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INTRODUCTION

Technologies of Testimony and Distant Witnessing

Shortly after the death of Auschwitz survivor and president of the Illinois Holocaust Museum and Education Center, Fritzie Fritzshall, on June 19, 2021, I decided to spend some time talking with Fritzshall through the USC Shoah Foundation's Dimension in Testimony project (Figure 0.1). I logged into the IWitness platform from my home computer and decided to ask her a number of questions. Periodically shifting in the chair in which she sat, her head shook slightly back and forth; she evidenced a welcoming smile and changed the position of her hands and fingers ever so slightly, as if she was waiting for me to begin. I started with a simple "Hello, how are you?," to which she responded, "I am fine." I then asked her why she did this project. She responded by saying that although "it opens a wound" each time she tells her story, she feels an "obligation to teach" and "leave my story behind so the next generation can learn from me [about] what I have gone through."

When I ask her how she arrived in Auschwitz, she recounts a detailed and horrific story of being deported in a locked train with starving and sick people struggling to breathe, mothers holding dead and dying infants, and the overwhelming stench of human waste spilling over in the boxcar. The story ends with her arrival in Auschwitz, where she describes the last time she saw her mother. On the selection platform, she says that she told her mother to stand in a different line from her, anticipating that it would save them both from certain punishment. Later, she found out that her mother was sent immediately to her death, and she wonders: "Did I send my mother to the gas chambers? I don't know. Would she have lived? I don't know. I don't know." Hesitantly, I mustered the courage to ask: "Do you really think you sent your mother to her death?" The answer played does not seem quite right since it is about her mother's courage and care of her children in the ghetto and the boxcar. So, I rephrase my question: "Why did you tell your

FIGURE 0.1: Fritzie Fritzshall, Dimensions in Testimony, IWitness platform, USC Shoah Foundation.

mother to stand in the other line?" She responds by describing the brutal punishments she saw on the platform of women being hit with rifle butts and slapped around. Clasping and opening her hands, she continues by saying: "The fear was there and you just wanted to do what they asked you to do so you wouldn't be punished. So, I remember standing with my mother in this line, I remember motioning to her and telling her to go into the next line, I don't remember anything else. I don't remember any conversation, I don't remember a goodbye, I don't remember . . . I don't remember."

While speaking about the same traumatic event, her two answers provide different accounts of her memory and are delivered in markedly different voices. In fact, the words alone in the final quotation do not indicate anything about the creakiness of her voice, her tone of almost pleading with me to understand her, the hesitant pursing of her lips, or her labored breathing. The quoted transcript omits the fact that the single ellipsis represents a pause of almost ten seconds in duration. It also obscures the fundamental phonetic differences of the last two expressions of "I don't remember," the second of which is uttered as she chokes up and can barely express the words, perhaps in disbelief at her own lack of memory.

I decided to shift my questions to ask her if she had recorded a testimony with the USC Shoah Foundation or if she had recorded any testimony previously. To both questions, she gives the same answer: "The project we're doing here I think is amazing. I think technology is great and I love it. I think it's a great project." It turns out that this answer is played often for questions related to recording technologies and even to questions about whether she considers herself to be a "hologram" or "AI." When I try to test the system's illusion of immediacy and presence by asking "What do you think of the world today?" and "What do you think the world will look like in 100 years from now?," I get the same answer: "I don't know when you're talking to me but I hope that it is better now," evidencing the fact that our interaction is still fundamentally bound to the time-kernel of its moment of recording. When I go further by asking "do you have any questions for me?," she responds by reminding me: "I'm actually a recording so I can't answer that question."

But when I rephrase the question to be "Do you think this is the future of Holocaust testimony?," I receive a somewhat surprising answer: "I don't think I remember things accurately. I don't think anybody that's lived as long as I have, three hundred years at this point. . . . No, I don't. I have certain pictures that are in my mind and certain facts that I am really sure of but certain things, did it really happen, is it a memory, did I really see it, do I remember it . . . no, I'm not sure that I remember every single thing that happened during that particular time." She smiles as she says three hundred years, perhaps signaling to us that she knows we are both participating in the same illusion, but surely also hoping that she will live on, far into the distant future, through the technology to transmit her testimony. The desired infallibility of digital technology is in tension with the fallibility, finiteness, and contingency of human memory. And even though the answer does not quite fit the question asked, her words reveal the imbrication of the promises of technology with what might be considered the "necropolitics" of the digital archive.[1] While Achille Mbembe uses the latter term to refer to the sovereign's power over life and death, the necropolitics of the digital archive points to the ways in which the testimonial archive is not only a record of whose lives are preserved and in what modality (and whose lives are not or could never be) but also, more generally, who and what is in the database, who and what is searchable, and who and what can be heard beyond the facticity of death.

Of course, I was never "talking to" or "interviewing" Fritzshall. Instead, I was providing data to an automatic speech recognition tool that interpreted my words into text before the platform, running a set of natural language processing and

machine-learning algorithms, matched the best, prerecorded answer to what it decided was the intended meaning of my question. And yet the illusion of immediacy is compelling. She shifts in her chair, blinks her eyes, and moves her hands, seemingly waiting for me to pose more questions, as if to say: *Here I am, ready to listen and engage with you*. But what does it mean for the algorithm to "hear," "listen," and "interpret" my speech? Has the ethical obligation of the listener to be open to the testimony of the other shifted to an obligation of the algorithm to be open to my questions? We need to ask: Is there an ethics behind the decision-making of this algorithm? Or more generally, what are the ethics of any algorithmic engagement with a digital archive?

Dimensions in Testimony is a project of "distant witnessing" that raises fundamental questions of what it means for an ethics of testimony to intersect with an ethics of the algorithm. Starting in 2014, the USC Shoah Foundation, in partnership with the USC Institute for Creative Technologies, began to record survivors for this interactive form of volumetrically captured testimony. Initially (although somewhat erroneously) described as "holograms," the testimonies were recorded in a special studio to capture the survivor in 360 degrees in order to allow for three-dimensional projection and interaction.[2] Available both through a web interface and in physical installations across the world in museums, several dozen Jewish Holocaust survivors have been recorded to date, as well as one survivor of the Nanjing Massacre, two liberators, and one war crimes prosecutor.[3] Often asked over a thousand questions, the answers given by the interviewees are marked up and become part of a machine-learning system to allow the general public to pose questions interactively in real time. Unlike audiovisual testimonies that play linearly in a fixed fashion, each interaction with an interviewee in Dimensions in Testimony is a new experience, contingent upon the questions posed by the user, the system's parsing of the user's speech, and the calculations of the machine-learning algorithm that determine what clip is the most appropriate answer to play.

While the technologies upon which the project are built were only developed recently, it is not fortuitous that it launched at a time in which a profound generational shift is occurring: the last surviving witnesses of the Holocaust are passing away. It is no surprise that numerous museums and educational centers have developed interactive apps, virtual reality projects, and augmented reality experiences to foster forms of digital Holocaust memory.[4] At the same time, the final recordings of eyewitness testimonies—including the USC Shoah Foundation's "Last Chance Testimony Collection" initiative, its Dimensions in Testimony proj-

ect, and the "Forever Project" backed by the UK National Holocaust Museum—are being undertaken with great urgency. Most of the survivors of camps who are still able to tell their stories are in their mid to late 90s. Some lack the physical and mental stamina to sit for hours and recount the horrors of their childhood and early adult years. Holocaust testimony is shifting from experiential narratives of embodied memories to archived histories mediated by digital interfaces, databases, and algorithms. From the moment I logged onto the IWitness platform, my interaction with Fritzie Fritzshall was entirely mediated by technology, from clicking on the microphone icon to ask my question—and the automatic speech recognition tool that subsequently parsed the question into tokens for natural language processing—to the machine-learning algorithm that decided on the best match from the database of video clips and the video playback in my browser-based interface. The algorithmic layers between the user interface and the recorded archival content play an absolutely critical role in constituting the testimony and conditioning what an ethical engagement with the witness and the archive can be. These algorithmic layers are a central part of what we probe in this book.

Before we do so, we need to look back at the history of the genre of Holocaust testimony to gain a broader perspective on the significance of the changing media and technologies for both constituting and interacting with testimonial archives. As a genre of attestation to the destruction of the Jewish communities of Europe, Holocaust testimony—in the form of diaries, letters, photographs, narrative documentation, and collection building—began almost immediately after Nazi Germany invaded Poland in September of 1939.[5] Following the establishment of Jewish ghettos in the early 1940s, secret archives were founded in Bialystok, Kovno, Lodz, Vilna, and Warsaw, where victims documented the catastrophe unfolding around them.[6] Started by Emanuel Ringelblum in November of 1940, the Oyneg Shabes archive in the Warsaw ghetto was the most extensive and collected a trove of documents, including letters, diaries, clippings from the Jewish press, cultural and literary artifacts, posters, and ephemera of everyday life.[7] As the ghetto was evacuated and came under siege, the archive was buried in milk canisters under the city in the summer of 1942 and spring of 1943. Not unlike the precariousness and hopefulness of a message in a bottle, the archive—with its diversity of voices—was intended to be sent, as it were, to the future. After the war, it was partially salvaged when it was rediscovered and excavated in 1946. The technology of the milk cannister enabled an intentional form of witnessing in which testimonial inscriptions were preserved, stored, and transmitted beyond human mortality.

Collection efforts by historical commissions and documentation centers began before the war was over in Polish cities liberated by the red army and expanded throughout Europe in the immediate aftermath of the war, especially in Germany, Austria, Italy, and France. According to Laura Jockusch, "The survivor documentarians . . . pioneered the development of victim-focused Holocaust historiography . . . [using sources that] reflect the life stories, experiences, and self-perceptions of their creators, [such] as diaries, letters, autobiographies, and memoirs, along with testimony drawn from survivors' memories."[8] In addition to documenting information about displaced people (family background, addresses, languages, nationality), the historical commissions developed questionnaires to collect information about family separations, displacements, the fate of families, time in camps, liberation, and surviving family members.[9]

As a complement (or perhaps antidote) to the silent news reel footage of liberated camps, the first audio interviews with Holocaust survivors were recorded in 1946 by a man named David Boder.[10] Trained as a psychologist and linguist, he developed his own interview methodology to document and understand the traumatic impact of the Pan-European catastrophe. Using a wire recorder, Boder interviewed about 120 displaced people, mostly Jewish survivors of concentration camps, in displaced persons camps in Germany, Italy, France, and Switzerland.[11] Survivors were interviewed in nine languages, with the goal of translating and disseminating the testimonies across the Anglophone world.[12] As dialogically mediated, first-person narratives wrought with emotion, Boder considered the interviews to be a new form of "literature." This is because they represented forms of narrative characterized by a range of linguistic choices, emplotment decisions, storytelling devices, and translation effects. According to Boder, the "verbatim recorded narratives" not only demanded the development of an "art of listening" but also necessitated the development of mixed methodologies—qualitative and quantitative, humanistic and proto-computational—to analyze the traumatic language and emotional content.[13]

In the years that followed, formalized institutions of Holocaust memory were founded in the United States, Europe, and Israel. Holocaust survivor testimony became the centerpiece of their collecting initiatives.[14] Many of the early testimonies in Yad Vashem's collection were written down or recorded before it was formally established in 1953. Today, Yad Vashem has an archive of more than 131,000 testimonies across various media formats (of which about 36,000 are recorded voices and/or video). The Holocaust Survivors Film Project and the

Video Archive for Holocaust Testimonies at Yale (which later became integrated into the Fortunoff Archive) began recording audiovisual interviews in 1979, guided initially by the collaboration between television personality Laurel Vlock and child survivor and psychiatrist Dori Laub. Today, the archive has more than 4,400 testimonies and consists of some 10,000 hours of video footage. It is not coincidental, as Annette Wieviorka points out, that the impulse to record audiovisual testimonies in the late 1970s and early 1980s was spurred by televisual realities that returned to the immediacy of first-person accounts by survivors at the 1961 trial of Adolf Eichmann. These broadcasts and recordings set the stage for the public impact of the television miniseries *Holocaust* (1979), Claude Lanzmann's monumental film of witnessing, *Shoah* (1985), and the global reception of Steven Spielberg's *Schindler's List* (1993).[15] Founded in the wake of *Schindler's List*, the Survivors of the Shoah Visual History Foundation (which later became the USC Shoah Foundation Visual History Archive) began interviewing survivors in 1994. Today, with some 55,000 video testimonies, in over forty languages, the more than 120,000 hours of testimony comprise the largest such archive in the world.

To preserve this content and make it globally accessible on the web, archives and libraries have undertaken multiple processes of media migration and digitization, each of which has changed how the testimonies are heard, accessed, and searched.[16] Boder's analog wire recordings were transferred to reel-to-reel tape by the Library of Congress and later recorded on U-matic or VHS tape. In 1999, the Paul V. Galvin Library at the Illinois Institute of Technology (IIT) obtained copies of the recordings as Digital Audio Tape (DAT) files, and those DAT copies were transferred to WAV files in 2007–2008. They were encoded as digital flash files and are now playable as WAV files on the IIT website. The interviews are searchable by way of the extensive Text Encoding Initiative (TEI) mark-up created by the IIT team.[17] When Yale's Fortunoff Archive began recording testimonies in 1979, they were recorded on 3/4-inch U-matic videocassettes, before being transferred to VHS, and now digital streaming formats. The Shoah Foundation began recording testimonies in 1994 on thirty-minute Beta SP videotapes. In the early 2000s, the 235,000 tapes were digitized as Motion JPEG 2000 digital files, the industry standard for preservation. According to Stephen Smith, the former executive director of the USC Shoah Foundation, an "ethic of data integrity" informs the Foundation's commitment to "bit level preservation . . . of every byte of data (for its own sake)."[18] The eight petabytes of data are stored on Oracle StorageTek SL8500 machines, which are checked nightly for any errors.[19] Maintained by USC's Information Technologies data center, painstaking

preservation systems are used to protect and regularly backup all of the data to within one bit per five terabytes of data.[20] In certain ways, this commitment to the fidelity of both the digital files and the system's hardware—networked, backed-up, distributed, and mirrored—underscores how the archive aims to be a transgenerational refuge or asylum for the survivors' testimonies. The ethics of archiving are deeply rooted in ensuring a future for the testimonies to be heard.

During these critical decades of recording, archive creation, and media preservation, the testimony of Holocaust survivors was subject to much discussion and debate. Some historians asked if testimonies, many of which were collected decades after the events, were "factual" enough to be admitted as evidence into the historical record, especially if these testimonies contained inaccuracies; on the other hand, psychoanalysts like Laub argued that first-person testimonies were less about evaluating their historical accuracy and more about their role as documents of emotional realities, traumatic experiences, and epistemological frameworks—in other words, subjective ways of knowing, experiencing, and narrating.[21] Although certain Holocaust historians such as Raul Hilberg and Lucy Dawidowicz distanced themselves from the use of first-person testimony,[22] others such as Christopher Browning, Jan Gross, and Omer Bartov have shown how survivor testimony can be critical for historical work, especially when few or no other sources are available.[23] In his acclaimed study of the Starachowice slave-labor camps, Browning used nearly three hundred eyewitness accounts, spanning 1945 through 2008, as nearly all other evidence about the camps was destroyed. While survivor accounts, according to Browning, are often recognized for their "authenticity" (as they are drawn from the wellsprings of memory), they can also be problematic for historians because the memories may, for instance, become mixed with "iconic Holocaust tropes" in popular culture.[24] Nevertheless, Browning argues that it is possible for first-person accounts to be squared with "factual accuracy" to get at a "core memory" of the events, even if they—like all historical sources—do not provide "perfect evidence."[25] Instead, they open up spaces of evaluation and judgment for historical work to take place.

Derived from the Latin word *testimonium*, meaning "evidence, proof, witness, attestation," the root *testis* refers to a witness or to someone who attests, especially as a third party (or *terstis*) in a trial or court of law.[26] Witnesses deliver testimony of something known, observed, or experienced in light of having been present at the event to which they are testifying.[27] When testimony is evaluated by a judge or a historian, the ability to verify the testimony's factual accuracy and reliability

remains paramount.[28] However, as we argue in the analyses that follow, testimony need not be evaluated—certainly not exclusively—for strict factuality or the extent to which it accurately represents the reality of the past. Testimony is a widely variant form of narrative performance in which a survivor makes subjective choices about how to voice personal experiences of trauma. At its core, testimony is a narrative form of emplotment with an implicit promise to be truthful. It is presented and preserved as an act of truth-telling for others to hear, see, or read. Thus the dialogical process of telling and listening is just as important as the language describing the reality of experiences.

Connecting the dialogical aspects of interview-guided testimony to transgenerational responsibility, Geoffrey Hartman, one of the founders and original project directors of the Yale Fortunoff Archive, distilled what he considered to be the ethical dimension of video testimony: the "duty to listen and to restore a dialogue."[29] For Hartman, video testimony offers an "optic" for non-survivors to mediate the geographic, temporal, experiential, and psychological distance that they (or, we) have with respect to the events of the Holocaust. This mediation happens initially through the relationship between the interviewer and the survivor and, after that, through the generations of viewers who contribute to the creation of an "affective community" of witnesses to the witnesses.[30] For Hartman, the specific media technology of the audiovisual recording documents an ethical encounter between interviewer and survivor, which becomes, through each act of watching, an ethical encounter between viewer and survivor. In this sense, testimony functions as a performative embodiment of Martin Buber's "Ich-du" (I-you) relationship,[31] in which we—the non-survivors—enter into a "contract" through acts of listening, bearing witness, hearing, and being heard.[32] Survivors, Laub writes, have a need to be heard, to tell their stories to a listener who is actively present for the other, listening to both silence and speech, trauma and survivorship.[33] "The unlistened-to story," as in Primo Levi's recurring nightmare in *Survival in Auschwitz*, is a trauma akin to reexperiencing the event itself.[34]

Because bearing witness is a dialogical appeal that needs a listener, Hartman will explicitly situate it within a framework derived from the philosopher of relational ethics, Emmanuel Levinas. It is the philosophy of Levinas, perhaps more than any other, that has informed much postwar scholarship on the Holocaust related to ethics as obligation and responsibility to the other.[35] In survivor testimony, the physical face of the other—the traumatized, wounded face of the survivor—enters into a relationship of proximity, vulnerability, and closeness with the listener's own face. For Levinas, ethics is defined by an intersubjective

relationship with and responsibility for the other. He considers it a first philosophy, prior to the establishment of identity, origin, or any attempt to ground being. For Hartman, Laub, and many others, the ethics of testimony rests upon the presence of a relational listener: "Here I am," ready to listen attentively; I am all ears, standing open and ready to be summoned to this infinite demand, to this injunction to "hear."[36]

But what, specifically, constitutes an "ethics of response for secondary witnesses—interviewers, oral historians, and commentators,"[37] as Dominick LaCapra has asked? And, more pointedly for our contemporary situation, what might an "ethics of response" mean for us—the tertiary witnesses—whose acts of witnessing are mediated by computer interfaces, algorithms, and databases?[38] We consider the survivor to be the primary witness, the interviewer to be the secondary witness, and all of us listening to the testimonies via forms of digital mediation and computation to be tertiary or distant witnesses. I will use the term "distant witnessing" to refer to this subject position. The question is: How can we develop an ethics of witnessing in a world in which our temporal relationship to the voices of the dead is becoming more and more distant, but our ability to call up vast amounts of information from the digital archive is becoming more and more instantaneous?

Although many viewers will continue to engage with video testimony in ways that reflect the ethics of relationality and empathy central to its initial creation, the recording of Holocaust testimony is reaching an end.[39] As we approach the threshold of a generational shift in which living witnesses will have passed away, the character of the ethical relationship between survivor and listener is also changing: going forward, that relationship will be largely mediated by digital technologies, information architectures, and algorithms. Concretely speaking, this means search boxes, web interfaces, databases, query languages, mark-up and encoding protocols, speech recognition, natural language processing, visualizations, and a wide range of algorithmic methods and tools for reading, listening, creation, and analysis. Because the digital archive is structured, accessed, and interpreted by computational technologies and algorithmic methods, the futures of Holocaust memory and history will be shaped increasingly through these technologies and methods. Our relationship to the voices of the dead will be mediated through forms of distant witnessing, some of which already exist and others of which will emerge in the future. Not only do the scale and complexity of the digital records far exceed our human cognitive and empathetic capacities for listening, reading, and interpreting,[40] but new questions about the future of authenticity and digital

provenance have also taken center stage in light of the possibilities unleashed by generative AI.

While this book focuses primarily on digital archives of survivor testimony, the mass digitization of artifacts and documents related to all aspects of the history and memory of the Holocaust is well underway. We might mention, in passing, some of the collecting and digitization efforts at other major museums and archives, for instance: the fifty million records in the International Tracing Service archive that reference the fates of 17.5 million people at the Arolsen Archives;[41] the millions of individuals and life stories in Yad Vashem's Central Database of Shoah Victims' Names; the US Holocaust Memorial Museum's encyclopedias and databases of more than 44,000 concentration camps, ghettos, forced labor camps, detention centers, and other sites of persecution between 1933 and 1945.[42] And these figures do not even include the millions of documents, artifacts, photographs, films, and books that are steadily becoming digitized in each of these archives and museums, or new database projects such as those carried out under the aegis of the Claims Conference.[43] Beyond these institutional projects, we might mention the global investigatory work of Yahad-In Unum, an international human rights and educational organization that has documented—through forensic evidence, witness interviews, survivor testimonies, and digital maps—more than three thousand execution sites of Jews in Ukraine, Russia, Belarus, and the Baltic countries between 1941 and 1944.[44] The mass digitization of documentation represents the condition of possibility for newly emergent fields of research at the intersection of digital humanities, memory studies, public history, and the computational and social sciences.

While it may have made sense at one time to argue that the Holocaust was "an event without witnesses" to make a point about the destructiveness of the genocidal will and the inability to assume an outside frame of reference during the event,[45] the Holocaust is clearly an event with hundreds of thousands of witnesses who have contributed and helped to produce a staggering amount of testimonial evidence, documents, and data sources. In addition to recording and stewarding these testimonies, these institutional archives have also produced new data and documentary evidence about the Holocaust, especially through the critically important mark-up and encoding of testimonies, the creation of extensive metadata scaffoldings, and the production of new documentary databases. Today, computational forms of analysis can work in tandem with documentary, historical, and social analyses to produce new frames of reference and perspectives to examine evidence, patterns, relationships, narratives, motives, micro- and macro-level events, and more.

Even though the records and testimonies of the Holocaust have been (and continue to be) digitized on a massive scale, the use of computational methods and digital humanities tools for analysis is still in its early stages in the field of Holocaust studies. This may be because of a justified concern over replicating the violence caused by certain forms of quantification and the use of technologies that have the potential to dehumanize. Computation and quantification seem to present humanists with a "limit" on responsible modes of interpretation and representation.[46] Although not referencing computation specifically, LaCapra raised the question as to whether "there is something inappropriate about modes of representation which in their very style or manner of address tend to overly objectify, smooth over, or obliterate the nature and impact of the events they treat."[47] This could happen, he warns, through "excessive objectification, purely formal analysis, and narrative harmonization"[48]—all of which are potentialities of computation.

But, as we argue in this book, computational technologies and algorithmic methods do not necessarily lead to objectification, reduction, or simplification. These technologies and methods are not inherently unsuitable, but they do raise fundamental epistemological, aesthetic, and ethical questions, not unlike the questions raised several decades ago about appropriate and inappropriate modes of historical emplotment.[49] Inspired by Saul Friedländer who sought to develop "an integrative and integrated history" of the Holocaust to express the convergence of distinct elements, perspectives, and experiences, we are proposing an *integrated methodology* composed of computational and humanistic approaches to analyzing testimony. Such a methodology allows us to move between macro, meso, and micro scales of analysis, reflecting the size and complexity of the documentation in the archives. At the same time, because digital archives are now the primary access points and storage systems for testimony, integrated methodologies can yield new reading and listening practices as well as critical modes of engagement with the archive.

To do this, we need to proceed from the position that computational methods are not neutral, value-free, or objective. While they may sometimes help us discover or verify facts, these methods do interpretative and discursive work, which allows us to imagine possibilities, test hypotheses, change the scale of analysis, and represent knowledge in new ways. As architectural historian Paul Jaskot has pointed out, digital humanities scholars have developed and applied computational methods to expand our understanding of traditional sources by modeling contexts, bringing together new data, and scaling up interpretations in ways that explore new research questions.[50] Some of the pioneering work,

for example, at the nexus of digital mapping, 3D visualization, and data-driven research has been led by the collective associated with the "Geographies of the Holocaust" project. They use the measurements derived from Historical Geographic Information Systems (H-GIS) in ways that foreground probability, uncertainty, and qualitative visualization rather than objectivist forms of mapping.[51] Their research humanizes the victims and expands our understanding of historical dynamics by moving between macro-level systems at the continental scale to cities, ghettos, blocks, and individual experiences articulated in testimonial narratives.[52]

Advances in related fields such as computational linguistics, natural language processing, and machine learning have opened up new methods for mining and analyzing large textual corpora and promise to have a transformative impact on how scholars, archivists, and librarians work with digitized historical records.[53] Under the broad leadership of organizations such as the European Holocaust Research Infrastructure (EHRI) working in collaboration with the Common Language Resources and Technology Infrastructure (CLARIN), robust digital infrastructures are emerging to support transnational Holocaust research and education. Their goals are to provide access to archival materials, facilitate interoperability, preserve collections, and share resources and knowledge. As documented by CLARIN, a number of institutions have already developed technical pipelines, workflows, and datasets for transforming oral history interviews into interoperable research data.[54] Focusing mostly on language technologies, the research includes standardized text mark-up and annotation, text encoding, text summarization, transcription and translation, voice and text alignment, interface development, and semantic and spatial search. For example, in partnership with the Yale Fortunoff Archive, the USC Shoah Foundation, and the USHMM, Gábor Tóth has used computational linguistics and text mining tools to identify recurrent experiences in testimonial fragments across these three corpora. His project, "Let Them Speak," offers a new, searchable interface for identifying shared experiences and showing how "the experience of the *Drowned* can be rendered through the pieces of collective suffering."[55] Employing data mining and natural language processing, Tóth created a custom search interface that allows users to explore 2,681 testimonies attuned to recurrent linguistic features in the transcripts and their underlying linguistic networks.

Using empirical data and systematic analyses, researchers have also used quantitative methods from the social, political, and computational sciences to analyze historical phenomena related to the events of the Holocaust.[56]

Yad Vashem has developed a comprehensive Holocaust deportation database, which includes quantitative information and source materials about every transport organized by the Nazis.[57] The data—arranged by individual transports, dates, number of people deported, number of survivors, nationality, the route taken, agencies involved, and, when available, gender and age breakdown—are now being used to advance social science research in Holocaust studies.[58]

And yet, I do not think we should ignore any lingering uncertainty or skepticism that we may feel when it comes to using digital technologies, quantitative methodologies, algorithms, or computational tools to study the Holocaust. After all, we have to depart from the knowledge that technologies and methods of calculative reasoning shaped the foundation of the social engineering policies of dehumanization that gave rise to the Holocaust. As Zygmunt Bauman famously argued, bureaucratic forms of rationality, coupled with technologies of quantification and abstraction, were deeply linked to the modern management of society that formed one of the conditions of possibility for the Holocaust.[59] When those forces—the product of modern science, modern technology, and modern forms of state power—came together with racialized forms of instrumental reason driven by biostatistics, bureaucratic distantiation, and hierarchical quantification, the result was social engineering, eugenics, and eventually genocide. Bureaucratic operations, Bauman argued, substituted "technical for moral responsibility," allowing people to be dealt with as railway "cargo" and human beings to be "reduced . . . to pure, quality-free measurements."[60]

Not unlike the operations of certain algorithms, bureaucracy, according to Bauman, "is programmed to seek the optimal solution. It is programmed to measure the optimum in such terms as would not distinguish between one human object and another, or between human and inhuman objects. What matters is the efficiency and lowering of costs of their processing."[61] To the extent that science achieved its aim of becoming "value-free," it became, in the process, "morally blind and speechless," replacing the previous authority of religion and ethics with a "cult of rationality."[62] The technological instruments it spawned—grounded in calculation, bureaucracy, and distantiation—were unable to prevent the crimes of the state and, instead, became complicit with them. Today, we are, once again, living in a moment in which science, in concert with industry and big tech, sometimes claims (quite dubiously and erroneously) that algorithms are objective or that rationalist calculations are value-free, even as AI reshapes the idea of the human. The risk of technology becoming morally blind, speechless, and complicit is still very much with us.

We must thus urgently ask: How can we use technology without replicating the violence of objectivist logics? How can computation and algorithms be morally engaged and able to speak in ways that humanize others, serve to bear witness to past crimes, and help inform reparative approaches to historical injustices? As we endeavor to answer these questions, Bauman may have given us an indication of a possible way forward that is not an either-or choice. In his Amalfi Prize Lecture of 1990, he concludes by citing the admonitions of computer scientist Joseph Weizenbaum and calling for "a new ethics, an ethics of distance and distant consequences, an ethics commensurable with the uncannily extended spatial and temporal range of the effects of technological action."[63] Although Bauman does not give any further explanation of what this may entail, he helps us identify the problem in a way that offers a sense of possibilities: "a new ethics" would have to be responsive to distance and address how technologies of distance enable new kinds of actions, mediations, and responsibilities. As we will see, an ethics of distant witnessing goes hand-in-hand with the need to imagine an ethics of the algorithm.

As technologies of calculation, decision-making, and prediction, algorithms are all too often disassociated from human experiences of time, space, and intersubjective relationality precisely because they can be deployed anywhere, at any time, and in virtually any context. Far from being outside of history and society, algorithms and, more broadly, computational methods and quantitative thinking, need to be understood as deeply embedded, culturally contingent forms of power with a dialectical potential to humanize as well as dehumanize. They give rise to ways of knowing the world and constituting realities that could be—and, we argue, *should be*—yoked to an ethical framework enabled by human judgment and guided by values that are life-affirming. If there is to be a new ethics, human judgment must not be relinquished, overcome, or outsourced to algorithmic forms of decision-making. Instead, algorithms can function as heuristics with which to discover, devise, investigate, invent, compose, reflect, and, ultimately, humanize—provided algorithmic decision-making is guided by ethics as its first priority. Concretely, this means fostering human dignity, plurality, attentiveness, and care.

It would not be an exaggeration to say that we are in the midst of a paradigm shift in which digital technologies, algorithmic processes, and computational tools will soon mediate and structure our access to and knowledge of all historical events, not just the Holocaust, and to the dead more generally. What might it mean to bring together a new epistemology—guided and informed by algorithms—for the creation and analysis of testimony, on the one hand, and an ethics—guided and informed by testimony—for the development and deployment of algorithms,

on the other? The risks and dangers of datafication, the logic of objectivism, and instrumental reason loom large and have deep historical roots. Throughout this book, we will confront them dialectically, demonstrating both the humanizing possibilities and the dehumanizing perils of technology. If there is to be an ethics of testimony after the passing of the generation of eyewitnesses, it will be constituted, we argue, by forms of distant witnessing guided by what we are calling an ethics of the algorithm. And so, it is with algorithms that we must begin.

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