and YOUTUBE both among holocaust and difficult heritage on SNS publications. and, among *expression types*, SELFIE and HASHTAG shows much more often in Holocaust on SNS studies. But analysis shows even clearer differences in *theoretical* and *meta-theoretical* concept frequency across subfields. Excluding obvious associations, concepts with higher frequency specifically in holocaust-related publications include REMEMBRANCE, TRAUMA, VICTIMHOOD, GENOCIDE, ESTHETIC, and DARK TOURISM, and repeated references to authors such as WULF KANSTEINER, JOANNA GARDE-HANSEN, ASTRID ERLL, and MARIANNE HIRSCH (Figure 6); in difficult heritage publications, concepts such as colonial (and related terms, such as DECOLONIZATION), PUBLIC SPHERE, CIVIL WAR and DIALOGIC (Figure 7); in memory and identity studies, distinctive concepts include POLITICS, NATIONALISM, SYMBOL, COLLECTIVE MEMORY, HUMAN REMAINS, CONTESTATION,
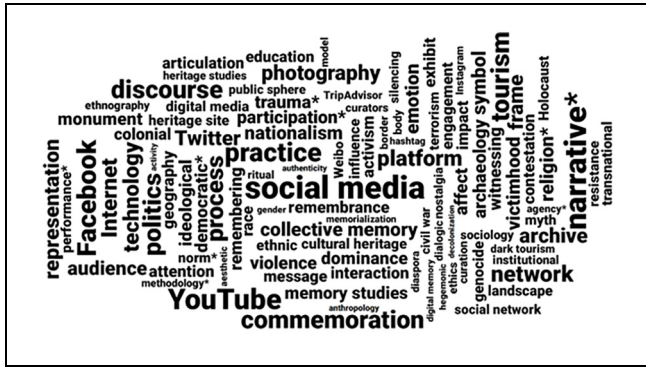
Figure 7. Most frequently mentioned concepts in difficult heritage on SNS publications.

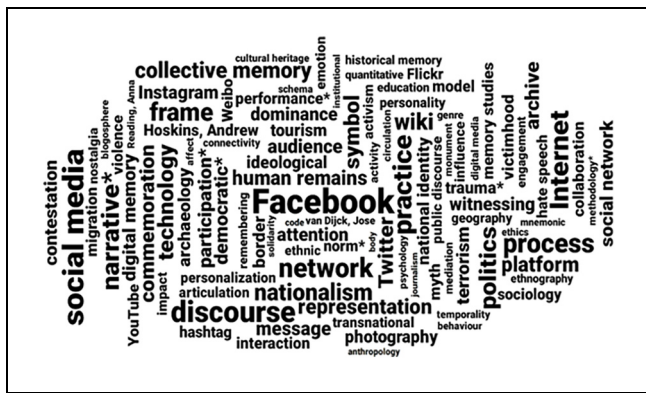**Figure 10.** Most frequent concepts in institutional communication on SNS publications.

Figure 8. Most frequent concepts in memory and identity on SNS publications.

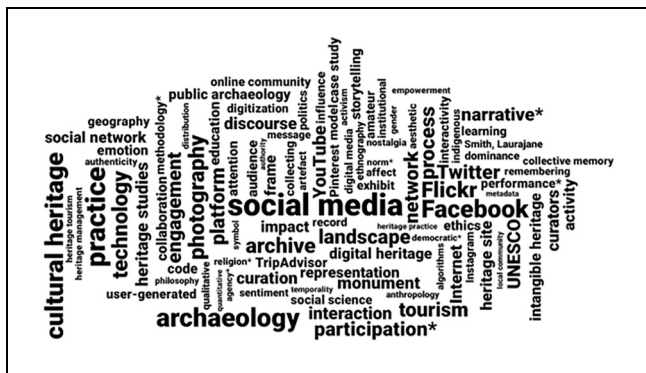**Figure 11.** Most frequent concepts in archeological communities on SNS publications.

Figure 9. Most frequent concepts in non-professional communities on SNS publications.

TERRORISM, DIGITAL MEMORY, IDEOLOGY, MYTH, and MIGRATION (Figure 8); in non-professional communities studies, concepts such as LANDSCAPE, HERITAGE STUDIES, INTANGIBLE HERITAGE, STORYTELLING, COLLECTING, and HERITAGE TOURISM, and references to authors such as

LAURAJANE SMITH (Figure 9); in studies of archeological communities on SNS, concepts like PUBLIC ARCHEOLOGY, AUTHORITY, ETHICS, and INEQUALITY (Figure 10); and, in institutional communication studies, concepts such as PARTICIPATION, EXHIBIT, CURATION, CO-CREATION, and CULTURAL INSTITUTION (Figure 11).

Taxonomy Concepts in Scholarly Discourse

The third challenge aims to address the following question:

> Challenge 3. To what extent are taxonomy concepts represented in the scholarly discourse of studies of heritage-related communities and institutional communication on SNS?

Much of the literature on cultural heritage in SNS focuses on institutional and professional heritage communication, concerned with the creation of a successful social media strategy that could foster meaningful USER

ENGAGEMENT. Amateur participation and non-professional communities are usually discussed in conjunction with professional HERITAGE COMMUNICATION, considering only in part differences between organizational and participatory CURATORIAL PRACTICES.

Most studies focusing on SNS heritage communication concern museums, which were first to recognize the potential of social media to attract AUDIENCES, aspiring to become community-based knowledge-sharing agents, contribute to a richer experience between artifacts and visitors, and foster interactive communication between the institution and its audience (Russo et al., 2006)—a shift that soon became an integral part of the rising PARTICIPATORY MUSEUM paradigm (Simon, 2010). However, many studies showcased examples of ineffective museum communication on SNS in achieving ACTIVE ENGAGEMENT (Alexander et al., 2008; Holdgaard, 2011; Kelly, 2009; Kotler et al., 2008; Rentschler & Hede, 2007; Russo & Peacock, 2009). The main reason advanced is that museums typically use SNS predominantly through a MARKETING FRAME (Kidd, 2011), or limit themselves to broadcasting information about their activities and events (Alexander et al., 2008; Kotler et al., 2008; Liew, 2014; Rentschler, 2007). This is in contrast to using INCLUSIVITY and COLLABORATION frames (Kidd, 2011), which successfully engage the community directly in museum activities such as curating, archiving and managing collections, or capturing community stories and autobiographies in new content (Bernstein, 2008). Therefore, the importance to create institutional policy for SNS and to measure IMPACT has been widely acknowledged (Cadell, 2013; De Man & Oliveira, 2016; Finnis et al., 2011; Malde et al., 2013; Marakos, 2014; Pett, 2012; Rodríguez Temiño & González Acuña, 2014; Visser & Richardson, 2013; Walker, 2014a).

SNS are popular platforms among archivists, because, like blogging and wiki sites, it provides an easy way for the creation of a virtual archive (Garaba, 2012; Theimer, 2010). However, some DIGITAL ARCHIVES studies point to sustainability concerns for preservation and future access of heritage information on SNS (Jeffrey, 2012; Law & Morgan, 2014; McNealy, 2011). This requires more profound study into processes of archiving highly interactive datasets, especially where discourse of potential future value is taking place, and where USER-GENERATED CONTENT is being gathered (Jeffrey, 2012). Beside, conceptual and technological differences between SNS services influence how cultural heritage representations are evolving in these particular environments: notwithstanding similar mechanisms of how cultural heritage is constituted across SNS when compared to the traditional outlets of communicating knowledge, FACEBOOK is "heavily colonized by representations of professional and academic archaeology," while Twitter presents "a cacophony of professional and non-professional voices of individuals and organizations," and both platforms are different from PINTEREST, which is more "collector centric," highlighting "the significance of imagery and impressions of the spectator" (Huvila, 2014, p. 27).

In fields of professional practice such as ARCHEOLOGY, the use of SNS is seen as an efficient attempt in speeding up discoverability of archeological content (Kansa & Deblauwe, 2011; Matthews & Wallis, 2015; Richardson, 2012) and fostering SCHOLARLY COMMUNICATION by increasing INTERACTION between archeological and amateur archeology-related communities (Beale & Ogden, 2012; Richardson, 2012, 2015; Walker, 2014a). Community building aspects are closely related to the notion of SOCIAL CAPITAL, of which SOCIAL NETWORKS are important generators and facilitators (Kansa & Deblauwe, 2011; Morris, 2011; Richardson, 2015). However, using SNS for archeological communication was found to have limited uptake, due to broader factors such as corporate communication policies, digital literacy, costs, ICT infrastructure, ethical issues, regional traditions, and individual attitudes (Beale & Ogden, 2012; Colley, 2014; Laracuente, 2012). Other studies also emphasized that the participation in public conversations through SNS invites reconsidering questions of archeological information AUTHORITY and reliability (Larsson, 2013; Richardson, 2012, 2014; Sánchez, 2013; Walker, 2014b). As noted, archeological organizations rarely support plural, participatory approaches to archeological heritage, or acknowledge a SHARED AUTHORITY, thus *indicating* a gap between professionally produced archeological data and non-professional or COMMUNITY PARTICIPATION (Morgan & Pallascio, 2015; Richardson, 2014). Some studies showcased that PRO-AMATEUR COMMUNITIES on SNS are better at interacting with online audiences than memory institutions, and at engaging with cultural heritage CURATION (Dallas, 2018; Giaccardi, 2012; Terras, 2010).

The importance of community participation and public action in cultural heritage was emphasized in the Faro convention (Zagato, 2015), whereas public engagement was thought to generate a new kind of heritage from below, defined as GRASSROOTS HERITAGE (S. B. Liu, 2010, p. 2975). New AFFORDANCES of digital, networked, and mobile technologies, enabling an ethos of "doing it together" in addition to "doing it yourself" (Jenkins et al., 2015), are essential principles of participatory culture. Digital technologies, including SNS, are deemed central for grassroots PARTICIPATORY HERITAGE, initially defined as "a space in which individuals engage in cultural activities outside of formal institutions for the purpose of knowledge sharing and co-creating with others" (Roued-Cunliffe & Copeland, 2017, p. XV); on the other hand, the growth of the meaning of communication for

the "present"of heritage has been noted throughout the research literature (Jones, 2017; Kalay et al., 2007; Kirshenblatt-Gimblett, 1995; Laužikas et al., 2018), and thus, participatory heritage may be conceptualized more concretely as "new forms of cultural heritage practice that emerge through the CO-CREATION and CONVERSATION of people who engage with cultural heritage objects for a variety of purposes, such as nostalgic incentives, commemoration, hobbyist interests, self-expression, pleasure or searching for an alternative source of knowledge and information" (Kelpšienė, 2021, p. 190).

The complex interconnections between professional and AMATEUR COMMUNITIES point to the existence of a "middle space" (Kansa & Deblauwe, 2011; Laracuente, 2012; Richardson, 2018; Richardson & Almansa-Sánchez, 2015), also conceptualized as a virtual CONTACT ZONE where diverse, unofficial, and personal narratives can be presented together (Purkis, 2017, p. 434). Others suggested that interactions on SNS, connecting professional and non-professional communities, could be perceived through SEMIOSPHERE theory's (Y. M. Lotman, 1990) notion of a CREOLIZED PERIPHERAL SPACE with a generative capacity to create new paradigms which might migrate to a newly-formed center, and thus become canonized and dominant in the future (Laužikas et al., 2018). Such creolization has been a challenge to many cultural heritage organizations, creating frictions with organizational policies and structures; for example, most institutional websites replicate institutional hierarchy in their information architecture, while community-driven initiatives are usually based on a "grassroots and up" approach and use SNS for cultural discussions, debates, documentation and the promotion of COMMUNITY IDENTITY, occasionally (and ironically) illustrated by images taken from institutional databases (Brown & Nicholas, 2012). On the other hand, VIRTUAL IDENTITY CONSTRUCTION in SNS heritage communities is enabled by both affiliations\in the physical world and associations created digitally with material objects, places, symbols, and signs (Schau & Gilly, 2003). AFFILIATIVE IDENTITIES (Schau & Gilly, 2003) are thus produced through a "collective bond that links individuals to collectivities through practices of cultural consciousness," enacted in SNS through different kinds of affiliative objects, and demonstrating a contingent, fluid, and hybrid status of cultural identity formation (Dallas, 2018, p. 126). For example, in some SNS communities, affiliative identity arises from the collection, sharing, and transformation of resources related to a place of interest (Wesberg & Jensen, 2017), while in others it manifests itself as EMOTIONAL COMMUNITY brought together by the affiliative power of nostalgia (Gregory, 2015).

Meta-Theoretical Dimensions of Difficult Heritage on SNS Scholarship

The fourth challenge to validate the ontological framework presented in this study is:

> Challenge 4. Can a meta-theoretical classification of studies of difficult HMI on SNS emerge from concepts and authors they refer to?

The mediacentric, culturalist and interactionist meta-theoretical approaches can be traced in difficult HMI on SNS literature.

The *mediacentric* approach is of rather lesser importance, Often, media representations of heritage are characterized as SIMULACRA (Rautenberg & Rojon, 2014; Wells, 2016; Wong & Qi, 2017; Zalewska, 2017), but this is used as a buzzword rather than in the meaning of JEAN BAUDRILLARD's concept. ASSEMBLAGE is also often mentioned, yet not in a Deleuzian sense, but simply as a gathering of media (e.g., Carter-White, 2018; Rutten et al., 2013; Wight, 2020; Zuanni, 2020). The very notion of media does not exceed the dichotomy between TRADITIONAL and SOCIAL MEDIA (e.g., Kow et al., 2017; Rutten et al., 2013; Vajda, 2017; Zhao & Liu, 2015).

The most widespread concept is REMEDIATION, used to characterize the digital memory of diverse objects, such as the Soviet past (Kaprāns, 2016; Kozachenko, 2019), the Finnish civil war (Heimo, 2014), the siege of Sarajevo (Knudsen, 2016), the transatlantic slave trade (Morgan & Pallascio, 2015), the Kambodian genocide (Benzaquen, 2014); World War II (Makhortykh, 2020), and Tibetan self-immolations (Warner, 2014). The REMEDIATION of TRAUMATIC experience and its heritage—notably, the memory of the Holocaust on Youtube—has not only positive aspects (Gibson & Jones, 2012; Kansteiner, 2017; Makhortykh, 2019), but also implies contestation (Carter-White, 2018; Manca, 2021). Related frequently occurring concepts to REMEDIATION, drawing from on the work on ANDREW HOSKINS, are MEDIA MEMORY and CONNECTIVE MEMORY (Birkner & Donk, 2020; Carter-White, 2018; de Smale, 2020; Mahmutović & Baraković, 2021; Makhortykh, 2019, 2020; Rutten et al., 2013). Interestingly, the notion of MEDIATIZED MEMORY appears more often than the concept of MEDIATIZATION, defined by mediatization theory as a (meta)process whereby media become constitutive of social phenomena (Lundström & Sartoretto, 2022). MEDIA ECOLOGY is used in a somewhat similar sense, to explain the evolution of polarized discourses related to troubled identity and political dependency (Osuri, 2019).

The *culturalist* approach is particularly visible in the popularity of the concept of NARRATIVE, and NARRATIVE

ANALYSIS, elucidating the role of NARRATIVES as communication frameworks (Kirin, 2020). The conflict between MONOLOGIC and DIALOGIC NARRATIVES is noted, and preference for the latter is supported (Arrigoni & Galani, 2019; Galani, Markham, & Mason, 2020) as it is more beneficial for the whole of society. Culturalist MEMORY STUDIES on SNS tend to focus on NARRATIVES (Arrigoni & Galani, 2019; Brentin, 2016; González Zarandona et al., 2018; Kirin, 2020; Koskinen-Koivisto, 2019) and DIGITAL STORYTELLING (Crooke, 2018; McCandlish & McPherson, 2021; Staiff, 2010).

Unsurprisingly, memory is often analyzed and defined in culturalist terms, through concepts such as memory of events, place memory, collective cultural forgetting, memory and collective identity, performative memory, and remembering. Several scholars focus on a social rather than individual perspective, drawing from concepts coined by the classics in the field, COLLECTIVE MEMORY by MAURICE HALBWACHS (Arrigoni & Galani, 2019; Birkner & Donk, 2020; Brentin, 2016; Heimo, 2017; Kirin, 2020; J. Liu, 2018; Zhao & Liu, 2015) and LIEUX DE MÉMOIRE by PIERRE NORA (Arrigoni & Galani, 2019; Baumann, 2020; Carter, 2015; Drinot, 2011; Farrell-Banks, 2019; Heimo, 2017; Ibrahim, 2016; Knudsen, 2016; Knudsen & Stage, 2013; Liboriussen & Martin, 2020; J. Liu, 2018; Silberman & Purser, 2012; Zhao & Liu, 2015). The memory of events, memory of places, and remembering are concepts called upon to discuss different kinds of exhibitions, websites (Arrigoni & Galani, 2019), memorials, and heritage sites, while personal or family memories on SNS are rather rare (Carter, 2015; Heimo, 2014, 2017).

SYMBOLS are particularly important for culturalist approaches as a means of assigning MEANING (Gibson & Jones, 2012) to places and events, but the notion is often used in an untheorized manner. Visual SYMBOLS discussed include gestures (Damcevic & Rodik, 2018), drawn images (El-Farahaty, 2019), photographs (Farquhar, 2013; Garduño Freeman, 2010; Ryzova, 2015), or material objects appearing as visual content (Adriaansen, 2020; Kozachenko, 2019). SYMBOLS also appear in verbal communication, for example, nationalist slogans chanted during football games (Sindbæk Andersen, 2016), or anthems (Bosch, 2020), or take the form of complex symbols, such as past events functioning as political symbols (Rodríguez-Temiño & Almansa-Sánchez, 2021). SYMBOLS might be considered a CONSTITUTIVE element of reality (Dobysh, 2019). Moreover, the symbolic is perceived as a realm of social existence, where phenomena such as SYMBOLIC VIOLENCE and SYMBOLIC TRAUMA (González Zarandona et al., 2018; Kaprāns, 2016; Zhukova, 2020) take place. SYMBOLIC REALITY permeates actual reality (Ibrahim, 2016) in places which, after PIERRE NORA, are identified as LIEUX DE MÉMOIRE, both offline (Arrigoni & Galani, 2019;

Zalewska, 2017) and online (Sumartojo, 2020). SOCIAL CONSTRUCTION here is situated in the process of SEMIOSIS (Damcevic & Rodik, 2018; Mahmutović & Baraković, 2021). SYMBOLS and SYMBOLIC MEMORY are also actualized through RITUALS (Brentin, 2016; Koskinen-Koivisto, 2019; Rutten et al., 2013; Wight, 2020), which, along with NARRATIVES, produce and sustain MYTHS (Ibrahim, 2016, 2017; Khlevnyuk, 2019; Kozachenko, 2019; Makhortykh, 2020; Ndlovu, 2018; Peralta, 2022; Rutten et al., 2013).

Memory practices on SNS are perceived by culturalists as ways to deal with institutional forgetting, to sustain officially CONTESTED MEMORY PRACTICES (Ibrahim, 2016; Mylonas, 2017), and to resist COLLECTIVE HISTORICAL AMNESIA (Ibrahim, 2016, 2017) and collective cultural FORGETTING (Rutten et al., 2013). Thus, it seems that MEMORY in the culturalist approach is first and foremost framed as communicative (Horsti, 2017; Kansteiner, 2017; Kozachenko, 2019; Modrow, 2018; Rutten et al., 2013). The culturalist approach provides the ground for CRITICAL HERITAGE, and CRITICAL HERITAGE STUDIES (Lorusso, 2014; Pietrobruno, 2013; Zuanni, 2020). However, it also contributes to classic topics in critical theory such as CRITIQUE OF HEGEMONY in the HMI sphere, such as hegemonic Eurocentrism (Horsti, 2017), nationalism (Kozachenko, 2019), and also hegemonic interpretatins of HMI and resistance (Birkner & Donk, 2020; Friesem, 2018; Kaprans, 2016; Liboriussen & Martin, 2020; Osuri, 2019).

The *interactionist* approach is manifested in discussions of PUBLIC SPHERE, not only following JÜRGEN HABERMAS' original notion (Arrigoni & Galani, 2019; Bonacchi et al., 2018; Knudsen & Andersen, 2019; Mylonas, 2017), but also considering critics such as NANCY FRASER, DOUGLAS KELLNER, and TODD GITLIN (Bosch, 2020; Mylonas, 2017). Both conceptualizations are relevant for understanding memory practices and dealing with DIFFICULT HERITAGE in social networks. But the notion of PUBLIC SPHERE is also quite often used as a non-theoretical, common-sensical term. On the other hand, the frequently occurring conception of DIALOGUE comes close to the Habermasian notion of DELIBERATION. Dialogue epitomizes the shift from a dissemination model of communication (one-to-many) to a networked one (many-to-many), as the feature of interpretative and interactive approaches oriented toward in three dimensions of (a) polyvocality, (b) civic listening and (c) the tension between institutional and online spaces for dialogue (Arrigoni & Galani, 2019; Galani, Markham, & Mason, 2020). In addition, sometimes the notion of dialogue is developed in the line of thinking described as "philosophy of dialogue" or "dialogue philosophy," based on the works of MARTIN BUBER, LEVINAS, BAKHTIN, and LØGSTRUP (Galani, Mason, & Arrigoni, 2020; Illman, 2011).

Interactionist and *culturalist* approaches are not mutually exclusive in difficult HMI on SNS scholarship. In some areas they converge, while in others they stand in dialectical tension. Convergence may be spotted in the concept of public defined, following SONIA LIVINGSTONE, as "a collection of people who may not all know each other but share "a common understanding of the world, a shared identity, a claim to inclusiveness, a consensus regarding the collective interest" (Boyd, 2007, p. 125; Livingstone, 2005, p. 9), and related concepts such as BENEDICT ANDERSON'S IMAGINED COMMUNITIES (Bosch, 2020; Budge & Burness, 2018; de Smale, 2020; Galani, Mason, & Arrigoni, 2020; Kozachenko, 2019; Rutten et al., 2013; Staiff, 2010; Tzanelli, 2017; Wells, 2016; Whigham et al., 2019), ZIZI PAPACHARISSI's notion of AFFECTIVE PUBLICS, and concepts of HYBRID SPACE, NETWORKED PUBLICS, and VIRTUAL COMMUNITIES (Bosch, 2020). Other shared concepts include REMEMBERING, COLLECTIVE ACTION or MEMORY, COLLECTIVE REMEMBRANCE or PARTICIPATION. on the other hand, dialectical tension might be detected in discussions concerning the relationship between collective identity and heritage: For example, when drawing the construction of NATIONAL IDENTITY, following Guibernau, "from five elements: the psychological (a feeling of belonging to a group, against a common enemy), historical (the selective use of history to build a collective memory, a connection to a lineage of ancestors), cultural (the recognition of symbols, rituals, and imagery), territorial (shared spaces that provide a good life to citizens), and political (a sense of common values)" (Farrell-Banks, 2019, pp. 90–91).

Conversely, psychology-based research paradigms focusing on TRAUMA, AFFECT (including AFFECTIVE ETHNOGRAPHY) and EMOTIONS (including the EMOTIONAL GEOGRAPHY) take predominantly an interactionist point of view. Trauma may be distinguished into individual, cultural and collective, but in all cases the element of social construction is present (Zhukova, 2020).

Discussion

In this study, we defined an ontology for semiotic and scholarly activity on SNS, addressing the needs for scholarly research in the narrower field of HMI while staying as closely as possible to the CIDOC CRM ontology (Bekiari et al., 2021). CIDOC CRM's upper ontology is suitable for our event-centric conceptualization, which puts *Semiotic Activity* in the center, connected to some *Person* as subject of the activity and some *Group as* its recipient, and producing some *Message* and assigning it some *Meaning* while employing pre-existing *Meanings*, while employing some *Affordance or Tool* and observing some *Semiotic Code* (Figure 1). We therefore go beyond social media ontologies we consulted, by addressing

semiotic aspects of user activity on SNS, and scholarly activities which address such SNS user activity.

Some additional aspects of our ontology where we diverge, extend, or specialize CIDOC CRM warrant consideration. Firstly, to ground the ontology and make it applicable in the specific field of scholarly research about HMI on SNS, we defined its lower layer as a taxonomy of *Concepts*, providing extensible vocabularies for categorization of *Semiotic Activities, Collectivities, Affordances or Tools, Expressions*, and a variety of *Meanings* established in the context of cultural heritage, digital heritage, social media, and memory and identity discourses (Figure 2). Secondly, we grounded the ontology and taxonomy work on a conceptualization of *mediacentric, culturalist* and *interactionist* meta-theoretical approaches governing scholarly discourse related HMI on SNS. Finally, to provide ground truth, we validated the results of the study through four examples: a representation of an actual HMI-related SNS conversation and scholarly intervention using knowledge graphs (Figures 3 and 4), a quantitative analysis of the occurrence of taxonomy terms in different subfields of HMI on SNS studies (Figures 5–11), a qualitative analysis of concepts used in studies on non-professional, archeological, and institutional heritage communication on SNS, and an meta-theoretical account of studies of HMI on SNS.

Secondly, we considered whether we should enrich the ontology so that it can account for granular argumentative interactions between participants in, especially, difficult and contested heritage contexts. As noted, there are several existing ontologies aimed to formally represent practical and formal argumentation and knowledge work. Our *Meaning* entity may be viewed as a superclass of Scholarly Ontology's notion of Assertion, encompassing affective and evaluative dispositions beyond the domain-specific cases of SO's Annotation, Research Question, Proposition and Goal entities (Pertsas & Constantopoulos, 2017, p. 178), and as a superclass of I4 Proposition Set in the CRMinf extension to CIDOC CRM, as it extends to a much wider range of instances beyond "formal binary propositions that an I2 Belief is held about" (Stead & Doerr, 2015, p. 10). Given, however, that our interest, in the context of HMI on SNS, is primarily in the relationship between *Expressions* and *Meanings* expressed by *Persons* and shared with *Collectivities* whose communicative practice as governed by specific *Semiotic Codes*, our ontology does not seek to represent the argumentation operations and structures, or the detailed scholarly activity processes these studies address.

Thirdly, a major aim for our ontology was to represent directly and clearly the semiotic, communicative, meaning-making aspects of activities such as posting a

message, commenting on a message, or replicating it in a different communicative context (e.g., by sharing it on Facebook, which creates a copy of the original message on the sharer's page). Being a broadly applicable reference ontology, CIDOC CRM does not provide directly for semiotic aspects of activity. We therefore defined two entities, *Expression* and *Meaning*, to represent the two complementary notions of signifier and signified in semiological theory. In this, we drew from a similar distinction between "medium" and "content" in the definition of "Representations" by the CHARM ontology (Gonzalez-Perez et al., 2012); but, unlike CHARM, we set these entity classes within an event-centric ontology structure aligned with CIDOC CRM. Therefore, in our model, the relationship connecting *Expression* with *Meaning* is a "shortcut" (Bekiari et al., 2021, p. 21) for a structure mediated by a *Semiotic Activity*, mediated by the *Affordance or Tool* at hand, and also by the *Semiotic Code*, that is, the meaning-making structures applied in the process of encoding – when a user posts a message on social media, bas–d on - decoding – when other users read that message (Hall, 1993).

A fourth, thornier, challenge, was how to account for semiotic activities which had as their object other semiotic activities, such as when scholarly research seeks to interpret some aspect of HMI-related semiotic activity between SNS users. In line with Lotman's cultural semiotics theorization (2005), we conceive the field of semiotic activity on SNS and the field of scholarly activity related to HMI as virtual *semiospheres*, and the way they interact (for instance, when scholars interpret SNS conversations, or when an SNS user refers to from some scholarly assertion about the past) as manifestation of *creolization* work in the boundaries between professional and non-professional communities (Laužikas et al., 2018). In line with this theorization, and to provide for the diversity of such operations of translation or creolization, we opted to stay closer to core CIDOC CRM by providing a formalization of the relationship between primary and secondary semiotic work through classification into *Activity Types*, rather than by adopting different entities as modeled in CHARM's *Valorizations* (Gonzalez-Perez et al., 2012, p. 191), or the explicit representation of inferential and belief adoption processes as posited by CRMinf (Stead & Doerr, 2015) and MIDM (Van Ruymbeke et al., 2018). Therefore, our ontology represents the process of knowledge translation between non-professional and professional SNS activities as a sequence of *Semiotic Activities*, the first of each characterized through some *SNS Activity Type* (e.g., posting on Twitter) and related to a *Non-Professional Collectivity Type* (e.g., member of a Lithuanian partisans Facebook group), while following ones related to both an *SNS Activity Type* (e.g., commenting) and a *Scholarly Activity Type* (e.g., theorizing, conducting a research study, etc.) in the context of an *Epistemic Collectivity Type* (e.g., heritage studies researchers) and mediated by a relevant *Semiotic Code* (e.g., the semiosphere of critical heritage studies).

Finally, in building the concept taxonomy, we analyzed classifications provided by the literature of social network sites for specific aspects of SNS activity. Given our understanding of the field of HMI on SNS, however, we concluded that we need a bottom-up, evidence-based approach to identifying specific terms that can truly capture the diversity and multiple foci of scholarly research on the field. Therefore, we established an approach to start from a provisional dictionary of terms from a frequency analysis on a corpus of publications from the established fields of heritage studies, memory studies, digital heritage, and social media studies, enrich it with relevant terms from the social and human sciences, organize them using qualitative data analysis methods in specific hierarchies, and validate it empirically by analyzing term occurrence in a comprehensive "target" corpus of publications on the narrower, "intersection" field of HMI on SNS. To our knowledge, while automated and quantitative methods of ontology extraction are common, there are no prior studies that apply such a mixed methods approach, combining frequency analysis with qualitative data analysis, for the development and validation of a concept taxonomy.

The objective of the study has been to develop an ontology "for the systematic, evidence-based representation and study of referential and discursive aspects of conversations on HMI on SNS, of interviews with participants in such conversations, and of scholarly works engaging with such phenomena." The ontology is not meant as just a theoretical exercise, but as a pragmatic construct that can be used to serve purposes of data constitution, analysis, and theory building. Therefore, to ensure fitness-for-purpose, we adopted a research design which included an explicit process of validating the ontology by applying it for the purpose of four concrete activities that might emerge in the process of actual HMI on SNS research. Firstly, with regard to data constitution, we demonstrated that the ontology is fit for the purpose of data representation in the case of a semiotic interaction between SNS users referring to the contested memory of the June 1941 uprising in Lithuania (the referential aspect), and the subsequent uptake of this interaction in scholarly interpretation, viewed as a process of translation (the discursive aspect). Secondly, with regard to analysis, we showed how the taxonomic hierarchies defined as part of the ontology can be used to provide a "distant reading" of a corpus of 274 publications investigating HMI on SNS by means of a frequency analysis of taxonomy concepts and cited authors, enabling, in

addition, the extraction of useful insights on the differentiation between subfields of SNS practice related to the Holocaust, other contexts of difficult heritage, memory and identity work, non-professional communities, institutional communication, and archeological communities. Thirdly, we provided a complementary critical qualitative account demonstrating that taxonomy concepts in the ontology do inform the discourse of publications in the field of HMI on SNS scholarship. Finally, we demonstrated the usefulness of the ontology for theory building by using it to test the hypothesis that the intellectual structure of the scholarship of difficult HMI on SNS may be understood in the light of latent *mediacentric*, *culturalist* and *interactionist* meta-theoretical lenses. The successful application of the ontology in these four different scenarios indicates that it can be a useful instrument for the representation, analysis and theoretical investigation of social media interactions related to heritage, memory, and identity.

Conclusion

In this study, we presented an ontology suitable to support the process of data constitution, analysis and theory building on semiotic activity of HMI on SNS and related scholarly activity and validated the ontology through successful application in four examples of relevant investigations on related data and scholarly literature. To address RQ1, the study establishes a core ontology through a structure of entities and relationships suitable for expressing HMI-based interactions on SNS while accounting both for the purposeful, tool-mediated activity of participants, and for the cultural semiotic nature of communicative acts, based on an intellectual framework of activity theory and cultural semiotics, departs in several notable ways from prior work in cultural heritage ontologies. To address RQ2, it introducing a concept taxonomy relevant to requirements specific to HMI on SNS practice which accounts not only for substantive concepts representing the properties of SNS communicative activity structure and theoretical or thematic concepts characterizing the referential content of SNS communications, but also meta-theoretical concepts pertaining to the meaning of these communications. To address RQ3, the study introduces a novel process of taxonomy "ground truthing" based on lexical analysis of a corpus of reference works from the fields of cultural heritage, memory studies, social media studies, and digital heritage, and of ontology validation based on its use to support data constitution, analysis and theory-building in HMI on SNS research.

Based on its conceptual structure and formal properties, the ontology can be a useful framework for the following purposes:

1. To construct data models for the collection and representation of data from SNS platforms, and build research datasets from SNS posts, comments, and reactions.
2. To develop thematic guides and questionnaires for qualitative interviewing related to HMI on SNS.
3. To build thematic analysis vocabularies and code systems for qualitative content analysis of SNS data, interview transcripts, and literature review items.
4. To formulate queries useful to filter and summarize evidence represented in a corpus of primary and secondary data related to HMI on SNS.
5. To get insights for the identification of sensitizing concepts or the construction of a theoretical framework for studies related to HMI on SNS.

Limitations of the study are related to the conceptualization and design decisions it adopts, and to the unavoidable trade-off between expressiveness and usability. Firstly, the core ontology does not account for the representation of rhetorical, narrative, discourse, or argumentation structures within Expressions, and therefore complementary conceptual structures and tools will be necessary to formally support related analysis procedures. Secondly, the concept taxonomy is structured as a monothetic hierarchy, a structural limitation which, while easy to maintain and use, may be at odds with polythetic ("family resemblance") or fuzzy (non-deterministic) way categories may be pragmatically constructed and understood in social and epistemic practice; it is therefore not meant as a formalism suitable for fundamental theoretical research on epistemic concepts within heritage, memory and identity in social media studies. Finally, the applicability of the ontology as a schema was tested only by testing its expressiveness in representing examples of HMI-related SNS interactions in the form of a small number of knowledge graphs; further work will be necessary to assess if an ontology-compliant database of HMI-related SNS interactions can be useful in supporting queries to account for a variety of important research questions.

In our ongoing research, we already applied the ontology to generate an applicable data model, in the form of a property graph schema, for the collection and representation of several thousand conversations related to Lithuanian cultural heritage and history from Facebook and Instagram, and for initial searches related to research questions in the project. We also used the concept taxonomy for the identification of sensitizing concepts for the study, and for the definition of the thematic guide for conducting interviews with SNS mnemonic actors, which we expect to test in practice in the forthcoming period. In addition, we used ontology entities and concept

taxonomies as the guiding structure to develop a provisional code system which we intend to use for lexical analysis and qualitative coding of both SNS conversation threads and interview transcripts. In future work, we aim to report on how well the ontology serves the needs of such an evidence-based investigation of semiotic activity on SNS, a hugely consequential field for further studies of heritage, memory and identity work in the emerging global communication domain of online social networks.

Declaration of Conflicting Interests

Funding

Ethical Statement

Not applicable

ORCID iD

Kestas Kirtiklis ⓘ https://orcid.org/0000-0001-5179-0186

References

Adriaansen, R.-J. (2020). Picturing Auschwitz. Multimodality and the attribution of historical significance on Instagram (*Imaginando Auschwitz. La multimodalidad y la atribución de significado histórico en Instagram*). *Journal for the Study of Education and Development*, *43*(3), 652–681. https://doi.org/10.1080/02103702.2020.1771963

Akkermans, H., & Gordijn, J. (2006). Ontology engineering, scientific method and the research agenda. In S. Staab & V. Svátek (Eds.) *Managing knowledge in a world of networks* (pp. 112–125). Springer.

Alexander, C., Burnette, A., Dark, D. H. D., Rossi, J., & Minor, N. (2008). Beyond launch: Museum videos on YouTube. *Proc. Museum on the Web*.

Allsop, B. (2016) Social media and activism: a literature review. *Social Psychological Review 18*(2): 35–40.

Arrigoni, G., & Galani, A. (2019). Digitally enhanced polyvocality and reflective spaces. In A. Galani, R. Mason, & G. Arrigoni (Eds.), *European heritage, dialogue and Digital Practices* (1st ed., pp. 37–61). Routledge.

Babbie, E. R. (2015). *The practice of social research*. Nelson Education.

Barros, B., Verdejo, M. F., Read, T., & Mizoguchi, R. (2002). *Applications of a collaborative learning ontology* [Conference session]. Mexican International Conference on Artificial Intelligence (pp. 301–310).

Bates, M. J. (2005). An introduction to metatheories, theories, and models. In K. E. Fisher, S. Erdelez, & L. E. McKechnie (Eds.), *Theories of information behavior* (pp. 1–24). Information Today, Inc.

Baumann, U. (2020). Past Future Concrete" revisited: Ex-Yugoslav monuments shaped as destinations via online image practices. *Český Lid*, *107*(4), 469–492. https://doi.org/10.21104/cl.2020.4.03

Beale, N., & Ogden, J. (2012). Social media at the CAA2012: A reflective report. *Internet Archaeology*, *32*. https://doi.org/10.11141/ia.32.6

Bekiari, C., Bruseker, G., Doerr, M., Ore, C. E., Stead, S., & Velios, A.; CIDOC CRM Special Interest Group. (2021). *Definition of the CIDOC Conceptual Reference Model (Version 7.1.1), Volume A*. ICOM-CIDOC. http://www.cidoc-crm.org/sites/default/files/cidoc_crm_v.7.1.1_0.pdf

Benzaquen, S. (2014). Looking at the Tuol Sleng Museum of genocidal crimes, Cambodia, on Flickr and YouTube. *Media Culture & Society*, *36*(6), 790–809. https://doi.org/10.1177/0163443714532983

Bernstein, S. (2008, April 9). *Where do we go from here? Continuing with Web 2.0 at the Brooklyn Museum*. Museums & the Web 2008. https://www.archimuse.com/mw2008/papers/bernstein/bernstein.html

Bhaskar, R. (1979). *The possibility of naturalism: A philosophical critique of the contemporary human sciences*. Routledge.

Birkner, T., & Donk, A. (2020). Collective memory and social media: Fostering a new historical consciousness in the digital age? *Memory Studies*, *13*(4), 367–383. https://doi.org/10.1177/1750698017750012

Bonacchi, C. (2022). *Heritage and nationalism: Understanding populism through big data*. UCL Press. https://doi.org/10.2307/j.ctv1wdvx2p

Bonacchi, C., Altaweel, M., & Krzyzanska, M. (2018). The heritage of Brexit: Roles of the past in the construction of political identities through social media. *Journal of Social Archaeology*, *18*(2), 174–192. https://doi.org/10.1177/1469605318759713

Bosch, T. E. (2020). *Social media and everyday life in South Africa*. Taylor and Francis, Taylor & Francis Group, Routledge.

Boyd, D. (2007). *Why youth (heart) social network sites: The role of networked publics in teenage social life (SSRN Scholarly Paper ID 1518924)*. Social Science Research Network. https://papers.ssrn.com/abstract=1518924

Brentin, D. (2016). Ready for the homeland? Ritual, remembrance, and political extremism in Croatian football. *Nationalities Papers*, *44*(6), 860–876. https://doi.org/10.1080/00905992.2015.1136996

Brown, D., & Nicholas, G. (2012). Protecting indigenous cultural property in the age of digital democracy: Institutional

and communal responses to Canadian First Nations and Māori heritage concerns. *Journal of Material Culture*, *17*(3), 307–324. https://doi.org/10.1177/1359183512454065

Budge, K., & Burness, A. (2018). Museum objects and Instagram: Agency and communication in digital engagement. *Continuum*, *32*(2), 137–150. https://doi.org/10.1080/10304 312.2017.1337079

Burke, M., Kraut, R., & Marlow, C. (2011). Social capital on Facebook: Differentiating uses and users. *Proceedings of the SIGCHI conference on human factors in computing systems* (pp. 571–580). ACM. http://dl.acm.org/citation.cfm?id = 1979023

Cadell, L. (2013). Socially practical or practically unsociable? A study into social media policy experiences in Queensland cultural heritage institutions. *Australian Academic & Research Libraries*, *44*(1), 3–13. https://doi.org/10.1080/00048623.201 3.773858

Cameron, F., & Kenderdine, S. (Eds.) (2007). *Theorizing digital cultural heritage*. MIT Press.

Carter, P. (2015). Virtual ethnography: Placing emotional geographies via YouTube. In D. L. Butler, S. P. Hanna, A. E. Potter, E. A. Modlin, & P. Carter (Eds.), *Social memory and heritage tourism methodologies* (pp. 48–67). Routledge.

Carter-White, R. (2018). Death camp heritage 'from below'? Instagram and the (re)mediation of Holocaust heritage. In H. Muzaini & C. Minca (Eds.), *After heritage: critical perspectives on heritage from below* (pp. 86–106). Edward Elgar Publishing.

Charitonos, K., Blake, C., Scanlon, E., & Jones, A. (2012). Museum learning via social and mobile technologies: (How) can online interactions enhance the visitor experience? *British Journal of Educational Technology*, *43*(5), 802–819. https://doi.org/10.1111/j.1467-8535.2012.01360.x

Chung, T.-L., Marchetti, S., & Fiore, A. M. (2014). Use of social networking services for marketing art museums. *Museum Management and Curatorship*, *29*(2), 188–205.

CIDOC-CRM. (2022). *What is the CIDOC-CRM?* https://www.cidoc-crm.org/.

Colley, S. (2014). Social media and archaeological communication: An Australian survey. *Archäologische Informationen*, *36*, 65–80. https://journals.ub.uni-heidelberg.de/index.php/arch-inf/article/view/15385

Conklin, J., & Begeman, M. L. (1988). GIBIS: A hypertext tool for exploratory policy discussion. *ACM Transactions on Information Systems*, *6*(4), 303–331. https://doi.org/10.1145/58566.59297

Crooke, E. (2018). Giving voice to silences: Harnessing the performative in two memory projects in Northern Ireland. *Liminalities: A Journal of Performance Studies*, *18*, 121–138. https://pure.ulster.ac.uk/en/publications/giving-voice-to-silences-harnessing-the-performative-in-two-memor

Crotty, M. (1998). *The foundations of social research: Meaning and perspective in the research process*. Sage.

Dallas, C. (2016). Digital curation beyond the "wild frontier": A pragmatic approach. *Archival Science*, *16*(4), 421–457. https://doi.org/10.1007/s10502-015-9252-6

Dallas, C. (2018). Heritage encounters on social network sites, and the affiliative power of objects. In S. Antoniadou, I. Poulios, G. Vavouranakis, & P. Raouzaiou (Eds.), *Culture and perspective at times of crisis: State structures, private initiative and the public character of heritage* (pp. 116–131). Oxbow Books.

Damcevic, K., & Rodik, F. (2018). Ready for the homeland: Hate speech on Croatian right-wing public Facebook pages. *Romanian Journal of Communication and Public Relations*, *20*(3), 31.

De Man, A., & Oliveira, C. (2016). A stakeholder perspective on heritage branding and digital communication. In V. Katsoni & A. Stratigea (Eds.), *Tourism and culture in the age of innovation* (pp. 447–455). Springer.

de Smale, S. (2020). Memory in the margins: The connecting and colliding of vernacular war memories. *Media War & Conflict*, *13*(2), 188–212. https://doi.org/10.1177/1750635219 828772

Dobysh, M. (2019). Euromaidan and conflict in Eastern Ukraine in social networking sites: Territorial differences of pro-Russian subscriptions in Ukraine. *Hungarian Geographical Bulletin*, *68*(1), 51–64. https://doi.org/10.15201/hungeobull.68.1.4

Doerr, M., Kritsotaki, A., Christophides, V., & Kotzinos, D. (2012). Reference ontology for knowledge creation processes. In A. Moen, A. Mørch, & I. Paavola, S. (Eds.), *Collaborative Knowledge Creation* (pp. 31–52). Sense Publishers.

Doerr, M., Kritsotaki, A., Rousakis, Y., Hiebel, G., & Theodoridou, M. (2016). *Definition of the CRMsci: An extension of CIDOC-CRM to support scientific observation—Proposal for approval by CIDOC CRM-SIG (draft)* (Technical Report Version 1.2.3). ICS-FORTH. https://www.ics.forth.gr/isl/CRMext/CRMsci/docs/CRMsci1.2.3.pdf

Drinot, P. (2011). Website of memory: The war of the Pacific (1879–84) in the global age of YouTube. *Memory Studies*, *4*(4), 370–385. https://doi.org/10.1177/1750698011409290

Drotner, K., & Schrøder, K. C. (Eds.). (2013). *Museum communication and social media: The connected museum*. Routledge.

El-Farahaty, H. (2019). Egyptian satirical graphics on social media after the Arab Spring. *Communication Research and Practice*, *5*(3), 255–273. https://doi.org/10.1080/22041451. 2019.1627792

Engeström, Y. (1999). Activity theory and individual and social transformation. In Y. Engeström, R. Miettinen, & R.-L. Punamäki-Gitai (Eds.), *Perspectives on activity theory* (pp. 19–37). Cambridge University Press.

Engeström, Y. (2000). Activity theory as a framework for analyzing and redesigning work. *Ergonomics*, *43*(7), 960–974.

Farquhar, L. (2013). Performing and interpreting identity through Facebook imagery. *Convergence*, *19*, 446–471. http://con.sagepub.com/content/early/2012/10/15/13548565 12459838.abstract

Farrell-Banks, D. (2019). 1215 in 280 characters: Talking about Magna Carta on Twitter. In A. Galani, R. Mason, & G. Arrigoni (Eds.), *European heritage, dialogue and digital practices* (pp. 86–108). Routledge.

Finnis, J., Chan, S., & Clements, R. (2011). *Let's get real: How to evaluate online success (No. 30; Report from the Culture24 Action Research Project)*. WeAreCulture24.

Fleck, L. (1979). *Genesis and development of a scientific fact (Repr. 11. Aufl)*. University of Chicago Press.

Friesem, L. (2018). Holocaust tweets as an act of resistance. *Israeli Studies Review*, *33*(2), 85–104.

Galani, A., Markham, K., & Mason, R. (2020). Problematising digital and dialogic heritage practices in Europe: Tensions and opportunities. In A. Galani, R. Mason, & G. Arrigoni (Eds.), *European heritage, dialogue and digital practices* (pp. 9–36). Routledge, Taylor & Francis Group. http://www.oapen.org/download/?type=document&docid=1005157

Galani, A., Mason, R., & Arrigoni, G. (Eds.) (2020). *European heritage, dialogue and digital practices*. Routledge, Taylor & Francis Group. http://www.oapen.org/download/?type=document&docid=1005157

Garaba, F. (2012). Availing the liberation struggle heritage to the public: Some reflections on the use of Web 2.0 technologies in archives within the East and Southern Africa Regional Branch of the International Council on Archives (ESARBICA). *Information Development*, 28(1), 22–31.

Garduño Freeman, C. (2010). Photosharing on Flickr: Intangible heritage and emergent publics. *International Journal of Heritage Studies*, 16(4-5), 352–368. https://doi.org/10.1080/13527251003775695

Giaccardi, E. (2012). Reframing heritage in a participatory culture. In E. Giaccardi (Ed.), *Heritage and social media: Understanding heritage in a participatory culture* (1st ed., pp. 1–10). Routledge.

Gibson, P. L., & Jones, S. (2012). Remediation and remembrance: "Dancing Auschwitz" collective memory and new media. *E–SACHESS - Journal for Communication Studies*, 2), 107–131. https://www.ceeol.com/search/article-detail?id=52633

Golbeck, J., & Rothstein, M. (2008). *Linking social networks on the web with FOAF: A semantic web case study* [Conference session]. *Proceedings of the Twenty-Third AAAI Conference on Artificial Intelligence* (pp. 1138–1143).

Gonzalez-Perez, C., Martín-Rodilla, P., Parcero-Oubiña, C., Fábrega-álvarez, P., & Güimil-Fariña, A. (2012). Extending an abstract reference model for transdisciplinary work in cultural heritage. In J. M. Dodero, M. Palomo-Duarte, & P. Karampiperis (Eds.), *Metadata and semantics research* (pp. 190–201). Springer. http://link.springer.com.myaccess.library.utoronto.ca/chapter/10.1007/978-3-642-35233-1_20

González Zarandona, J. A., Albarrán-Torres, C., & Isakhan, B. (2018). Digitally Mediated Iconoclasm: The Islamic State and the war on cultural heritage. *International Journal of Heritage Studies*, 24(6), 649–671. https://doi.org/10.1080/13527258.2017.1413675

Gregory, J. (2015). Connecting with the past through social media: The 'Beautiful buildings and cool places Perth has lost' Facebook group. *International Journal of Heritage Studies*, 21(1), 22–45. https://doi.org/10.1080/13527258.2014.884015

Gruber, T. R. (1995). Toward principles for the design of ontologies used for knowledge sharing? *International Journal of Human-Computer Studies*, 43(5-6), 907–928. https://doi.org/10.1006/ijhc.1995.1081

Guarino, N., Oberle, D., & Staab, S. (2009). What is an ontology? In S. Staab & R. Studer (Eds.), *Handbook on ontologies* (pp. 1–17). Springer. http://link.springer.com/chapter/10.1007/978-3-540-92673-3_0

Hall, S. (1993). Encoding, decoding. In S. During (Ed.), *The cultural studies reader* (pp. 90–103). Routledge. http://www.hu.mtu.edu/~jdslack/readings/CSReadings/Hall_Encoding-n-Decoding.pdf

Harrison, R. (2013). *Heritage: Critical approaches*. Routledge.

Harrison, R. (2020). *Heritage futures: Comparative approaches to natural and cultural heritage practices*. UCL Press.

Heimo, A. (2014). The 1918 Finnish civil war revisited: The digital aftermath. *Folklore Electronic Journal of Folklore*, 57, 141–168. https://www.ceeol.com/search/article-detail?id=257040

Heimo, A. (2017). The Italian Hall tragedy, 1913: A hundred years of remediated memories. In T. Sindbæk Andersen & B. Törnquist-Plewa (Eds.), *The twentieth century in European memory: Transcultural mediation and reception* (pp. 305–343). Brill. https://brill.com/view/title/35261

Holdgaard, N. (2011). *The use of social media in the Danish museum landscape*. Museums and the Web 2011: Proceedings. Toronto: Archives & Museum Informatics. Recuperado El, 9. http://www.museumsandtheweb.com/mw2011/papers/the_use_of_social_media_in_the_danish_museum_l.html

Horsti, K. (2017). Communicative memory of irregular migration: The re-circulation of news images on YouTube. *Memory Studies*, 10(2), 112–129.

Hoskins, A. (2018). The restless past: An introduction to digital memory and media. In A. Hoskins (Ed.) *Digital memory studies: Media pasts in transition* (pp. 13–36). Routledge.

Hughes, L., Constantopoulos, P., & Dallas, C. (2015). Digital methods in the humanities. In S. Schreibman, R. Siemens & J. Unsworth (Eds.), *A new companion to digital humanities* (pp. 150–170). John Wiley & Sons, Ltd.

Huvila, I. (2014). Engagement has its consequences: The emergence of the representations of archaeology in social media. *Archäologische Informationen*, 36, 21–30. https://journals.ub.uni-heidelberg.de/index.php/arch-inf/article/view/15382

Ibrahim, Y. (2016). Tank Man, media, memory and Yellow Duck Patrol: Remembering Tiananmen on social media. *Digital Journalism*, 4(5), 582–596. https://doi.org/10.1080/21670811.2015.1063076

Ibrahim, Y. (2017). Facebook and the Napalm Girl: Reframing the iconic as pornographic. *Social Media + Society*, 3(4), 2056305117743140.

Illman, R. (2011). Reciprocity and power in philosophies of dialogue. *Studies in Interreligious Dialogue*, 21(1), 47–63.

Jeffrey, S. (2012). A new digital dark age? Collaborative web tools, social media and long-term preservation. *World Archaeology*, 44(4), 553–570. https://doi.org/10.1080/00438243.2012.737579

Jenkins, H., Ito, M., & Boyd, D. (2015). *Participatory culture in a networked era: A conversation on youth, learning, commerce, and politics*. Polity.

Jones, S. (2017). Wrestling with the social value of heritage: Problems, dilemmas and opportunities. *Journal of Community Archaeology & Heritage*, 4(1), 21–37. https://doi.org/10.1080/20518196.2016.1193996

Kalay, Y., Kvan, T., & Affleck, J. (2007). *New heritage: New media and cultural heritage*. Routledge.

Kansa, S. W., & Deblauwe, F. (2011). User-generated content in Zooarchaeology: Exploring the "middle space" of scholarly communication. *Archaeology*, 2, 185–206. http://escholarship.org/uc/item/1r6137tb.pdf#page=202

Kansteiner, W. (2017). Transnational Holocaust memory, digital culture and the end of reception studies. In T. Sindbæk Andersen & B. Törnquist-Plewa (Eds.), *The twentieth century in European Memory: Transcultural mediation and reception* (pp. 240–267). Brill. https://brill.com/view/title/35261

Kaprans, M. (2016). Framing the Ukrainian insurgent army and the Latvian legion: Transnational history-writing on Wikipedia. In T. S. Andersen & B. Törnquist-Plewa (Eds.), *Disputed memory: Emotions and memory politics in Central, Eastern and South-Eastern Europe* (pp. 249–272). De Gruyter.

Kaprāns, M. (2016). Hegemonic representations of the past and digital agency: Giving meaning to "The Soviet Story" on social networking sites. *Memory Studies*, 9(2), 156–172. https://doi.org/10.1177/1750698015587151

Kelly, B. (2009). Time to stop doing and start thinking: A framework for exploiting Web 2.0 services. *Museums and the Web 2009*. http://opus.bath.ac.uk/19499

Kelpšiene, I. (2019). Exploring archaeological organizations' communication on Facebook: A review of MOLA's Facebook Page. *Advances in Archaeological Practice, 7*(2), 203–214. https://doi.org/10.1017/aap.2019.9

Kelpšienė, I. (2021). *Participatory heritage: A multiple-case study of Lithuanian grassroots cultural heritage communities on Facebook* [Doctoral Dissertation, Vilnius University]. https://doi.org/10.15388/vu.thesis.181

Kelpšienė, I., Armakauskaitė, D., Denisenko, V., Kirtiklis, K., Laužikas, R., Stonytė, R., Murinienė, L., & Dallas, C. (2022). Difficult heritage on social network sites: An integrative review. *New Media & Society*. Advance online publication. https://doi.org/10.1177/14614448221122186

Khlevnyuk, D. (2019). Narrowcasting collective memory online: 'liking' Stalin in Russian social media. *Media Culture & Society*, 41(3), 317–331.

Kidd, J. (2011). Enacting engagement online: Framing social media use for the museum. *Information Technology and People*, 24(1), 64–77.

Kidd, J. (2014). *Museums in the new mediascape: Transmedia, participation, ethics*. Ashgate Publishing.

Kietzmann, J. H., Hermkens, K., McCarthy, I. P., & Silvestre, B. S. (2011). Social media? Get serious! Understanding the functional building blocks of social media. *Business Horizons*, 54(3), 241–251. http://www.sciencedirect.com/science/article/pii/S0007681311000061

Kirin, R. J. (2020). Fear, humanity and managing the heritage of war: Two narratives from Western Slavonia. *Strah, ČoIječnost i Upravljanje Baštinom Rata: Dvije Naracije Iz Zapadne Slavonije*, 57(1), 135–161. https://doi.org/10.15176/vol57no107

Kirshenblatt-Gimblett, B. (1995). Theorizing heritage. *Ethnomusicology*, 39(3), 367–380. https://doi.org/10.2307/924627

Knudsen, B. T. (2016). The besieged city in the heart of Europe: Sniper Alley in Sarajevo as memorial site on YouTube. In R. Christensen & K. Sandvik (Eds.), *Mediating and remediating death* (pp. 111–132). Routledge. http://go.utlib.ca/cat/11368235

Knudsen, B. T., & Andersen, C. (2019). Affective politics and colonial heritage, Rhodes must Fall at UCT and Oxford. *International Journal of Heritage Studies*, 25(3), 239–258. https://doi.org/10.1080/13527258.2018.1481134

Knudsen, B. T., & Stage, C. (2013). Online war memorials: YouTube as a democratic space of commemoration exemplified through video tributes to fallen Danish soldiers. *Memory Studies*, 6(4), 418–436. https://doi.org/10.1177/1750698012458309

Koskinen-Koivisto, E. (2019). Transnational heritage work and commemorative rituals across the Finnish-Russian border in the old Salla region. In S. Saramo, E. Koskinen-Koivisto, & H. Snellman (Eds.), *Transnational death* (pp. 200–213). Finnish Literature Society SKS. https://oa.finlit.fi/site/books/10.21435/sfe.17/

Kotler, N. G., Kotler, P., & Kotler, W. I. (2008). *Museum strategy and marketing: Designing missions, building audiences, generating revenue and resources* (2nd ed.). Jossey-Bass.

Kow, Y. M., Gui, X., & Cheng, W. (2017). One social movement, two social media sites: A comparative study of public discourses. *Computer Supported Cooperative Work: CSCW*, 26(4), 807–836. https://doi.org/10.1007/s10606-017-9284-y

Kozachenko, I. (2019). Fighting for the Soviet Union 2.0: Digital nostalgia and national belonging in the context of the Ukrainian crisis. *Communist and Post-Communist Studies*, 52(1), 1–10. https://doi.org/10.1016/j.postcomstud.2019.01.001

Kumar, A., & Joshi, A. (2017). Ontology driven sentiment analysis on social web for government intelligence. In *Proceedings of the Special Collection on eGovernment Innovations in India* (pp. 134–139).

Lange, C., Bojars, U., Groza, T., Breslin, J. G., & Handschuh, S. (2008). *Expressing argumentative discussions in social media sites* [Conference session]. Social Data on the Web (SDoW), Workshop at the 7th International Semantic Web Conference (pp. 31–42).

Laracuente, N. R. (2012). Public archaeology 2.0: Facilitating engagement with Twitter. *AP: Online Journal in Public Archaeology*, 2, 81–99. http://revistas.jasarqueologia.es/index.php/APJournal/article/view/15

Larsson, Å. M. (2013). Participate or perish. Why archaeology must gain confidence. *Archaeological Dialogues*, 20(1), 29–35. https://doi.org/10.1017/s138020381300007x

Laužikas, R., Dallas, C., Thomas, S., Kelpšienė, I., Huvila, I., Luengo, P., Nobre, H., Toumpouri, M., & Vaitkevičius, V. (2018). Archaeological knowledge production and global communities: Boundaries and structure of the field. *Open Archaeology*, 4(1), 350–364. https://doi.org/10.1515/opar-2018-0022

Law, M., & Morgan, C. (2014). The archaeology of digital abandonment: Online sustainability and archaeological sites. *Present Pasts*, 6(1), 2. https://doi.org/10.5334/pp.58

Leont'ev, A. N. (1978). *Activity, consciousness, and personality*. Prentice-Hall. http://www.marxists.org/archive/leontev/works/1978/index.htm

Liboriussen, B., & Martin, P. (2020). Honour of Kings as Chinese popular heritage: Contesting authorized history in a mobile game. *China Information*, 34, 319–341. https://doi.org/10.1177/0920203x20908120

Liew, C. L. (2014). Participatory cultural heritage: A tale of two institutions' use of social media. *D-Lib Magazine*, 20(3/4), https://doi.org/10.1045/march2014-liew

Liu, J. (2018). Who speaks for the past? Social media, social memory, and the production of historical knowledge in

contemporary China. *Journal of International Communication*, *23*, 1675–1695. https://ijoc.org/index.php/ijoc/article/view/7873

Liu, S. B. (2010). *Grassroots heritage in the crisis context: A social media probes approach to studying heritage in a participatory age* [Conference session]. CHI'10 Extended Abstracts on Human Factors in Computing Systems (pp. 2975–2978). http://dl.acm.org/citation.cfm?id=1753899

Livingstone, S. (2005). Introduction. In S. Livingstone (Ed.), *Audiences and publics: When cultural engagement matters for the public sphere* (pp. 9–16). Intellect Books.

Lorusso, S. (2014). Critical heritage in cross-cultural perspectives. Interdisciplinarity, internationalization and social media in cultural heritage: Some case studies. *Conservation Science in Cultural Heritage*, *14*(2), 99–124. https://doi.org/10.6092/issn.1973-9494/5446

Lotman, J. (2005). On the semiosphere (Clark, W. trans.). *Sign Systems Studies*, *1*, 205–229. https://www.ceeol.com/search/article-detail?id=14996

Lotman, Y. M. (1990). *Universe of the mind. A semiotic theory of culture*. IB Taurus. http://ftp.columbia.edu/itc/architecture/ockman/pdfs/Lotman.pdf

Lotman, Y. M., Uspensky, B. A., & Mihaychuk, G. (1978). On the semiotic mechanism of culture. *New Literary History*, *9*, 211–232. http://www.jstor.org/stable/468571

Lundström, M., & Sartoretto, P. (2022). The temporal nexus of collective memory mediation: Print and digital media in Brazil's Landless Movement 1984-2019. *Social Movement Studies*, *21*, 453–468. https://doi.org/10.1080/14742837.2021.1905510

MacDonald, S. (2009). *Difficult heritage. Negotiating the Nazi past in Nuremberg and beyond*. Routledge. https://www.york.ac.uk/media/sociology/difficult%20heritage_excerpts.pdf

Mahmutović, M., & Baraković, V. (2021). Imaging the national day: Tracking the commemoration practices across visual social media spaces. *DHS-Iruštvene i Humanističke Studije: Časopis Filozofskog Fakulteta u Tuzli*, xi(14), 419–440. https://www.ceeol.com/search/article-detail?id=929421

Makhortykh, M. (2019). Nurturing the pain: Audiovisual tributes to the Holocaust on YouTube. *Holocaust Studies*, *25*(4), 441–466. https://doi.org/10.1080/17504902.2018.1468667

Makhortykh, M. (2020). Remediating the past: YouTube and second world war memory in Ukraine and Russia. *Memory Studies*, *13*(2), 146–161.

Malde, S., Finnis, J., Kennedy, A., Ridge, M., Villaspaesa, E., & Chan, S. (2013). *A journey towards understanding and measuring digital engagement* (p. 68) [LET'S GET REAL 2 : Report from the second Culture24 Action Research Project, Europeana Foundation.

Malinen, S. (2015). Understanding user participation in online communities: A systematic literature review of empirical studies. *Computers in Human Behavior*, *46*, 228–238. https://doi.org/10.1016/j.chb.2015.01.004

Manca, S. (2021). Bridging cultural studies and learning science: An investigation of social media use for Holocaust memory and education in the digital age. *The Review of Education Pedagogy & Cultural Studies*, *43*, 226–253. https://doi.org/10.1080/10714413.2020.1862582

Mann, W. C., & Thompson, S. A. (1988). Rhetorical structure theory: Toward a functional theory of text organization. *Text - Interdisciplinary Journal for the Study of Discourse*, *8*(3), 243–281. http://www.degruyter.com/view/j/text.1.1988.8.issue-3/text.1.1988.8.3.243/text.1.1988.8.3.243.xml

Marakos, P. (2014). Museums and social media: Modern methods of reaching a wider audience. *Mediterranean Archaeology and Archaeometry*, *14*(4), 75–81. https://zenodo.org/record/13707/files/9_Marakos_1st.pdf

Matthews, J., & Wallis, L. (2015). Broadcasting, listening and the mysteries of public engagement: An investigation of the AAA online audience. *Australian Archaeology*, *81*(1), 1–11. https://www.scopus.com/inward/record.uri?eid=2-s2.0-84937495725&partnerID=40&md5=9e01bb7bbac61147ccd1091b9c9b8af3

McCandlish, A., & McPherson, G. (2021). Promoting tangible and intangible hidden cultural heritage: Local communities influencing civic decision-making and international cultural policy. *International Journal of Cultural Policy*, *27*, 683–698. https://doi.org/10.1080/10286632.2020.1822348

McNealy, J. (2011). The privacy implications of digital preservation: Social media archives and the social networks theory of privacy. *Elon Law Review*, *3*, 133.

Meskell, L. (Ed.). (2015). *Global heritage: A reader*. Wiley Blackwell.

Mika, P. (2004). *Social networks and the semantic web* [Conference session]. IEEE/WIC/ACM International Conference on Web Intelligence (WI'04), (pp. 285–291). https://doi.org/10.1109/WI.2004.10039

Modrow, S. (2018). Maintaining and sharing a Haudenosaunee Identity: Onondaga collective memory and social media. *The International Information & Library Review*, *50*, 129–141. https://doi.org/10.1080/10572317.2018.1449425

Morgan, C., & Pallascio, P. M. (2015). Digital media, participatory culture, and difficult heritage: Online remediation and the trans-Atlantic slave trade. *Journal of African Diaspora Archaeology and Heritage*, *4*(3), 260–278. https://doi.org/10.1080/21619441.2015.1124594

Morris, J. (2011). Zoobook: Archaeologists connecting through social media. *The SAA Archaeological Record*, *11*(1), 30–32.

Mylonas, Y. (2017). Witnessing absences: Social media as archives and public spheres. *Social Identities*, *23*(3), 271–288. https://doi.org/10.1080/13504630.2016.1225495

Ndlovu, M. (2018). Speaking for the dead: Testimonies, witnesses and the representations of Gukurahundi atrocities in new media. *Journal of African Cultural Studies*, *30*(3), 293–306. https://doi.org/10.1080/13696815.2017.1359084

Olick, J. K., & Robbins, J. (1998). Social memory studies: From "collective memory" to the historical sociology of mnemonic practices. *Annual Review of Sociology*, *24*, 105–140.

Osuri, G. (2019). #kashmir 2016: Notes toward a media ecology of an occupied zone. *South Asian Popular Culture*, *17*(2), 111–131. https://doi.org/10.1080/14746689.2019.1612554

Pankong, N., Prakancharoen, S., & Buranarach, M. (2012). *A combined semantic social network analysis framework to integrate social media data* [Conference session]. 2012 4th International Conference on Knowledge and Smart Technology (KST) (pp. 37–42).

Parry, R. (Ed.) (2010). *Museums in a digital age*. Routledge.

Peralta, E. (2022). The return from Africa: Illegitimacy, concealment, and the non-memory of Portugal's imperial collapse. *Memory Studies*, 15, 52–69. https://doi.org/10.1177/1750698019849704

Pertsas, V., & Constantopoulos, P. (2017). Scholarly Ontology: Modelling scholarly practices. *International Journal on Digital Libraries*, 18(3), 173–190. https://doi.org/10.1007/s00799-016-0169-3

Pett, D. (2012). Uses of social media within the British Museum and museum sector. In C. Bonacchi (Ed.), *Archaeology and digital communication: Towards strategies of public engagement* (pp. 83–102). Archetype Publications Ltd.

Pietrobruno, S. (2013). YouTube and the social archiving of intangible heritage. *New Media & Society*, 15(8), 1259–1276. https://doi.org/10.1177/1461444812469598

Purkis, H. (2017). Making digital heritage about people's life stories. *International Journal of Heritage Studies*, 23(5), 434–444. https://doi.org/10.1080/13527258.2016.1190392

Rautenberg, M., & Rojon, S. (2014). Hedonistic heritage: Digital culture and living environment. *Cultura*, 11(2), 59–81. https://doi.org/10.5840/cultura201411215

Razis, G., & Anagnostopoulos, I. (2014). *Semantifying Twitter: The influence tracker ontology* [Conference session]. 2014 9th International Workshop on Semantic and Social Media Adaptation and Personalization (pp. 98–103).

Rentschler, R. (2007). Museum marketing: No longer a dirty word. In R. Rentschler & A.-M. Hede (Eds.), *Museum marketing, competing in the global marketplace* (pp. 12–20). Elsevier.

Rentschler, R., & Hede, A.-M. (Eds.) (2007). *Museum marketing: Competing in the global marketplace*. Routledge.

Richardson, L.-J. (2012). Twitter and archaeology: An archaeological network in 140 characters or less. In C. Bonacchi (Ed.) *Archaeologists and the digital: Towards strategies of engagement* (pp. 15–24). Archetype.

Richardson, L.-J. (2014). Understanding archaeological authority in a digital context. *Internet Archaeology*, 38. https://doi.org/10.11141/ia.38.1

Richardson, L.-J. (2015). The future of recording the past: Web archives as a resource for public archaeology. *Journal of Contemporary Archaeology*, 2(1), S28–S32. https://doi.org/10.1558/jca.v2i1.28284

Richardson, L.-J. (2018). Ethical challenges in digital public archaeology. *Journal of Computer Applications in Archaeology*, 1(1), 64–73.

Richardson, L.-J., & Almansa-Sánchez, J. (2015). Do you even know what public archaeology is? Trends, theory, practice, ethics. *World Archaeology*, 47(2), 194–211. https://doi.org/10.1080/00438243.2015.1017599

Rodríguez-Temiño, I., & Almansa-Sánchez, J. (2021). The use of past events as political symbols in Spain. The example of Vox and the need for a new archaeology of ethnicity. *International Journal of Heritage Studies*, 27(10), 1064–1078. https://doi.org/10.1080/13527258.2021.1941195

Rodríguez Temiño, I., & González Acuña, D. (2014). Using Facebook to build a community in the Conjunto Arqueológico de Carmona (Seville, Spain). *Journal in Public Archaeology*, 4, 61–93. http://revistas.jasarqueologia.es/index.php/APJournal/article/download/44/47

Roediger, H. L., & Wertsch, J. V. (2008). Creating a new discipline of memory studies. *Memory Studies*, 1(1), 9–22. https://doi.org/10.1177/1750698007083884

Rosenberger, M., Lehmkuhl, T., & Jung, R. (2015). Conceptualising and exploring user activities in social media. In M. Janssen, M. Mäntymäki, J. Hidders, B. Klievink, W. Lamersdorf, B. van Loenen, & A. Zuiderwijk (Eds.), *Open and Big Data Management and Innovation* (pp. 107–118). Springer International Publishing.

Roued-Cunliffe, H., & Copeland, A. (Eds.) (2017). *Participatory heritage*. Facet Publishing.

Russo, A., Kelly, L., & Sebastian, C. (2006). *How will social media affect museum communication?* Nordic Digital Excellence in Museums (NODEM). http://eprints.qut.edu.au/archive/00006067/01/6067_1.pdf

Russo, A., & Peacock, D. (2009). *Great expectations: Sustaining participation in social media spaces*. In J. Trant & D. Bearman (Eds.), *Proceedings of Museums and the Web Conference*, Boston, MA. Archives & Museum Informatics. http://hdl.handle.net/1959.3/52287

Rutten, E., Fedor, J., & Zvereva, V. (Eds.) (2013). *Memory, conflict and new media: Web wars in post-socialist states*. Routledge.

Ryzova, L. (2015). Unstable icons, contested histories: Vintage photographs and neoliberal memory in contemporary Egypt. *Middle East Journal of Culture and Communication*, 8(1), 37–68. https://doi.org/10.1163/18739865-00801004

Sánchez, J. A. (2013). To be or not to be? Public archaeology as a tool of public opinion and the dilemma of intellectuality. *Archaeological Dialogues*, 20(1), 5–11. https://doi.org/10.1017/s1380203813000044

Schau, H. J., & Gilly, M. C. (2003). We are what we post? Self-presentation in personal web space. *Journal of Consumer Research*, 30(3), 385–404. https://doi.org/10.1086/378616

Schneider, J., Groza, T., & Passant, A. (2013). A review of argumentation for the social semantic web. *Semantic Web*, 4(2), 159–218. Sedlacik, M. (2015). Social media and heritage preservation. *Present Pasts*, 6(1). https://doi.org/10.5334/pp.60

Shum, S. J. B., Selvin, A. M., Sierhuis, M., Conklin, J., Haley, C. B., & Nuseibeh, B. (2006). Hypermedia support for argumentation-based rationale: 15 years on from gIBIS and QOC. In A. H. Dutoit, R. McCall, I. Mistrik, & B. Paech (Eds.), *Rationale management in software engineering* (pp. 111–132). Springer-Verlag/Computer Science Editorial.

Silberman, N., & Purser, M. (2012). Collective memory as affirmation: People-centered cultural heritage in a digital age. In E. Giaccardi (Ed.), *Heritage and social media: Understanding heritage in a participatory culture* (pp. 13–30). Routledge.

Simon, N. (2010). *The participatory museum*. Museum 2.0. http://www.participatorymuseum.org/read/

Sindbæk Andersen, T. (2016). Football and memories of Croatian fascism on Facebook. In T. Sindbæk Andersen & B. Törnquist-Plewa (Eds.), *Disputed memory: Emotions and memory politics in Central, Eastern and south-Eastern Europe* (pp. 297–317). De Gruyter. https://www.degruyter.com/downloadpdf/title/511021#page=303

Smith, L. (2006). *Uses of heritage*. Routledge.

Staiff, R. (2010). Communicating heritage values: Re-thinking heritage interpretation in an age of digital media. *Proceedings of the World Universities Congress* (pp. 1469–1480).

Stead, S., & Doerr, M. (2015). *CRMinf: The argumentation model. An extension of CIDOC CRM to support argumentation* (Version 0.7). https://www.ics.forth.gr/isl/CRMext/CRMinf/docs/CRMinf-0.7.pdf

Sumartojo, S. (2020). Tweeting from the past: Commemorating the Anzac centenary@ ABCNews1915. *Memory Studies*, *13*(4), 400–415.

Tempich, C., Pinto, H. S., Sure, Y., & Staab, S. (2005). An argumentation ontology for DIstributed, loosely-contvolvingnd evolvInG Engineering processes of oNTologies (DILIGENT). In A. Gómez-Pérez & J. Euzenat (Eds.), *The semantic Web: Research and Applications* (*Vol. 3532*, pp. 241–256). Springer.

Terras, M. (2010). Digital curiosities: Resource creation via amateur digitization. *Literary and Linguistic Computing*, *25*(4), 425–438. https://doi.org/10.1093/llc/fqq019

Thakor, P., & Sasi, S. (2015). Ontology-based sentiment analysis process for social media content. *Procedia Computer Science*, *53*, 199–207.

Theimer, K. (2010). *Web 2.0 tools and strategies for archives and local history collections*. Neil-Schuman Publishers, Inc.

Toulmin, S. E. (1958). *The uses of argument*. Cambridge University Press.

Tzanelli, R. (2017). Staging pilgrimage on Skopelos after Mamma Mia!(2008): Digital and terrestrial hospitality in cinematic tourism. In M. E. Korstanje & B. Handayani (Eds.), *Gazing at death: Dark tourism as an emergent horizon of research* (pp. 131–260). Nova Sciences.

Vajda, G. K. J. S. (2017). Making (dis) connections: An interplay between material and virtual memories of the Holocaust in Budapest. *Urban People*, *19*(2), 297.

Van Dijck, J., Poell, T., & De Waal, M. (2018). *The platform society: Public values in a connective world*. Oxford University Press. http://go.utlib.ca/cat/12299126

Van Ruymbeke, M., Hallot, P., Nys, G.-A., & Billen, R. (2018). Implementation of multiple interpretation data model concepts in CIDOC CRM and compatible models. *Virtual Archaeology Review*, *9*(19), 50–65.

Vassiliadis, C. A., & Belenioti, Z. C. (2017). Museums & cultural heritage via social media: An integrated literature review. *Tourismos*, *12*(3), 97–132.

Villanueva, D., González-Carrasco, I., López-Cuadrado, J. L., & Lado, N. (2016). SMORE: Towards a semantic modeling for knowledge representation on social media. *Science of Computer Programming*, *121*, 16–33.

Visser, J., & Richardson, J. (2013). *Digital engagement in culture, heritage and the arts*. http://online.pubhtml5.com/bsvu/ahlj/ahlj.pdf

Walker, D. (2014a). Decentering the discipline? Archaeology, museums and social media. *AP: Online Journal in Public Archaeology*, *1*, 77–102.

Walker, D. (2014b). Antisocial media in archaeology? *Archaeological Dialogues*, *21*(2), 217–235. https://doi.org/10.1017/s1380203814000221

Walton, D. (2006). *Fundamentals of critical argumentation*. Cambridge University Press.

Warner, C. D. (2014). A memorial of heroes past: Portraying Tibetan self-immolation on Facebook. In D. R. Christensen & K. Sandvik (Eds.), *Mediating and remediating death* (pp. 175–196). Ashgate.

Waterton, E., & Watson, S. (2015). Heritage as a focus of research: Past, present and new directions. In E. Waterton & S. Watson (Eds.), *The Palgrave handbook of contemporary heritage research* (pp. 1–17). Palgrave Macmillan.

Wells, C. (2016, August 24). *"Vyborg is ours": Remembering a'lost town'in Finland* [Conference session]. 13th International Conference on Urban History: Reinterpreting Cities, Helsinki.

Wesberg, G. L., & Jensen, T. (2017). Who is the expert in participatory culture? In H. Roued-Cunliffe & A. Copeland (Eds.), *Participatory heritage* (pp. 87–96). Facet Publishing.

Whigham, S., Lopez-Gonzalez, H., & Ramon, X. (2019). Més Que un joc?": Sport and Contemporary Political Nationalism in Scotland and Catalonia. *Journal of Sport & Social Issues*, *43*(3), 219–244. https://doi.org/10.1177/0193723519 836398

Wight, A. C. (2020). Visitor perceptions of European Holocaust Heritage: A social media analysis. *Tourism Management*, *81*, 104142.

Wong, C. U. I., & Qi, S. (2017). Tracking the evolution of a destination's image by text-mining online reviews - the case of Macau. *Tourism Management Perspectives*, *23*, 19–29. https://www.sciencedirect.com/science/article/pii/S22119736 17300260

Zagato, L. (2015). The notion of "Heritage Community" In the Council of Europe's Faro Convention. Its impact on the European legal framework. In M. Tauschek (Ed.), *Between imagined communities and communities of practice* (p. 141). Göttingen University Press.

Zalewska, M. (2017). Selfies from Auschwitz: Rethinking the relationship between spaces of memory and places of commemoration in the digital age. *Studies in Russian, Eurasian and Central European New Media*, *18*, 95–116.

Zarezadeh, Z. Z., Rastegar, H. R., & Gretzel, U. (2018). Reviewing the past to inform the future: A literature review of social media in tourism. *Czech Journal of Tourism*, *7*, 115–131. https://doi.org/10.1515/cjot-2018-0006

Zhao, H., & Liu, J. (2015). Social media and collective remembrance. The debate over China's great famine on weibo. *China Perspectives*, *2015*(2015/1), 41–48.

Zhukova, E. (2020). How cultural traumas occur on social media: The case of the Ukrainian famine, 1932–1933. *International Journal of Politics Culture and Society*, *35*, 1–25. https://doi.org/10.1007/s10767-019-09348-1

Zuanni, C. (2020). Heritage in a digital world: Algorithms, data, and future value generation. *LIMINA-Grazer Theologische Perspektiven*, *3*(2), 236–259. https://limina-graz.eu/index.php/limina/article/view/85