

RESEARCH ARTICLE

How social memory works on social media: A methodological framework

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Abstract

Social media challenge several established concepts of memory research. In particular, the day-to-day mundane discourse of social media blur the essential distinction between commemorative and non-commemorative memory. We address these challenges by presenting a methodological framework that explores the dynamics of social memory on various social media. Our method combines top-down data mining with a bottom-up analysis tailored to each platform. We demonstrate the application of our approach by studying how the Holocaust is remembered in different corpora, including a dataset of 5.3 million Facebook posts and comments collected between 2015 and 2017 and a 5 million Tweets and Retweets dataset collected in 2021. We first identify the mnemonic agents initiating the discussion of the memory of the Holocaust and those responding to it. Second, we compare the macro-rhythms of Holocaust discourse on the two platforms, identifying peaks and mundane discussions that extend beyond commemorative occasions. Third, we identify distinctive language and cultural norms specific to the memorialization of the Holocaust on each platform. We conceptualize these dynamics as 'Mnemonic Markers' and discuss them as potential pathways for memory researchers who wish to explore the unique memory dynamics afforded by social media.

Keywords: collective memory; social media; Holocaust; computational methods; cross-platform analysis

Introduction

The rise of digital media has reshaped the interrelations between media and memory due to the unique characteristics of digital media, such as their immediacy, global reach, convergence logic, reliance on user-generated content, and the data traces that they leave (Birkner and Donk 2020; Hajek *et al.* 2016; Tirosh 2018). Consequently, the intersection between social media and collective recollecting has challenged several veteran assumptions regarding how collective memories are shaped, disseminated, and interpreted (Hoskins 2017).

Maurice Halbwachs famously suggested that collective recollecting is 'a reconstruction of the past that adapts the image of ancient facts to the beliefs and spiritual needs of the

present' (1980, 7). This constant shift between past and present is manifested in two corresponding components of memory work: at one end of the spectrum are intended commemorations that aspire to charge past events with current meanings through public mnemonic devices, such as monuments, historical museums, and rituals. At the opposite end of the spectrum, the non-commemorative presence of phenomena such as textual markers, laws, and individuals realizes the past's enduring presence within the present (Schudson 1997, 2014).

This essential distinction, which echoes the logic of legacy media, has been challenged by the rise of social media, which blurs the distinctions between commemorative and non-commemorative memory and between institutional and non-institutional mnemonic agents. Hence, social media memory discourse lumps together multitudes of mnemonic agents in a continuous and often seemingly context-lacking conversation (Frosh 2018; Lundrigan 2020; Pfanzer 2017).

Given the challenges posed by the rise of social media memory, we propose a methodological framework designed to explore the spaces, dynamics, and characteristics of both commemorative and non-commemorative social media mnemonic discourses. Our approach complements existing conceptual models, such as Laužikas *et al.*'s (2023) ontology-based framework for studying heritage, memory, and identity on social networking sites. While these models offer valuable formal representations, our framework differs in focus and objectives.

Instead of a conceptual model or ontology, we propose a platform studies-inspired workflow for critically examining collective memory work on social media. Our approach emphasizes the often underrepresented role of platforms in these processes.

By identifying 'Mnemonic Markers', we explore the dynamic interplay between platform affordances and memory practices, capturing the fluid and contextual nature of social media memory work that static ontological structures may struggle to represent.

Platform studies scholarship argues for studying digital platforms as key objects of analysis in their own right rather than solely focusing on the contents or users of platforms (Gillespie 2010; Helmond 2015). Instead of mere intermediaries, such studies view platforms as curated digital environments that shape and govern the activities and interactions within them. A central concept in this regard is affordances – the perceived possibilities for action that a platform's technical architecture, features, algorithms, data flows, and business models enable or constrain for different stakeholders (Bucher and Helmond 2018). Platform studies, therefore, explore these socio-technical affordances as contextually embedded dynamics that orchestrate particular forms of relation-making on platforms (van Dijck *et al.* 2018).

Our exploration of digital Mnemonic Markers conjoins platform studies with collective memory scholarship by applying key concepts and analytical approaches from the former to investigate distinct mnemonic dynamics investigated by the latter. In so doing, we adopt Bucher and Helmond's (2018) platform-sensitive approach for studying affordances as the multidirectional possibilities for action, interaction, and meaning-making emerging from social media platforms' socio-technical assemblage. Bucher and Helmond distinguish between low-level affordances rooted in a medium's materiality/features and high-level affordances constituting inherent capabilities that shape user engagement: high-level affordances are exemplified by boyd's (2011) work on how social networking sites shape networked publics through persistence, replicability, scalability, and searchability. Low-level affordances are illustrated by Postigo's (2016) analysis of YouTube features shaping probable uses and meanings while serving business interests.

Our suggested methodological framework combines these two levels. While investigating platforms' low-level affordances' entanglement with mnemonic discourse, our goal is to identify the high-level affordances or communicative practices, tying social media and

memory work – the collective processes through which memories are constructed, shared, and negotiated on, by, and through social media platforms.

We developed this framework within the specific context of the construction of the memory of the Holocaust. In the field of media memory studies, the investigation of the shaping of the memory of the Holocaust bears unique significance, as the extreme nature of the Holocaust illuminates the limitations and capabilities of the media in their representation of difficult pasts (Meyers *et al.* 2014). Hence, scholars who explore the dilemmas involved in Holocaust remembrance on social media encounter a uniquely charged intersection between new technological advances and the fundamental questions that have defined and, at times, haunted the field of memory studies since its inception.

Research on the shaping of the recollection of the Holocaust tends to focus on the roles of institutional or commercial mnemonic agents within commemorative contexts (Walden 2022a; Young 1993). Correspondingly, scarce scholarly attention has been dedicated to how the memory of the Holocaust is shaped within non-commemorative contexts; that is, instances in which the Holocaust is mentioned in routine social discourse while addressing current issues (Neiger *et al.* 2011; Steir-Livny 2022). To address this gap, our framework aims to identify the dynamics, actors, terminology, and contexts in which social media users talk about the Holocaust purposefully and directly, but also when they are (supposedly) not ‘talking about the Holocaust’.

After presenting our methodological approach, we explore its implementation through three analyses illustrating its potential for studying social media memory across platforms and languages. Through the analysis of these findings, we identified three overarching ‘Mnemonic Markers’ – *directionality*, *temporality*, and *vernacular* – as high-level affordances uniquely characterizing how memories are constructed, shared, and negotiated on social media. We conclude by discussing how these markers can direct future research into social media memory work.

Paradoxes of social media as memory machines

Social groups construct their images of the world by constantly shaping versions of the past. This constant (re)construction process requires mediation sites, which are provided mainly by the media in modern societies. Social media play a paradoxical role as memory media: they simultaneously enhance and hinder memory construction and actively shape what will be remembered (and forgotten), how memories are defined, when memory work and remembering take place, and who is remembering. Social media offer individuals a means to store, share, and revisit personal experiences; at the same time, they shape the accessibility and prominence of individual memories through their specific affordances (Henig and Ebbrecht-Hartmann 2022; Manca 2021).

Jacobsen and Beer (2021) view social media as automated memory machines that ultimately redefine ‘the notion of what a memory is and how the concept of memories might be defined’ (p. 6). They further argue that compared to the act of ‘digging’, which Walter Benjamin used to describe the type of memory work in which an individual actively excavates her own past, social media algorithms are ‘resurfacing’ memory based on a logic that is opaque to social media users.

The logic underlying such algorithmic-induced personal recollection curates and displays specific memories and defines what is worthy of being remembered. As a ‘third space’, social media blur the boundaries between private and public conversations (Bruns and Highfield 2016). Consequently, social media also blur the boundaries between private (personal) memories and public (collective) memories (van Dijck 2012): personal memories resurface as content ready to be shared with others; at the same time, user-generated content that is explicitly commemorative and aimed at engaging in collective

remembering is mediated through personalization algorithms that prioritize certain memories over others, based on factors such as engagement metrics, user demographics, or advertising interests. Furthermore, the contextual environment in which memories are posted and interacted with on social media can influence their encoding by social media users. Hence, for instance, features such as Twitter's 'trending topics' or the shifting prominence of current events can shape which memories are granted public visibility and attract engagement.

Another paradoxical aspect of social media platforms as memory machines concerns their ephemerality. Social media platforms capture and store every user activity. This traceability could potentially preserve a thorough digital archive of both individual and collective experiences. Yet, there is no assurance of long-term accessibility or preservation. Although they act as comprehensive archives, social media platforms often restrict access to these records and set terms for retrieving historical data as memories (Ben-David 2020).

Holocaust remembrance on social media

Collective recollecting is ultimately a form of storytelling (Schudson 1992); thus, the complexities of social media Holocaust remembrance could best be explored by addressing three narrative dilemmas:

The solemn-trivial axis – how can the Holocaust be narrated? The fact that the Holocaust is such an ultimate moral crisis led to the development of conventions demanding that its narration be accurate and solemn, and frame the Holocaust as a unique historical event. Such conventions contradict the premises of the operation of the mass media, especially mass commercial media. The digital age further challenges these conventions, as digital storytelling tends to be standardized and concise: social media storytelling does not facilitate a nuanced discussion of the collective trauma and its ramifications; moreover, while the Holocaust is, supposedly above all disputes, social media discourse tends to entice polarization and selective exposure (Messing and Westwood 2014). Finally, the realities of the Holocaust starkly contradict commercial mass media narrative patterns, as they strive for a 'happy end' and social media's everyday flow of posts and stories emphasizing the 'good life' (Gerlitz and Helmond 2013).

The proximate-remote axis – who has the authority to narrate the Holocaust? Questions of narrative authority are foundational for collective memory research. Since the end of WW2, the testimonies of Holocaust survivors have become a definitive marker of Holocaust remembrance (Shandler 2017). However, through time, the Holocaust has also been narrated by various mnemonic agents who did not personally experience the Holocaust. The rise of digital platforms and the prevalence of social media have increased the abilities of various, at times unexpected, mnemonic agents to narrate the Holocaust (Meyers *et al.* 2014). Such processes could, potentially foster 'memory democratization'; at the same time, the proliferation of new digital voices, narrating the memory of the Holocaust could challenge the morals promoted by institutional mnemonic agents (Tirosh and Mikel-Arieli 2023).

The linear-interactive axis – who are the intended audiences of Holocaust narratives, and what are the audiences' roles in the narration process? Mass legacy media mostly embrace unidirectional modes of communication: audiences are 'heard', if ever, only through rating data. New online environments have challenged this imbalance, blurring the distinctions between media producers and audiences (Jenkins 2004). Power differences do not diminish with the shift from offline to online media; still, communication scholars have to consider the ways in which the velocity of digital communication and the ease of creating and sharing information (John 2022) shape the contours of current digital Holocaust commemoration.

Moreover, media technologies' evolving affordances expand audience participation in Holocaust memorization. While Landsberg (2004) defined 'prosthetic memory' as memory based on mediated experiences through cultural artifacts, Walden (2022b) argues that current immersive digital technologies enable users to critically participate in Holocaust memory production.

Designing a framework for the exploration of memory discourse on social media

In what follows we propose a methodological framework tailored for memory researchers to address the challenges posed by social media-based memory practices. Our approach is primarily informed by the Digital Methods approach to web research, which focuses on the materiality and dynamics of digital media and data (Rogers 2013). This approach highlights the digital grounding of contemporary social and cultural phenomena, advocating for the analysis of online platforms and digital objects on their own terms – terms that are native to the medium and cannot be fully addressed by traditional social scientific methods.

Recognizing that not all memory scholars are versed in Digital Methods, we introduce key principles of this approach and detail our specific framework for studying memory work on social media.

Issue mapping

As a methodological approach that fosters interdisciplinary collaboration and perspectives, some of the theoretical principles guiding the Digital Methods approach rely on actor-network theory (ANT), which assigns equal agency to human and non-human actors, operating in complex socio-technical networks (Latour 1992). Latour's ANT proposed describing these networks without researchers pre-imposing their preconceptions, instead tracing the unfolding relationships between actants (Latour 2005). The ANT concept 'controversy mapping' refers to the practice of tracing and visualizing the network of actors, associations, and disputes that emerge around a particular socio-technical issue or topic (Marres and Moats 2015; Venturini 2012). Researchers engaging in controversy mapping closely observe and explore the different human and non-human actors involved in the controversy, and the competing claims and perspectives they mobilize (Venturini *et al.* 2019).

Through the theoretical development of controversy mapping coupled with public digital tools, Marres and Rogers (2005) developed digital methods for demarcating, visualizing, and analyzing networks around socio-technical debates. Studies applying Digital Methods map, collect, and analyze web content, data, and interactions originating within digital platforms and infrastructures, including social media posts, hyperlinks, search engine results, and digital trackers (Rogers 2013).

This 'issue mapping' method studies the assemblages created by the web's content, individuals/organizations, and ordering devices around specific topics (Rogers 2013b). Issue networks are traced by 'following the actors' – collecting web data around a topic organized by various devices, then studying ties between actors and digital objects using network analysis, visualizing co-occurrence of keywords, and other methods for tracing the evolving issue 'ecology' (Sánchez-Querubín and Rogers 2018).

Platform-specific and cross-platform research

Digital Methods researchers aspire to study the web using medium-specific methods capturing each medium's unique dynamics (Rogers 2013). Researchers tailor data collection methods and analytical tools to capture features, architectures, and infrastructures of specific platforms like Google Search, Twitter, Wikipedia, or Reddit. By focusing on a single platform, they develop a deep understanding of how its technological affordances,

algorithms, and cultural conventions influence digital content and data production, circulation, and interpretation (Bucher and Helmond 2018).

However, focusing on a single platform can isolate larger actor-networks into silos and overlook inter-platform dynamics. Recent advancements in Digital Methods have introduced tools for studying phenomena across platforms (Rogers 2017b), examining the movement of content, users, or data between them. Additionally, cross-platform analyses reveal how different platform configurations shape unique publics or issues, highlighting techno-cultural biases and platform-specific vernaculars (Pearce *et al.* 2020).

Query design

Tracking actors' vernacular language and claims is key in issue mapping. Digital Methods researchers strive to gather comprehensive data on an issue network, capturing all relevant vernacular without imposing specific keywords (Marres and Rogers 2005; Rogers and Ben-David 2010). This involves 'query design' – crafting and refining search queries and data collection strategies mindful of potential biases, platform specificities, and cultural practices (Ben-David 2019; Rogers 2017a; Rogers and Ben-David 2010). Through iterative testing, researchers ensure the inclusion of all pertinent language, terms, and claims, sometimes evolving keywords into complex queries to yield precise results for their research questions.

Digital Methods for memory studies researchers: a methodological framework

Our approach for identifying and studying unique aspects of social media memory builds on the principles of issue mapping, platform specificity, cross-platform analysis, and query design. We adapt 'issue mapping' toward 'collective memory mapping', aiming to demarcate mnemonic assemblages of an event or topic, and map the broad actor-networks of memory agents, content, cultural practices, and vernacular within and across platforms.

We suggest that the dynamics of collective memory and controversy analysis share foundational assumptions, making issue mapping suitable for studying digital mnemonic practices. Firstly, shaping collective memory is a dynamic and socially constructed process, involving ongoing negotiations over past interpretations (Zelizer 1995). Secondly, controversy is integral to these dynamics, with groups shaping collective memories in service of their collective goals (Wertsch and Roediger III, 2008). Lastly, collective memory emerges from the interplay between various mnemonic agents – individuals, communities, and material technologies – leading to multiple, often contested versions of memory (Shahzad 2012).

Our proposed methodological framework consists of two phases. The first, 'Top-Down Issue Demarcation', involves systematic data collection to locate discussions about collective pasts across social media platforms. This phase mirrors the issue mapping processes discussed above and includes query design – a method of creating a comprehensive list of search phrases to locate discussions about recollection topics on platforms. These queries are then used to gather data from social media platforms through manual searching, using application programming interface (API) services or web scraping, each carrying specific technical and ethical considerations (Ben-David 2020; Freelon 2018). After data collection, researchers proceed to initial data exploration, employing various methods to identify emerging patterns, potential research questions, or discursive foci. This may involve network visualizations, mapping associations between search phrases and frequently used social media accounts to pinpoint mnemonic focuses and participating agents.

The bottom-up phase complements this exploration process by delving into the retrieved dataset to uncover each platform's cultures of use (Rogers 2017b). Whereas

the top-down phase addresses the ‘where’, ‘when’, and ‘by whom’, the bottom-up phase explores ‘how’ social media memory functions in practice. Researchers investigate the interplay between platform-specific features and user behaviors to discern patterns in mnemonic discourse and vernacular. This analysis may involve using natural language processing tools to study how different mnemonic agents (like institutional accounts, influencers, everyday users, or avatars) engage with and evoke memories of the past.

Questions of ‘how’ social media memory works are sensitive to language and cultural vernacular, and thus call for additional qualitative analysis of the data. In the case of the study of the shaping of Holocaust memory, we are particularly interested in identifying when people invoke the memory of the Holocaust when they are ‘not talking about the Holocaust’, or in some cases, when they are not (culturally and socially) supposed to be talking about the Holocaust. And so, if the exploratory analysis of the first phase is concerned with understanding the temporal and networked distribution of search queries designed by the researchers for issue discovery, this phase locates vernacular language, discursive foci, and clusters of actors that emerge *around* the search phrases. Such peripheral discourse helps unravel vernacular language and platforms’ culture of use that emerge from the data beyond the initial query list.

The bottom-up analysis concentrates on how specific technological features of platforms, like the distinction between Facebook posts and comments, or Twitter’s Replies, Quotes, and Retweets, shape memory work on social media. For instance, researchers might explore whether terms from main posts also appear consistently in comments, or how hashtags help form mnemonic communities on Twitter. This phase invites both computational studies and detailed qualitative examinations of emerging discursive patterns (Neiger *et al.* 2023).

Our methodological approach is both platform-agnostic and platform-specific: the top-down issue demarcation provides guidelines for identifying online discourse about the Holocaust across platforms. Simultaneously, the bottom-up analysis considers how platform-specific features shape the formation or reconfiguration of mnemonic agents and discourse related to the Holocaust (Bucher and Helmond 2018). This dual focus, spanning across platforms and closely examining platform-specific dynamics, enables a comprehensive understanding of social media-based collective recollection of the Holocaust (see Table 1).

Following the outlining of the two-phase structure of our methodological framework, we aim to provide a practical guide for researchers interested in investigating specific topics or events using this approach (see Figure 1). We demonstrate the application of the framework through the case study of studying Holocaust social memory work on Facebook and Twitter.

Top-down social media discourse demarcation

Source selection

Our query design process started by identifying six online English and Hebrew sources, each representing a distinct ‘mnemonic genre’. In English, we chose the *United States Holocaust Memorial Museum (USHMM)* website, the *New York Times* website, and the English Wikipedia entry on the Holocaust. In Hebrew, our selections included the *Yad Vashem* website, Israel’s official Holocaust commemoration authority; the leading online news website *Ynet*; and the Hebrew Wikipedia entry on the Holocaust. We consider the *USHMM* and *Yad Vashem* websites as platforms for institutional commemorative discourse, carefully narrating the historical event. The contents from the *New York Times* and *Ynet* reflect a professional-journalistic editorial approach, anchoring the past within the present. Wikipedia entries in both languages represent crowdsourced, born-digital discourse.

Table 1. Top-down demarcation and bottom-up analysis of discourse on social media: questions, method, and platform specificity.

	Top-down demarcation	Bottom-up analysis
Questions	Where is discourse taking place?	When, by whom, and in which contexts is this discourse invoked?
Method	Systematic query design Data mining through search or API	Network analyses NLP tools Temporal analysis
Platform specificity	Platform-agnostic: the same search list can be used across platforms	Platform-specific: illuminating platform cultural dynamics

Text mining

To compile a list of search phrases from these six sources, we employed Python to scrape texts, adjusting the extraction method to suit each source's unique characteristics. We retrieved the entire Hebrew Wikipedia entry on the Holocaust (7,929 words) using the Wikipedia API extracts prop (Zesch *et al.* 2007). Using *Scrapy* (n.d.), we crawled all items published under the tags 'Holocaust' and 'The Holocaust' on *Ynet* between February 2008 and March 2020 (478 items), scraping metadata and text from each article's `ld+json` object. Similarly, we accessed all articles under the header 'Chapters in the History of the Holocaust' on *Yad Vashem's* website (7,027 words), extracting text from the HTML body. We employed the same method to extract data from the English Holocaust Wikipedia page (13,178 words) and scraped the *USHMM* website (712,516 words) as we did for *Yad Vashem's* site. For the *New York Times* corpus, we utilized the news organization's API to extract all items under the categories 'The Holocaust' and 'The Nazi-Era' published between 2009 and October 2022 (1,934 items).

Data processing

Data processing involved summarizing texts by identifying frequent bigrams – consecutive word pairs highlighting key concepts (Oberbichler and Pfanzer 2021). We preprocessed data through tokenization and lemmatization. For Hebrew, we used the Hebrew Tokenizer Python Library (Tsarfaty *et al.* 2019) and NLTK for bigram frequencies. For English, we employed SpaCy for tokenization and lemmatization, and NLTK for bigram calculation (Bird 2006).

Subsequently, we manually evaluated the resulting bigram lists, assessing their relevance as potential queries. Five research team members (including the three authors) qualitatively assessed whether each of the top 20% most frequent bigrams could serve as a relevant query for retrieving Holocaust-related discourse. A bigram was selected as a query term if at least three coders found it relevant. This process yielded 74 Hebrew bigrams and 84 English bigrams.

Query design

In the next phase, we transformed the selected bigrams in each language into queries – adding, for example, all the necessary conjugations for capturing the phrases in all their morphological forms. In cases where the bigram alone was not definitively and exclusively identified as related to the Holocaust or might lead to ambiguous search results, we anchored the context by adding the word 'Holocaust' to the search phrase. For example,

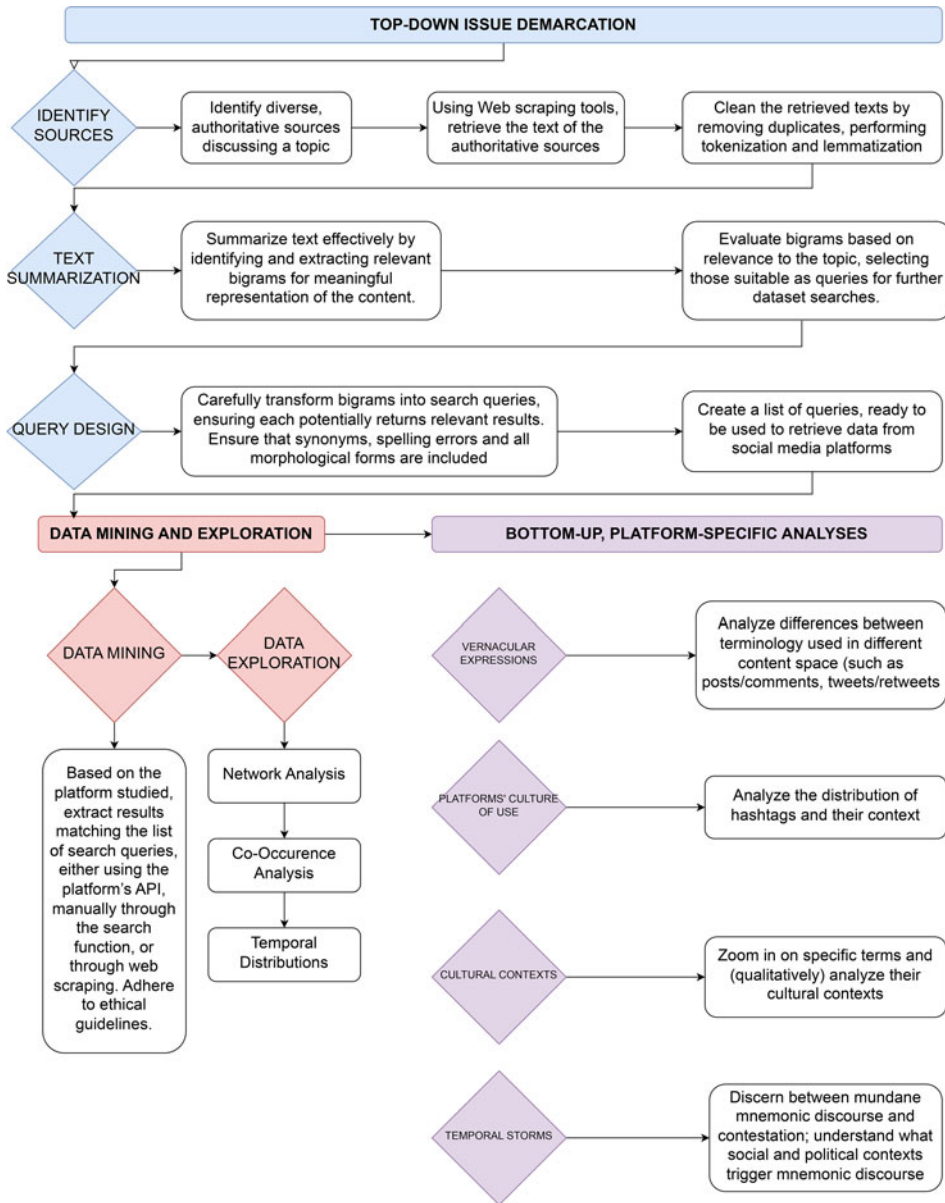


Figure 1. A flowchart outlining the steps of the methodological framework.

while the bigram ‘Adolf Eichmann’ clearly indicates a reference to the Holocaust, the bigram ‘Six Million’ may capture other mentions of the number, unrelated to the number of Jews murdered during the Holocaust. Hence, in that case, we anchored the bigram by modifying the query to [‘Six Million’ AND ‘Holocaust’].

As previously noted, the process of query design involves a reflexive and iterative evaluation of the selected starting points for data mining. We therefore sought to identify the similarities and differences in the English and Hebrew lists, reflecting cultural distinctions despite identical methods. Hence, for instance, terms such as ‘concentration camp’,

English Bigrams

Auschwitz accord; Auschwitz gas; Auschwitz ii; Buchenwald Dachau; camp gas; camp ghetto; Christian Gerlach; Cornelius Gurlitt; der judenfrage; European jews; euthanasia program; Führer's; gas van; German occupy; German Reich; ghetto uprising; Gross Rosen; Hans Frank; Hitler youth; Holocaust education; Holocaust; genocide; Holocaust memorial; Holocaust museum; Holocaust survivor; Holocaust victim; Joseph Goebbels; occupy poland; Saul Friedländer; Shoah foundation; Simon Wiesenthal; Sousa Mendes; Survive Holocaust; transit camp; Vichy France; Warsaw uprising; Wiesenthal center; zyklon b



Adolf Eichmann; Adolf Hitler; Aktion; Anne Frank; Auschwitz Birkenau; Auschwitz camp; Belzec Sobibor; Bergen Belsen; concentration camp; Dachau camp; death camp; death march; dp camp; einsatzgruppe; Elie Wiesel; extermination camp; final solution; gas chamber; German SS; Heinrich Himmler; Holocaust denial; Holocaust victim; Holocaust remembrance; John Demjanjuk; Josef Mengele; kristallnacht night; Lodz ghetto; Nazi Germany; Nuremberg trial; operation Reinhard; Raul Hilberg; Schindler; six million; Treblinka camp; Wannsee conference; Warsaw ghetto; Yad Vashem

Hebrew Bigrams

Adam Czerniaków; Arian race; Chelmno camp; crematoria; Drancy camp; Efraim Zuroff; forced labor camps; Gabor Neumann; gestapo; ghetto; Holocaust and revival; Holocaust day; Holocaust memory; Holocaust's lessons; International Holocaust remembrance day; Janusz Korczak; judenrat; Kovno ghetto; like sheep to slaughter; Lohamei Hageta'ot (the ghetto fighters kibbutz); march of the living; Minsk ghetto; Nazis and their collaborators; Nazi oppressor(s); perished (in the Holocaust); race laws; racism; reparations; Richard Williamson; Riga ghetto; righteous among the nations; second generation; swastika; Theresienstadt ghetto; third generation; third reich; transport (de); Vilno ghetto; witness; yellow star; youth educational trips to Poland; zikaron basalon (memory in the living room)

Figure 2. Unique and shared bigrams in the English and Hebrew query lists.

or names of perpetrators such as Adolf Eichmann appear in both the English and the Hebrew lists. In contrast, the bigrams that appear only in the Hebrew list reflect some of the unique characteristics of Israeli Holocaust commemoration culture: ‘like lambs to the slaughter’ (a two-word phrase in Hebrew) is a derogatory term that was originally used during Israel’s first decades to critique the supposed passive compliance of Jewish victims during the Holocaust. Correspondingly, the English list features American-centered terms and institutions such as the USC-based Shoah Foundation (see Figure 2).

Mining social media data

Below, we illustrate two instances of utilizing the query lists to mine data from Facebook and Twitter, conducted before the research API access was deprecated.¹

In the first instance, we explored an existing dataset of Facebook posts and comments initially collected for another purpose. In 2015, a custom server-side tool was developed to extract data from Facebook’s Graph API (Ben-David and Soffer 2019). This tool enabled researchers to select a public Facebook page and a time range for analysis. Automated extraction was performed daily, gathering all posts and comments made by Israeli parliament members (MKs) who maintained a Facebook page during the period. A total of 47k posts and 5.3M comments on the posts were collected between March 2015 and March 2017. We employed the Hebrew Holocaust query list to explore the database, obtaining separate results for posts and comments. Results files were organized by query, and a metadata file summarizing all queries was created.

In the second instance, we turned to Twitter to establish a real-time data collection process for Holocaust-related content. The Twitter API was utilized to collect all

¹ Social media platforms have recently mounted restrictions on data access for researchers, presenting significant risks to the field of social media research. However, we posit that these challenges do not impact the essence of a methodological approach for identifying memory work on social media. Despite API restrictions, alternative methods such as web scraping remain viable (Freelon 2018). Additionally, the newly implemented Section 40 of the Digital Services Act (DSA) provides a legal framework for systematic data requests from very large online platforms (VLOPs), ensuring continued research access.

Tweets, Retweets, and Quote Tweets mentioning at least one of the queries in either Hebrew or English. Data collection was conducted daily between 14 December 2020 and 24 June 2021. Over 5 million items in English and just over 49,000 items in Hebrew were collected (see [Table 2](#)). Hashtags used in each language were further extracted from each dataset (English: 61,201 hashtags, 1.1% of all Tweets; Hebrew: 158 hashtags, 0.32% of all Tweets). These datasets offer diverse perspectives on Holocaust mnemonic practices on social media: the Facebook dataset emphasizes localized aspects within a predetermined sphere of political discourse, while the Twitter dataset facilitates cross-platform comparison of the Israeli-Hebrew context alongside wider international contexts, enabling cross-cultural analyses. Three examples of analyses using the retrieved data are outlined below.

Bottom-up analyses: platform-specific, cross-platform, and cross-cultural

1: Holocaust memory in Israeli Facebook political discourse

This dataset, a digital chronicle of parliament's 2015–2017 term documenting MKs' posts and public comments, was not purposefully collected for studying mnemonic practices. Yet, the systematic collection enabled investigating Holocaust discourse within various political discursive contexts. During these years, MKs mostly posted about parliamentary work, reacted to public issues, wrote holiday greetings, etc. Such an archive serves as a good starting point for understanding social media mnemonic practices, allowing discovery of 'when people are talking about the Holocaust when they are not (socially and culturally) supposed to be talking about the Holocaust'. We therefore asked: when and how is the Holocaust memory evoked, and by whom in this specific case? Such analysis allowed excavating a cultural-specific (Israel) and platform-specific (Facebook) vernacular by identifying discourse *surrounding* our searched keywords. Moreover, taking Facebook's affordances into account, we considered its distinction between page posts and user comments. Such architectural division allows further exploring dynamics shaping Holocaust discourse on Facebook; for instance: which Holocaust invocations are initiated by politicians (and then discussed in comments), and which are brought up in comments when posts did not mention the traumatic historical event?

Co-occurrence analysis, temporal distribution, and qualitative analysis

We calculated a co-occurrence table comparing each query's prevalence alongside others. We examined each term's frequency over time – during public commemorations (e.g. International Holocaust Remembrance Day) and routine days. Finally, we extracted terms used in post texts (by politicians) or comments (by users). Overall, the data displays a skewed distribution of search phrases and co-occurrences. The most frequent (Hebrew) bigrams were 'Adolf Hitler' and 'Holocaust Day' (an abbreviation for Israel's Memorial Day for the Holocaust and the Heroism, hereinafter MDHH), followed by 'Holocaust Denial', 'Racism/Racist', and 'Nazi Germany'. The least used were 'Holocaust and Revival', 'Holocaust Commemoration', and 'Chelmno Extermination Camp' (see [Figure 3](#)).

Findings show Israeli politicians' Holocaust discourse on Facebook is primarily commemorative (Schudson 1997), focusing on commemorative events and main perpetrators. Specific historical events (e.g. 'Operation Reinhard'), people (Anne Frank), or places (Vilnius Ghetto) are rarely mentioned. In contrast, in the comments section, the Holocaust is continuously brought up by users, in contexts that are unrelated to the politicians' posts, or to events or the commemoration of the Holocaust (see [Figure 4](#)). Hence for instance on 16 October 2015, MK Ayelet Shaked (Jewish Home party), Israel's Interior Minister at the time posted a text addressing the legal status of family members of

Table 2. Data collected from Twitter: mentions of Holocaust-related queries.

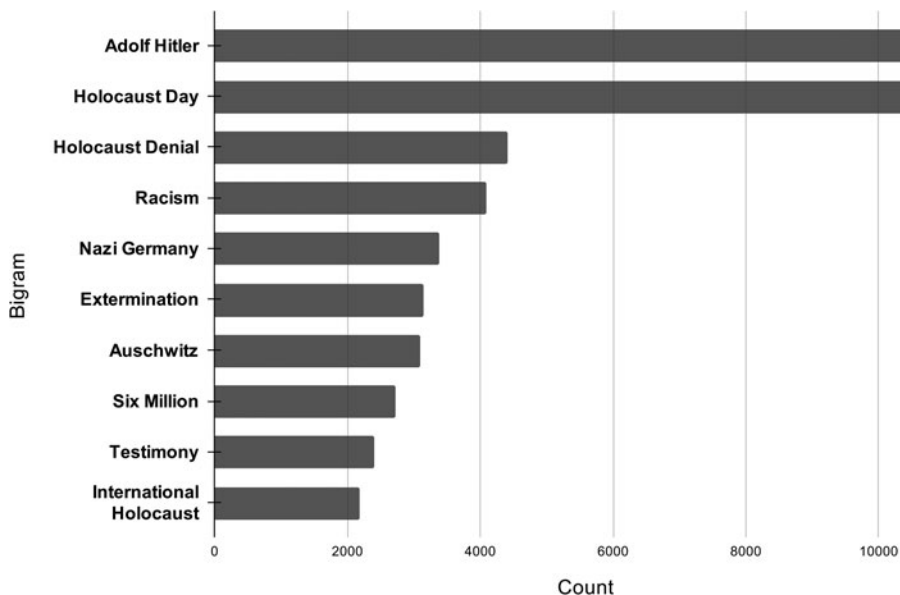
Language	No. of tweets	No. of users	No. of quote tweets
English	5,180,416	2,033,907	586,320
Hebrew	49,364	13,979	3,027

convicted Palestinian terrorists. One of the commentators replied: ‘A judge/police officer who harasses a person for [smoking] weed is Eichmann, hiding behind the law will not help. In Nazi Germany there was also a [rule of] law, he is Eichmann Satan ...’

Moreover, unlike politicians’ official, somber rhetoric and tone, the public’s Holocaust discourse is markedly mundane, at times humoristic and ironic. An illuminating example is the different ways and contexts politicians and commentators mention Josef Mengele, the Auschwitz physician who selected victims for the gas chambers and performed deadly experiments on humans. Parliamentarians mentioned Mengele only five times throughout the studied period, all in a commemorative context – four mentions on Israel’s MDHH. For instance, the following text was posted by MK Eli Ben-Dahan (Jewish Home) on 5 May 2016:

Ephraim Reichenberg, who suffered from Mengele’s experiments and a relative of my wife, lit a [memorial] torch last night [at the official MDHH commemoration ceremony], and told his moving story...Ephraim’s story symbolizes the ability of Holocaust survivors to survive an inferno and still be happy, start a family and build a state.

In contrast, in the comments space, the term ‘Mengele’ was invoked throughout the year (998 comments by 95 users). Most mentions appeared as insults and hate speech

**Figure 3.** Top bigrams associated with Holocaust discourse in the Facebook dataset.

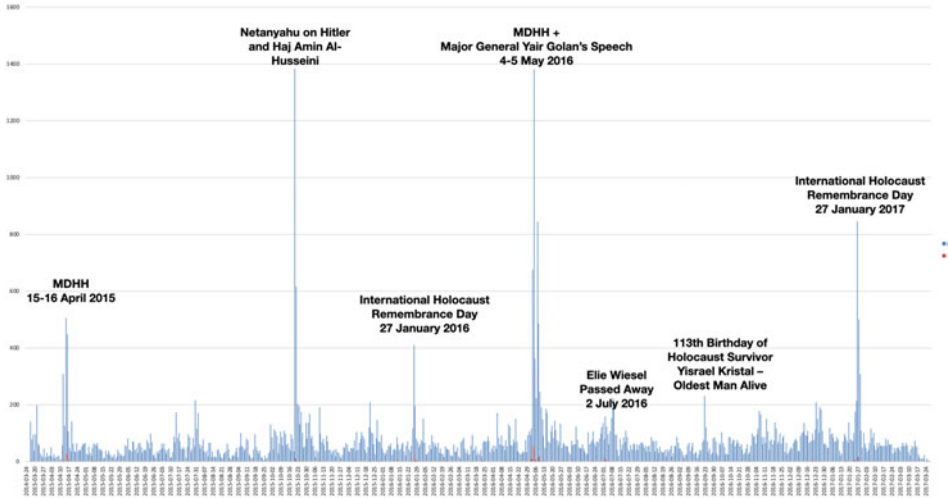


Figure 4. The temporal distribution of Holocaust-related posts (red) and comments (blue) in the Facebook dataset.

expressed in heated arguments that have no direct connection to the Holocaust and its commemoration. Hence for instance on 1 February 2017, MK Isaac Herzog (Labor) posted a text addressing the evacuation of Amona, an unauthorized West Bank settlement, during which Jewish settlers clashed with Israeli security forces. One of the commentators to Herzog's post wrote: '80% of the people want to put the leftists in a concentration camp. I volunteer to be Mengele and crack open your twisted leftist brain.' Another commentator to Herzog's post addressed the assumed responsibility of Israel's Supreme Court justices to the evacuation:

They [the judges] are worse than the haters of Israel ... They have no part in the people of Israel, nor in the land of Israel. God willing and with God's help, all those who took part in the evacuation will be shot on a missile straight to an enemy country, and there they will be experimented on like Mengele did in the Holocaust. Amen.

This pattern repeats itself in the discourse found around the most occurring queries. Terms such as 'Gestapo' and 'Hitler' are rarely used by politicians, but proliferate in the comments space as a discursive means to attack real or imagined rivals. The hateful speech that invokes the term is so extreme that one user intervened to calm down the debate by grounding the severity of the comparison to its historical origin: 'As the son of a Holocaust survivor ... who is a "Mengele twin," it is very sad that such a comparison is made, and anyone who says otherwise here does not understand that there is no humor in these things. I am ashamed and offended.' Put differently, in the comments space, the Holocaust becomes a battering ram for attacking people holding opposing opinions. Such vernacular is a clear indication of abusive memory work (Neiger *et al.* 2023).

Other platform-specific temporal dynamics are evident in the delay between politicians' posts and Holocaust-related comments. Despite Facebook's circulation of recent content (Ben-David and Soffer 2019; Kaun and Stiernstedt 2014; Rieder *et al.* 2015), our dataset shows Holocaust-related comments average a 10 h 41 min delay. This temporal distance suggests these mentions follow bottom-up discursive patterns unrelated to post contents.

This illustration unveils Israeli cultural mnemonic practices and the difference between politicians, who only address the Holocaust memory in awe-inspiring commemorative contexts, and Israeli Facebook users, who continuously call out real and imagined rivals derogatorily by comparing them to Nazi Germany figures and events. Arguably, such stark, diametric distinction is also shaped by Facebook's architecture creating separate discursive spaces for posts and comments.

II: A cross-cultural analysis of English and Hebrew tweets and hashtags on Twitter

As mentioned, on the second occasion, we queried Twitter using the same query lists used for probing the Facebook dataset, collecting data over a period of 6 months. Unlike the Facebook dataset, which was exclusively in Hebrew, we queried Twitter using both the Hebrew and English lists to facilitate the examination of cross-cultural differences (Sheldon *et al.* 2017) between English and Hebrew Holocaust-related discourses.

Findings

Given the dataset size differences, our analysis focuses on identifying patterns in each language space, highlighting similarities and differences. First, we examined the top query distributions: both language spaces exhibit long-tail distributions, with the top Hebrew bigrams being conjugations of 'The Holocaust' (14,222, 28.8%), 'Adolf Hitler' (12,543, 25.4%), and the Israeli term 'Holocaust Day' (8,470, 17.5%). In English, the discrepancy was far more drastic, with 'Adolf Hitler' comprising roughly 51% (2,660,390) and 'concentration camp' only 5.7% (see [Figure 5](#)).

The shared bigrams across languages indicate iconized commemoration vocabulary. Several appear in both top rankings, but with considerable proportional variation: while 'The Holocaust' ranks top in Hebrew, it is ranked 16th in English (39,223, 0.75%). Other differing weights include 'Six Million' and 'Concentration Camp'. Some bigrams in the English top 20 like Oskar Schindler and Anne Frank do not appear in the Hebrew top 20 bigrams, while Adolf Eichmann and Heinrich Himmler are frequent in Hebrew but not English. Such findings require further qualitative, culturally anchored exploration.

Next, we shifted attention to Twitter hashtags, a platform-specific affordance exemplifying mnemonic framing processes: Hashtagging anchors the past within the present and vice versa, allowing users to present past events as analogies and reasons for unfolding processes (Edy 1999); it fosters rapid generation of 'loose' online memory communities, constantly reshaping users' understanding of the past's interrelations with the present.

An initial top 10 hashtag exploration in the Hebrew and English datasets reveals striking differences ([Table 3](#)). The English top hashtags are commemorative and somber: acknowledging remembrance dates (#HolocaustMemorialDay), extermination camps (#Auschwitz), and moral lessons (#NeverAgain). The only exception to this commemorative tendency is #TigrayGenocide, conjoining Holocaust memory and recent Tigray War crimes – a non-commemorative mnemonic framing.

Four leading Hebrew hashtags (#HolocaustDay, #WeRemember, #Kristallnacht, #HolocaustRemembranceDay) frame Holocaust remembrance within commemorative contexts. In contrast, 6 of the top 10 Hebrew hashtags reflect current Israeli social issues, such as #GoAway, which ties Holocaust memory to protests demanding the removal of Prime Minister Benjamin Netanyahu. Critiques within #GoAway tweets highlighted and mocked Netanyahu's self-promotion during his 2021 MDHH Yad Vashem speech. Similarly, #AshkenaziHatred hashtags connect Holocaust memory to tensions between Israeli Jews of European (Ashkenazi) descent and Israeli Jews of Middle Eastern descent.

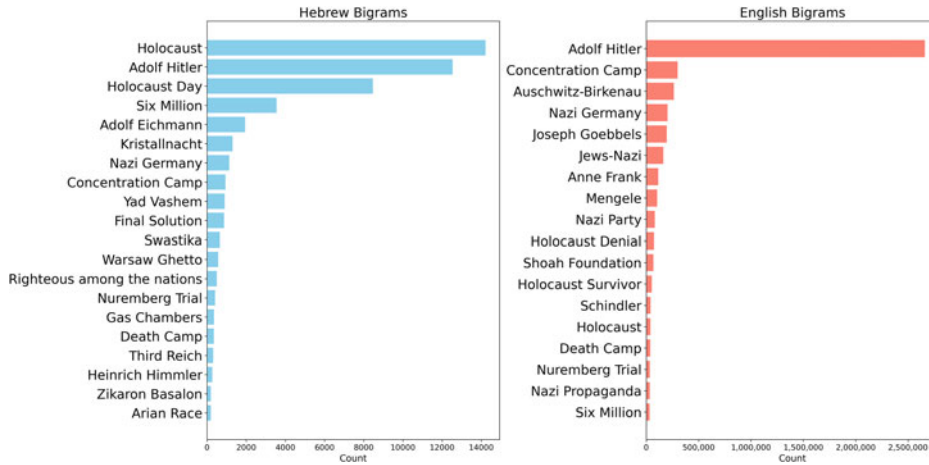


Figure 5. Top bigrams in the Hebrew and English Twitter datasets.

The hashtag #Processes reflects complex interactions between Israeli politics and Holocaust memory, referring to a 2016 speech by Major General Yair Golan. In this speech, Golan likened troubling trends in Israeli society to historical processes in 20th-century Europe, sparking intense debate about the appropriateness of such comparisons. Some tweets under #Processes directly engaged with Golan’s speech, debating its validity; in another case, the police decision to investigate PM Netanyahu was Retweeted under the hashtag #Processes with the added comment: ‘looks like the Gestapo has taken control over the country’.

Furthermore, several leading Hebrew hashtags provide a *meta-mnemonic* framing of Holocaust memory, critiquing or joking about the norms of Holocaust discourse in Israel. For example, the top hashtag #sorry is often used preemptively in social media apologies for inappropriate Holocaust references: one #sorry tweet explained that the only legitimate use of the Holocaust by way of comparison is in reference to ‘bad

Table 3. Top 10 hashtags in English and in Hebrew.

English hashtags	Count	Hebrew hashtags	Count
None	5,195,711	None	50,851
#Auschwitz	19,167	#Sorry	24
#Holocaust	9,165	#Processes	23
#HolocaustMemorialDay	6,908	#HolocaustDay	19
#HolocaustRemembranceDay	6,551	#AshkenaziHatred	18
#WeRemember	6,230	#WeRemember	18
#RememberOne	4,068	#HolocaustRemembranceDay	16
#Hitler	3,958	#Kristallnacht	14
#NeverAgain	2,682	#GoAway	13
#TigrayGenocide	2,472	#Holocaust_Day_Israel_2021	13

university courses'. Another #sorry tweet alluded to the television reality show 'Survivor' and asked: 'A Holocaust survivor is the person who was not eliminated by the Ghetto council?'

III: The temporal dynamics of social media memory work: rhythms and triggers of Holocaust discourse on Twitter

As mentioned, our framework aimed to discern when people indirectly discuss the Holocaust. This effort entailed the analysis of temporal discursive patterns in social media. In our study of the Facebook dataset, we noted differences between politicians, who posted about the Holocaust mainly on commemorative dates, and commenters, who consistently mentioned it throughout the year. We extend this analysis to Twitter to examine if similar patterns exist. Such investigations reveal the cycles, rhythms, and peaks of mnemonic discourse, highlighting the dynamics of memory work online. These dynamics help pinpoint areas of contention and controversy, crucial in shaping collective memory.

Previous research argued that platforms are rhythmic media, with algorithms and ordering practices shaping social interactions. For example, newsfeeds typically have a limited lifecycle, where content is promoted by algorithms for a brief period (up to 24 h) before becoming static (Carmi 2020). In this study, we explore cycles of Holocaust-related discourse on Twitter by identifying and characterizing events that trigger discursive explosions (Foucault 1978, 17), as seen in spikes of Holocaust-related bigrams mentioned on the platform.

To this end, we used the English Twitter dataset and calculated the distribution of timestamps over time. We identified discursive bursts of heightened discussions related to the Holocaust, explored their contents, and identified the circumstances that triggered such bursts. We therefore ask: What events trigger the discussion of Holocaust-related themes on Twitter? How long do such discursive bursts last? And what characterizes the shift between Holocaust-related discursive peaks and day-to-day Holocaust-related discourse?

As evident from Figure 6, the volume of daily Holocaust-related Tweets, Retweets, and Quote Tweets throughout the studied period is 26,130. However, the standard deviation of the daily temporal distribution is high (14,994), due to several spikes of intensive discussions that occurred throughout the studied period. The late-January and early April spikes occurred around commemorative occasions – the International Holocaust Remembrance Day and the Israeli MDHH. The remaining discursive bursts, however, were triggered by current violent occurrences: The early January spike co-occurred with the January 6, US Capitol attack and the May spike co-occurred with a violent clash between Israel and Hamas-controlled Gaza. During both periods, users brought up the Holocaust as a metaphor, analogy, and yardstick used to explain and contextualize current acts of violence. For example, on January 8, users repeatedly described US Capitol insurrectionists as Holocaust Deniers. One user replied to a tweet that expressed support for Trump: 'You know, at least when the crimes of the Holocaust became clear, the Germans had the good sense to deny that they were Nazis.' On that same day, another user tweeted: 'I can't believe the rioters in the capitol yesterday. Poor defenseless politicians [...] had to hide much like jews hiding from the nazis.'

On May 2021, after violence erupted between Israel and Gaza, pro-Palestinian Twitter users expressed anger at Israel by bringing up the Holocaust: '#Zionists are doing to #Palestinians, What #nazis did to #Jews at a slower pace. If the eye of the world wasn't on them they would apply the final solution at the same speed. Much like #Chin to

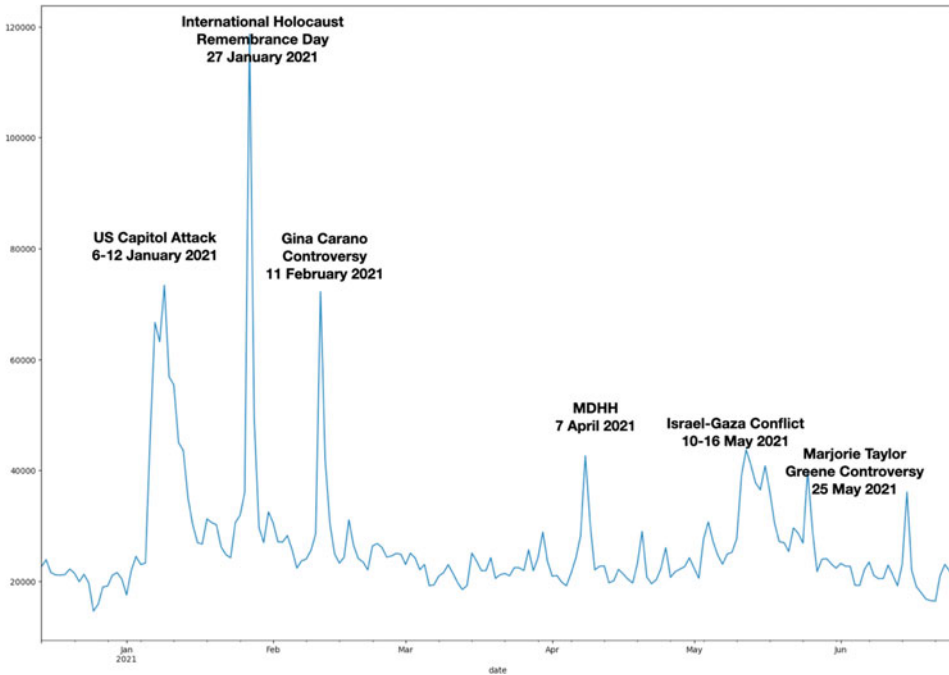


Figure 6. The temporal distribution of Tweets in the English Twitter dataset.

#Yughurs.\n#FreePalestine'. At the same time, supporters of Israel justified its actions by alluding to the 1940s collaboration between Palestinian leader Haj Amin al-Husseini and the Nazis. One user replied to US Congresswoman Ilhan Omar:

I'm a Jew. I'm indigenous to the land of Israel. If the Palestinians didn't want the European Jews to emigrate from Europe, they probably shouldn't have collaborated with the Nazis to drive them from there, and the other Arab countries shouldn't have ethnically cleansed them.

Controversial statements by public figures also triggered discursive bursts. On 11 February, Disney fired Star Wars actress Gina Carano for comparing being conservative to being Jewish in Nazi Germany. The dataset reflects this controversy: many users condemned Carano's comparison (#fireginacarano), while others debated if her firing exemplified 'cancel culture'. Hence for example, on 11 February, Mark Cernovich, a popular right-wing social media conspiracy theorist tweeted: 'the blacklisting of gina carano is proof that the left: *checks notes* doesn't like comparing being a conservative to the holocaust'. Other comments adopted a more cynical approach; hence, for instance, on 13 February, comedian Jeremy Kaplowitz tweeted: 'what's going on with gina carano basically proves her point because jews in the holocaust *also* weren't able to star in The Mandalorian'.

Finally, an examination of the breakdown of temporal trends per bigram reveals a familiar pattern (see Figure 7): some bigrams, and especially 'Adolf Hitler', were mentioned in items throughout the studied period, regardless of commemorative dates or triggering online media bursts. By contrast, the volume of items containing other bigrams, such as names of concentration camps (Auschwitz-Birkenau) or iconic figures

(Anne Frank), tended to peak only around commemorative dates. Such patterns help us identify new ‘Mnemonic Markers’ (see below) characterizing how social memory works on social media.

Discussion

This article aims to provide a comprehensive methodological framework to facilitate the study of memory work across social media platforms. By merging platform-agnostic and platform-specific elements, this framework can enhance discussions on how collective memory is constructed on social media. Researchers can utilize a top-down issue mapping process to create queries for various collective memory events or topics, then employ bottom-up analyses to explore how these topics are debated, contested, and evolve over time, along with the unique mnemonic vernacular that arises from user practices and platform affordances. It is important to note that the bottom-up analyses are not exhaustive. Once the top-down approach has demarcated a mnemonic space on social media, various computational, qualitative, and quantitative methods can be employed to address different research questions.

More generally, the proposed framework aims to locate those overarching high-level affordances, or mnemonic dynamics that social media afford (Bucher and Helmond 2018), which we find necessary to advance digital memory studies. The scholarly understanding of what collective memory is and how collective memory is shaped directs researchers at several fundamental questions concerning *agency* (who is socially permitted, or encouraged to speak about the past? Who has the resources to do so?), *platform* (how do the characteristics and affordances of venues or platforms influence the ways in which the past is narrated?) and *context* (when is the past discussed? Why then?). The implementation of our methodological framework helps address these fundamental questions within the realm of social media by illuminating three high-level affordances

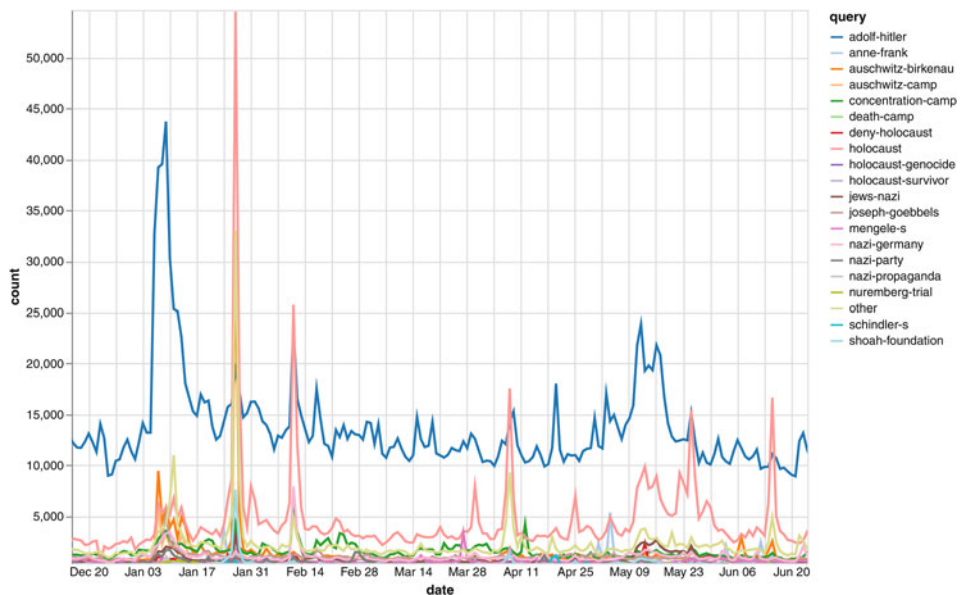


Figure 7. The temporal distribution of bigrams in the English Twitter dataset.

of social media memory work, which we term *Mnemonic Markers: Directionality, Temporality, and Vernacular*.

Directionality refers to the discursive dynamics unfolding between those who initiate a mnemonic discourse, and those reacting to it. A key affordance of many social media platforms is the separation between the primary content (e.g. a post, video, article) and the comments section below it. This architecture creates a dialectic space where content is distinctly separated from the discourse around it (Ben-David and Soffer 2019). We suggest that this distinction constitutes a fundamental element in shaping social media memory. Our findings show institutional mnemonic agents address Holocaust memory on social media in primary content spaces and directly related contexts. In contrast, 'lay' agents address the Holocaust in varied contexts and for diverse purposes in both primary content and comment spaces.

The mnemonic discourse within comment spaces distinctly differs from that in main content areas, where references to the Holocaust often emerge detached from the primary content. This difference in directionality – who starts the conversation, where, and in what context, and who responds – helps identify non-commemorative memory spaces where Holocaust discourse might not be anticipated.

Directionality as a high-level affordance aids researchers in understanding the complex dynamics of initiation and response, as well as the interactions between different communicative agents. This insight encourages social media memory researchers to further explore the complex relationships and interactions among memory agents of varying statuses and their proximity to the remembered event.

Temporality refers to the various temporal dynamics characterizing social media memory work: peaks, cycles, rhythms, and pauses. Our findings illustrate the importance of examining the dynamics of social memory work as they evolve over time, and not as merely a snapshot frozen in time. Further, examining the temporal dynamics of social media memory work corresponds with one of the fundamental distinctions foregrounding the study of collective memory, distinguishing between commemorative and non-commemorative memory. Our explorations of various social media datasets revealed the simultaneous existence of a 'baseline' presence of continuous social media Holocaust-related discourse alongside mnemonic bursts that occur on either commemorative (official memorial days) or non-commemorative (political violence) occasions. And so, the unique affordances of social media offer collective memory scholars the opportunity to expand and challenge the assumed commemorative/non-commemorative binary division.

Vernacular: The third suggested Mnemonic Marker grows out of the identification of shared and distinct vocabularies used to verbalize the memory of the Holocaust. The process of devising our research framework followed by its implementation illuminated the coexistence of shared (across languages and platforms) lexical spheres alongside the development of unique mnemonic vernaculars, used within specific language spaces, by specific communities on specific online platforms. Such mnemonic vernaculars offer unique opportunities to study the meeting point between cultural and historical consciousness and technological affordances.

The Holocaust permeates multiple contexts beyond explicit commemoration. Directionality, temporality, and vernacular act as Mnemonic Markers assisting researchers in exploring the constant stream of social media discourse, where the logic of issue mapping (Marres and Rogers 2005) intertwines with processes shaping collective memory. These Markers establish connections between content, each platform's distinctive characteristics (Marres and Moats 2015), and cultural/social factors. Directionality is crucial for comprehending power dynamics and bottom-up memory-shaping processes undermining traditional gatekeepers (Shahzad 2012). Vernacular illuminates fluctuations in framings,

forms of reference, and the ‘uselessness’, exploitation, or secularization of memory work. Temporality grasps dynamics stimulating memory work beyond constant frequencies.

Despite its value for memory researchers, our framework has notable limitations. Primarily, our top-down/bottom-up approach focuses on lexical analysis and overlooks the rich multi-modal context of social media, limiting our ability to detect and analyze non-verbal Holocaust references prevalent on visual platforms like TikTok or Instagram (Henig and Ebbrecht-Hartmann 2022). Additionally, our current framework does not capture vernacular using coded language designed to evade content moderation policies, such as when users propagate Holocaust denial or anti-Semitic sentiments (Magu *et al.* 2017).

Analyzing large-scale datasets can de-contextualize dynamic, localized conversations experienced individually and mediated by personalized algorithms. While our method enables deeper exploration of social media memory, it does not fully contextualize each Holocaust discussion. Our qualitative analysis helps recontextualize conversations, but studying static datasets overlooks temporal dynamics and algorithmic personalization influences (Jacobsen and Beer 2021).

Future research could further explore and confirm the usefulness of the Mnemonic Markers of *directionality*, *temporality*, and *vernacular* in analyzing other collective memory phenomena. These markers also pave the way for new comparative studies in social media memory research, such as investigating whether similar directional and temporal patterns occur across different topics, cultures, and platforms, or comparing unique mnemonic platform vernaculars across languages and geographies. Given the continuous evolution of social media, it is crucial to regularly reassess the methodological and conceptual frameworks we employ to understand social memory dynamics on these platforms.

Data availability statement. The data that support the findings of this study are available from Facebook and Twitter. Restrictions apply to the availability of these data, which were used under licence for this study. Anonymized data are available from the authors upon request.

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