

Viktoria Brüggemann, Mark-Jan Bludau, Sarah Kreiseler, Silvia Casavola, Jona Pomerance and Marian Dörk

## Granularities of Dispersion and Materiality. Visualizing a Photo Archive about the Jewish Diaspora

*Bedeutungsvolle und sensible digitale Darstellungen für kulturelle Sammlungen zu finden, erfordert eine umsichtige Umsetzung und Zusammenarbeit, von der Datenmodellierung und Katalogisierung bis zur Ideenfindung und Entwicklung von Prototypen. In unserem Beitrag berichten wir von unserer designorientierten Forschung, die sich mit der Visualisierung eines Fotoarchivs über die jüdische Diaspora befasst. Mit dem Ziel, eine Webplattform zu schaffen, die vielfältige explorative und narrative Erlebnisse bietet, reflektieren wir die Verwendung digitaler und analoger Methoden für visuelle Sammlungen, insbesondere für eine Sammlung des jüdischen Kulturerbes.*

*Finding evocative and sensitive digital representations for cultural heritage collections requires careful implementation and collaboration, encompassing data modeling, cataloging, ideation and prototyping. In this article, we present design-oriented research focused on visualizing a photo archive about the Jewish diaspora. Our aim is to create a web platform that offers multiple exploratory and narrative experiences. We reflect on our approach, which involves both digital and analog methods, emphasizing the affordances of visual cultural heritage and the unique characteristics of a Jewish heritage collection.*

Capturing the Jewish diaspora through photography encompasses a multitude of impressions, questions, personal narratives and potential interpretations of the resulting images – especially when sharing this work with a wide audience online. Philosopher Daniel Boyarin and anthropologist Jonathan Boyarin explain that diaspora refers not only to physical dispersion across regions and nations but also to the cultural, emotional and symbolic dimensions of belonging, rupture and continuity. Rather than a singular trajectory, diaspora entails a multiplicity of lived experiences shaped by exile, adaptation and reinterpretation over time.<sup>1</sup> In the research project *Granularities of Dispersion and Materiality – Visualizing a Photo Archive about the Jewish Diaspora (GraDiM)*, we are developing concepts for visualizing Frédéric Brenner’s photo archive, which documents the Jewish diaspora over 40 years and across more than 40 countries. This archive contains about 100,000 analog and digital photographs, along with their contact sheets, publications, diaries and additional visual, textual and audio materials. The defining theme of the archive – the dispersed nature of the Jewish diaspora – guides our approach. The term “granularity” in information design refers to the scale and level of detail chosen

<sup>1</sup> Boyarin, Daniel / Boyarin, Jonathan: Diaspora: Generation and the Ground of Jewish Identity, in: Critical Inquiry 19(4) (1993), pp. 693–725.

to represent a dataset. In the context of GraDiM, this encompasses multiple facets: overlapping hierarchies and chronologies, such as the processes of photographing, development and image selection as well as design challenges in data representation and conceptual questions about how to narrate the collective story of a people alongside the individual stories of those photographed.

The archive has been digitized and cataloged with corresponding metadata for the first time and in close collaboration with Frédéric Brenner. This process has added titles, descriptions, locations and names to the photographs. Additionally, over 120 religious and cultural keywords related to rituals, practices and culturally significant objects have been included. Regarding Jewish studies, the archive's temporal and geographical scope, along with its initial publication and visualization, offers various research opportunities concerning Jewish life in the diaspora. The archive promises new ways to interrogate Jewish dispersion, memory and continuity through a visual and computational lens. The intersection of digital methods with Jewish cultural history invites reconsideration of what constitutes a Jewish archive, how dispersion is represented across media and how interfaces might mediate relationships between past and present. Ultimately, the archive will be accessible through a web platform that provides multiple exploratory and narrative experiences. While many visualization techniques offer distant aggregate overviews of abstracted data, few preserve the unique visual character of a collection, bridging distant perspectives on numerous photos with close-up views of individual images. Our interdisciplinary research focuses on designing, prototyping and evaluating visualization and interaction techniques that enable meaningful and comprehensible movements between different levels of granularities with regard to semantics, relations, hierarchies, photographic processes and visual elements.

In this article, we reflect on our research and design process, beginning with an introduction to the Frédéric Brenner archive. As our project navigates the intersections of Jewish studies, digital humanities, visual culture and human-computer interaction, we subsequently present the main research threads and questions, followed by the outcomes of a co-creative ideation process. We hope this article stimulates a debate about the use of both digital and analog methods for studying and designing visual cultural heritage collections. Our aim is to ensure that we do not become overwhelmed by the seemingly endless possibilities offered by digital tools but instead remain committed to the aesthetics, materiality and significance of cultural collections.

## **Digitizing a photo archive about the Jewish diaspora**

In this section, we outline the characteristics of Frédéric Brenner's work and elaborate on the key questions related to visualization and storytelling. The decision to work with Brenner's archive was shaped by its exceptional qualities: It is an artistic and historical work created by a Jewish photographer, focusing on Jewish individuals and communities across generations and geographies. While the subjects are scattered around the globe, the archive unites them in a singular constellation, enabling reflection on Jewish life as both fragmented and interconnected. This unique assemblage provides rich ground for Jewish historical inquiry – not only by tracing changes in practices, appearances and

affiliations, but also by capturing moments of intimacy and cultural negotiation that are often overlooked in traditional historiography.

In addition to showcasing the materiality of the photographs and the selection processes involved in Brenner's work, the subject of the Jewish diaspora raises important questions regarding dispersion and fragmentation. These include inquiries into the stories that the photographs can convey about the depicted individuals, themes of exile and home as well as notions of otherness and similarity. Such questions become particularly evident when incorporating metadata that meaningfully connect the photos without imposing or constraining certain interpretations. We report on the digitization and cataloging process, detailing the automated and manual methods and workflows we have tested and employed. Our central ambition is to reveal the richness and depth of the archive by developing visual and analytical instruments that reflect its complexity without reducing the data in favor of uniformity or clarity.

## The Frédéric Brenner archive

Over his photographic journey spanning more than four decades, Frédéric Brenner has explored the multiple expressions of life in the diaspora, creating a large and comprehensive visual archive of the Jewish people from the late 20th century into the 21st century. The archive includes over 100,000 black-and-white and color negatives, 4,688 contact sheets, 50 diaries, publications, exhibition catalogs and additional video and audio materials. While the primary focus is on portraits, Brenner's photographic style shifts between documentary and artistic approaches, encompassing a broad range of other motifs, such as landscapes, group photos and self-portraits. He differentiates three main periods in his work, characterized by photography as 1) an ethnographic journey, 2) the production of tableaux vivants and 3) a search for intimacy.



*Figure 1: From left to right, "Lewi Faez studying in his grandfather's jewelry workshop, El Hajar, Haidan, Yemen, 1983"; "Marranos celebrating Passover in secret, Belmonte, Portugal, 1988"; "Sam Profettas, Mois Amir, Avraham Robissa, Baruch Sevi, Salonika, Greece, 1991."*

In his project *Diaspora: Homelands in Exile*, Brenner portrayed the unique lives and identities of Jewish people in over 40 countries, including among others Israel, the USSR, India, Morocco, Yemen, Cuba, Ethiopia and the USA. The project began in 1978 and culminated in a publication of the same name in 2003. The essence of the project, situated

at the intersection of ethnographic research and artistic practice, is best summarized by Brenner himself:

When I started out, my project was almost ethnographic in nature, if not in intent. But the more I progressed, the more I was forced to abandon the myth of ‘one people.’ I was searching for what I believed in, continuity. I found only discontinuity. Looking for oneness, I only found disparity and otherness. And the more Jews I met, the less I understood what a Jew looks like.<sup>2</sup>

Brenner’s reflection resonates with recent discussions in Jewish studies that emphasize the discontinuities, ambiguities and pluralities of diasporic identity.<sup>3</sup> Instead of documenting a unified Jewish diaspora, Brenner’s photographs challenge viewers to grapple with the layered and often contradictory dimensions of Jewishness in a global, shifting landscape. The photo archive exhibits a broad diversity within the diaspora and highlights the tensions between exile and a (projected) home. The photographs offer glimpses into various countries, cultures, family dynamics and religious practices, some of which depict communities that have since disappeared. Several families are portrayed at different points in time, illustrating processes of family growth, migration and adaptation. However, this context is not always immediately retrievable for viewers, as the titles and descriptions in previous publications or exhibitions have often been kept simple and succinct, typically consisting of only a place and a year (see Figs. 1–3 for examples from different periods along with their originally published titles).

The second period is characterized by large installations that resemble tableaux vivants due to their staging. This is best demonstrated by an installation on Ellis Island from 1996 (see Fig. 2), featuring photos of prominent American Jews such as Ruth Bader Ginsburg, Steven Spielberg, Ralph Lauren and Barbra Streisand, each presented in a golden ornamented frame. This so-called “icon series” is one of many that explores the disparate experiences of Jewish individuals in the USA, also portraying Jewish fur traders in Alaska and a Passover celebration in a women’s prison.



*Figure 2: “Installation, Ellis Island, New York, USA, 1996.”*

<sup>2</sup> Brenner, Frédéric: Diaspora: Homelands in Exile, online at: <http://www.fredericbrenner.com/diaspora-homelands-in-exile/> [April 2, 2025].

<sup>3</sup> Ratskoff, Ben: Rethinking Jewish Diaspora: On Analogy, Translation, and Abjection, in: *The Funambulist* (2022), online at: <https://thefunambulist.net/magazine/diasporas/rethinking-jewish-diaspora-on-analogy-translation-and-abjection> [April 3, 2025].

The icon series was published in *Diaspora: Homelands in Exile*, with some of the accompanying photos contextualized through associated texts in a separate publication called *Voices*. This publication features written passages by philosophers, historians, poets, the individuals portrayed and Brenner. These passages represent the conversations and controversies surrounding the topic of diaspora that Brenner and others have engaged in, prompted by the photographs. For instance, the photo of the installation on Ellis Island is accompanied by a question answered by some of the participants: “What are your hopes, as a Jew, for America as we enter the new millennium?” – ‘Hope is an illusion; as to the future; let’s take it one day at a time’ – Richard Serra, sculptor.”<sup>4</sup> In other cases, the publication narrates how Brenner came to meet the individuals he photographed; at times, the texts offer interpretations of a visual, conceptual or historical nature. However, not all photographs are discussed in *Voices*, and when they are, their interpretations often remain fragmentary. As Tsvi Blanchard notes in the introduction:

‘Voices’ reminds us that nothing in Brenner’s photographs should be fixed or finished; its commentaries deny us the comfort of a single intellectual ‘take.’ [...] The printed passages counteract the seemingly static and instantaneous nature of photography by making it part of an ongoing and evolving conversation through time and space.<sup>5</sup>

In his latest project, *Zerheilt*, Brenner sought to capture intimate encounters through photography, focusing on Berlin as a “stage for a vast spectrum of expressions and performances of Jewishness.”<sup>6</sup> Reflecting on the city’s evolving Jewish population – comprising Eastern European Jews, relocated Israeli Jews, or German Christian converts – Brenner elaborates on the title of his work:

Moreover, Jewishness is being staged and celebrated everywhere, from theater to klezmer to Jewish cooking, but this ‘Jewish revival’ often feels less like an act of healing than some novel form of disfigurement – to put it in the words of the poet Paul Celan: ‘Sie haben mich zerheilt!’ (They have healed me to pieces!).<sup>7</sup>

In the accompanying book publication of the same name as well as in the central exhibition at the Jewish Museum Berlin the photos of *Zerheilt* were not accompanied by titles or descriptions. Rather, a “chorus” ran alongside the photos, offering fragments from conversations between Brenner and the photographed individuals as well as excerpts from readings or texts in the public sphere. For instance, the chorus for the first photo from the left in Fig. 3 includes:

entertainment disenchantment de integration deterritorialized immigrant  
disfigured disintegration erlösung f for fake façade inconsolable nineveh non  
negotiable sehnsucht self destruction too much love topographie verfremdung  
vergangenheitsbewältigung ubu roi zerheilt.<sup>8</sup>

<sup>4</sup> Brenner, Frédéric: *Diaspora: Homelands in Exile*. New York 2003, p. 95.

<sup>5</sup> Brenner, *Diaspora*, 2003, p. ix.

<sup>6</sup> Jüdisches Museum Berlin: Frédéric Brenner – *Zerheilt: Healed to pieces*, online at: <https://www.jmberlin.de/en/exhibition-zerheilt> [January 10, 2025].

<sup>7</sup> Brenner, Frédéric: Without the Leaves, I Would not Have Started, in: Brenner, Frédéric / Myers, Oren (ed.): *Zerheilt*. Berlin 2021, n. pag.

<sup>8</sup> Brenner / Myers: *Zerheilt*. Berlin 2021, n. pag.



Figure 3: Excerpts from *Zerheilt*, untitled, 2021.

Naturally, a description and analysis of this vast photographic archive can only remain fragmentary. Frédéric Brenner's work raises questions about Jewish identity, otherness, disparity, the life circumstances of the depicted individuals and the sovereignty of interpreting these questions. Rather than serving merely as a case study for data visualization, Brenner's archive must be understood as a significant cultural and artistic project in its own right. His body of work contributes to a long-standing tradition of Jewish visual storytelling, one that spans from illustrated manuscripts to post-war documentary photography. At the same time, his approach is deeply contemporary, engaging with questions of memory, representation and alterity that resonate across disciplines. In this sense, Brenner's photographs do not simply depict Jewish life – they provoke viewers to rethink what Jewishness means today, inviting a mode of engagement that is as introspective as it is analytical. Although his perspective is undeniably present in his photography, by revisiting his work and making it available in its entirety to a broad public, Brenner hopes to facilitate a dialogue among and within people, enabling a journey of self-exploration through multiplicity. Similarly, the aim of the GraDiM project is to create a platform that allows for multiple perspectives on the photographs. However, it has been important for Brenner to leave certain aspects unsaid – such as omitting titles for his photographs – resulting in a positive tension between adding metadata, definitions and stories to the archive and preserving multiplicity and ambiguity. Close collaboration with the photographer, careful study of the archive's diverse assets and the inclusion of varied perspectives through workshops are thus central pillars of the project.

## Digitization and cataloging

Digitizing cultural collections involves producing metadata – either manually or with the assistance of machine learning – that facilitate searching, browsing and exploring these collections. This typically includes titles and descriptions, information about the artist, the time and place of the artwork, keywords and more. Despite the high demand for semantic linking within collections and interconnections with other archives, metadata conventions for photographic collections remain limited.<sup>9</sup> Variations in archival and museum practices as well as software have resulted in a variety of ontologies, reference systems and categorization schemes. Additionally, differing cataloging

<sup>9</sup> Daquino, Marilena / Mambelli, Francesca / Peroni, Silvio et al.: Enhancing Semantic Expressivity in the Cultural Heritage Domain: Exposing the Zeri Photo Archive as Linked Open Data, in: *Journal on Computing and Cultural Heritage* 10/4, 2017, pp. 1–21.

principles are evident when comparing Jewish heritage collections, which further influences the aspects of culture that are accessible to a certain (informed) public.<sup>10</sup>

Computational methods are increasingly employed to explore the growing pool of digitized cultural objects, moving beyond the traditional reliance on search bars and thumbnail lists.<sup>11</sup> In the context of analyzing photographic collections, the techniques employed thus far for pattern recognition as well as models trained on image data for motif recognition, text linking and relation extraction<sup>12</sup> present both promising opportunities and significant concerns. Computational image analysis that incorporates machine learning raises serious ethical issues related to biases, discrimination and the potential misuse of algorithmic and data-driven methods,<sup>13</sup> especially in the realm of portrait photography, which can lead to inferences about sensitive personal information, such as religious beliefs. Nevertheless, multimodal large language models are especially relevant and efficient for generating keywords or image embeddings within extensive visual collections, albeit with certain restrictions, additions and corrections provided by human oversight.<sup>14</sup> Striking a balance between the possibilities of automatic methods – which may struggle to classify cultural objects in their depth – and the time-consuming, often non-linkable manual and custom approaches remains a challenge in producing meaningful metadata for cultural heritage collections.

One aim of the research collaboration with Frédéric Brenner has been to digitize, catalog and subsequently publish the entire archive to make it accessible to the public. In addition to the analog and digital photographs, this effort includes their contact sheets (see Fig. 4, left) and diaries authored by Frédéric Brenner (see Fig. 4, center). The aforementioned publications can also serve as valuable resources for cataloging and storytelling. The digitization of the photographs, contact sheets and diaries was completed by an external company in late 2023. Simultaneously, Frédéric Brenner and a team of catalogers, together with UCLAB,<sup>15</sup> began exploring options for cataloging to add metadata to the photographs, such as titles, descriptions, locations and dates. It is important to note that while this approach may differ from previous presentations of Brenner's work, it enables long-term and structured preservation (the Frédéric Brenner archive is preserved by the National Library of Israel) and allows for the development of

<sup>10</sup> Kizhner, Inna / Terras, Melissa / Afanasieva, Julia et al.: The Culture of the Very Rich and Very Poor: Do Digital Museum Collections Tell Us Anything about Jewish Culture?, in: *Jewish Studies in the Digital Age* (2022), pp. 43–64.

<sup>11</sup> Windhager, Florian / Federico, Paolo / Schreder, Günther et al.: Visualization of Cultural Heritage Collection Data: State of the Art and Future Challenges, in: *IEEE Transactions on Visualization and Computer Graphics* 25 (2019), pp. 2311–2330.

<sup>12</sup> See for instance Kolesnikov, Alexander / Beyer, Lucas / Zhai, Xiaohua et al.: Big Transfer (BiT): General Visual Representation Learning (2020), online at <https://arxiv.org/abs/1912.11370> [December 20, 2024]; Radford, Alec / Kim, Jong Wook / Hallacy, Chris et al.: Learning Transferable Visual Models From Natural Language Supervision (2021), online at <https://arxiv.org/abs/2103.00020> [December 20, 2024]; van der Corput, Paul / van Wijk, Jarke J.: Comparing Personal Image Collections with PICTuReVis. In: *Computer Graphics Forum* 36 (2017), pp. 295–304.

<sup>13</sup> See, for example, Hepworth, Katherine / Church, Christopher: Racism in the Machine: Visualization Ethics in Digital Humanities Projects, in: *Digital Humanities Quarterly* 12 (2018), online at: <https://www.digitalhumanities.org/dhq/vol/12/4/000408/000408.html> [December 20, 2024]; Kizhner, Inna / Terras, Melissa / Rumyantsev, Maxim et al.: Digital Cultural Colonialism: Measuring Bias in Aggregated Digitized Content Held in Google Arts and Culture, in: *Digital Scholarship in the Humanities* 36 (2021), pp. 607–640.

<sup>14</sup> Arnold, Taylor / Tilton, Lauren: Explainable Search and Discovery of Visual Cultural Heritage Collections with Multimodal Large Language Models, in: *Proceedings of the CHR 2024: Computational Humanities Research Conference* (2024), preprint, online at: <https://arxiv.org/pdf/2411.04663v1> [December 20, 2024].

<sup>15</sup> Urban Complexity Lab at the University of Applied Sciences Potsdam: <https://uclab.fh-potsdam.de> [March 6, 2025].



connections and narratives throughout his body of work. Embedded within a Jewish heritage collection, the metadata demand careful curation and handling, as it may contain interpretations or ambiguities as well as personal information about the depicted individuals.



*Figure 4: Contact sheets, diaries and image series reveal selection and production processes.*

After testing multiple approaches, including cataloging in Google Sheets, the photo platform Pics.io was selected for cataloging the photographs. It was chosen primarily for its user-friendly interface, which catered to the needs of catalogers working from various countries and facilitated close engagement with the photos. Additionally, it allowed for batch edits, enabling the breakdown of a total of 100,000 photos into approximately 18,000 image series of similar motifs (see Fig. 4, right). Over a period of 1.5 years, about 30 catalogers, with varying levels of involvement, worked together with Frédéric Brenner to assign dates, locations and names of depicted individuals. This effort resulted in approximately 1,000 named locations, ranging from monuments to street names to cities, and more than 1,200 named individuals. Brenner also crafted titles and descriptions for the photographs. Other data, some of which are automatically extracted, include technical specifications (e.g., camera model, film type and exposure time) and the subject matter of the photograph (e.g., portrait, landscape and architecture).

Subsequently, the digitized photographs and metadata were imported into the open-source database Omeka S, a web-publishing platform specifically designed for cultural heritage collections. This platform has the capability to produce linked open data and export and import structured data, such as CSV files. Within Omeka S, the data are further complemented with Wikidata IDs, aiming to obtain names of places or individuals in other languages, descriptions of certain events or cultural terms, geo-coordinates of locations and more. It is important to note that despite these great possibilities, some information from Wikidata may remain fragmentary or even questionable, particularly regarding disputed borders or cities that have undergone name changes since Brenner's visit. For provenance reasons, Wikidata information is always annotated with its source to distinguish between manually cataloged information and automatically extracted data from external origins.

Additionally, keywords that enable connections between the photographs have been added to the database, particularly focusing on cultural and religious aspects. On a visual level, we have tested the automatic extraction of image content (e.g., photographs showing people, animals or certain objects) via machine learning and a Python toolkit.<sup>16</sup>

<sup>16</sup> Arnold, Taylor / Tilton, Lauren: Distant Viewing Toolkit, 2019. Online at: <https://github.com/distant-viewing/dvt> [January 12, 2024].



While the results were promising, they still require careful curation and manual correction. In addition to the general concerns associated with machine learning, conceptual relevance questions arose: What relationships do we specifically wish to show? It is paramount to remain true to the cultural significance of Brenner's work; a superficial visual description and mere linking of observable elements in the photographs do not adequately honor them. For example, a machine learning system might detect a book as an object in the photographs but fail to recognize that it is the Torah, which would provide viewers with an important key for interpretation. The same issue applies to existing vocabularies frequently used for cataloging in the Digital Humanities, such as the Art & Architecture Thesaurus created by the Getty Research Institute.<sup>17</sup> These extensive resources require careful selection and handling, and they may still overlook specific aspects.

For these reasons, Frédéric Brenner and his team manually assigned keywords, initially conducting a test run on a selection of key photographs before extending the process to all 18,000 series of photographs. During the test run, two lists of keywords were created: one for descriptive keywords, such as objects, religious celebrations and rituals, and another for intangible keywords, which represent concepts or ideas that Brenner associates with the photographs, such as "appropriation", "icon", "memory." Where possible, a Wikidata ID was assigned to include definitions for the terms. The intangible keywords reflect recurring themes for Brenner, providing insights into discussions and interpretations throughout his work. These subjective annotations aim to foster ambiguity, offering viewers a glimpse into the multiplicity and complexity of certain topics.

While the processes of digitization and cataloging may seem straightforward in their description, they have evolved organically through various iterations, tests, setbacks and refinements. The size of the archive and the number of people involved in cataloging, along with the project's broad ambitions, often complicate navigation of the technical infrastructure – both hardware and software – as well as the collaborative processes of modeling and cataloging. Striking a balance between usability for catalogers and establishing appropriate requirements for data import and export has frequently posed a challenge. Even with careful planning and coordination, the organically developed dataset may conflict with the originally planned data models, requiring refinement when merging data from different sources.

## Visual interfaces for cultural collections

While significant efforts have been made in recent years to digitize and publish cultural collections online, the presentation methods still predominantly rely on uniform grids of thumbnail images. This approach arguably fails to fully leverage the potential of digital access. This limitation is particularly pronounced in collections of visual arts and media, especially those representing minority cultures and communities, which often

<sup>17</sup> The Getty Research Institute: Art & Architecture Thesaurus Online, online at: <https://www.getty.edu/research/tools/vocabularies/aat/index.html> [March 4, 2025].

lack meaningful and sensitive metadata necessary for establishing connections between the artworks and their social and cultural contexts.

In this section, we reflect on the growing efforts to visualize the complexity and depth of cultural heritage collections. From finding visual forms for the collection to navigating between these views and staging evocative narratives within the archive, we abstract the process of building “generous interfaces for digital cultural collections.”<sup>18</sup> While this process offers many opportunities, the resulting interfaces can often feel disconnected from the complex humanistic research that inspired their creation and is intended to utilize them. Our research aims to reduce this semantic distance between the interface and the material<sup>19</sup> by incorporating and interlinking the rich visuality of the artifacts and by examining phenomena from diverse perspectives, including close and distant views.

## Close and distant views

Similar to slide projectors and contact sheets, digital image collections are often presented in the linear order afforded by slideshows and tables. Collection visualizations call for more evocative views of cultural holdings and aim to reduce the semantic distance from the source material. The goal is to strike a balance between new interfaces and fidelity to the collection’s aesthetics as well as the humanistic research questions it raises.<sup>20</sup> A defining design principle of visual interfaces prioritizes high-level access through distanced overviews.<sup>21</sup> This approach involves not only distant reading techniques based on textual data<sup>22</sup> but also distant viewing of visual corpora<sup>23</sup> and the direct plotting of image data to reveal evocative and insightful patterns.<sup>24</sup> In contrast, with photographs there is a prevailing assumption that close-ups allow viewers to grasp nuances that may be overlooked in a comprehensive view.<sup>25</sup> The material turn in art criticism has highlighted the value of materiality and the cultural agency of photo-objects,<sup>26</sup> aspects that have often been neglected in the digitization process, leading to a widespread perception of photographs as mere indices of their subjects.<sup>27</sup> In art history, the study of details and comparisons of artworks is well established, enabling attributions to certain

<sup>18</sup> Whitelaw, Mitchell: Generous Interfaces for Digital Cultural Collections, in: Digital Humanities Quarterly 9 (2015), online at: <https://www.digitalhumanities.org/dhq/vol/9/1/000205/000205.html> [December 20, 2024].

<sup>19</sup> Lamqaddam, Houda / Vande Moere, Andrew / Vanden Abeele, Vero et al.: Introducing Layers of Meaning (LoM): A Framework to Reduce Semantic Distance of Visualization, in: Humanistic Research, in: IEEE Transactions on Visualization and Computer Graphics 27 (2021), pp. 1084–1094.

<sup>20</sup> Lamqaddam et al.: Introducing Layers of Meaning, 2021.

<sup>21</sup> Shneiderman, Ben: The Eyes Have it: A Task by Data Type Taxonomy for Information Visualizations, in: Proceedings of the IEEE Symposium on Visual Languages (1996), pp. 336–363.

<sup>22</sup> Moretti, Franco: Distant Reading, London 2013.

<sup>23</sup> Arnold, Taylor / Tilton, Lauren: Distant Viewing: Analyzing Large Visual Corpora, in: Digital Scholarship in the Humanities 34 (2019), pp. 3–16.

<sup>24</sup> Crockett, Damon: Direct Visualization Techniques for the Analysis of Image Data: The Slice Histogram and the Growing Entourage Plot, in: International Journal for Digital Art History 2 (2016).

<sup>25</sup> Edwards, Elizabeth: Raw Histories: Photographs, Anthropology and Museums. Oxford, New York 2001, p. 3.

<sup>26</sup> Bärnighausen, Julia / Caraffa, Costanza / Klamm, Stefanie et al. (eds.): Photo-Objects: On the Materiality of Photographs and Photo Archives, Berlin 2019.

<sup>27</sup> Burns, Jasmine E.: The Aura of Materiality: Digital Surrogacy and the Preservation of Photographic Archives, in: Art Documentation: Journal of the Art Libraries Society of North America 36 (2017), pp. 1–8.

artists.<sup>28</sup> Nevertheless, examples of photographic visualizations that implement an interplay of detail and overviews are still rare.<sup>29</sup>

Since the advent of digital quantitative methods in the humanities, a productive tension has emerged between distant and close perspectives.<sup>30</sup> On one hand, overviews and quantitative methods promise new insights and high-level perspectives; on the other hand, they tend to emphasize commonalities while diminishing particular or extraordinary aspects. The methods and choices of aggregation, summarization and selection necessary to generate overviews or projections affect possible insights and probable interpretations.<sup>31</sup> Balancing the potential of overviews with the need for detail leads to the acknowledgment that one view can never be enough to account for the abundance of cultural objects.<sup>32</sup> Consequently, interfaces for cultural collections should facilitate shifts between overviews and details.<sup>33</sup> This highlights the need for design-oriented research to devise novel visualization techniques that bridge these modes, ensuring that the photographs retain their inherent visuality without being reduced to mere thumbnails.

## Interaction at multiple granularity levels of data

To provide access to multiple granularities, dimensions and abstraction states, interaction plays a crucial role in realizing the potential of data visualization. It facilitates “complex cognitive activities with visual representations”<sup>34</sup> that characterize actions such as filtering, navigating, collapsing / expanding and linking / unlinking. There is both a need and an ambition to devise visualization techniques that can present complex data from various perspectives in an engaging and insightful manner. This is particularly relevant for cultural collections, specifically photographic archives, which contain a multitude of images and varying levels of granularity. Within the Frédéric Brenner archive, examples of these granularities include moving from an overview of the entire archive to a series of photos on contact sheets to zoom into details in a digitized photograph.

One effective approach to accommodating data complexity is to integrate multiple perspectives through direct interactions and coupled transitions. For instance, *semantic*

<sup>28</sup> Müller-Bechtel, Susanne: Die kunstwissenschaftliche Zeichnung als Dokument der Forschungspraxis – Beobachtungen zu Möglichkeiten und Grenzen vergleichenden Sehens im 19. Jahrhundert, in: Bader, Lena / Gaier, Martin / Wolf, Falk (eds.): Vergleichendes Sehen, Munich 2010, pp. 194–207.

<sup>29</sup> Junginger, Pauline / Ostendorf, Dennis / Vissirini, Barbara Avila et al.: The Close-up Cloud: Visualizing Details of Image Collections in Dynamic Overviews, in: International Journal for Digital Art History (2020), pp. 6.2–6.13.

<sup>30</sup> Jänicke, Stefan / Franzini, Greta / Cheema, Muhammad Faisal et al.: On Close and Distant Reading in Digital Humanities: A Survey and Future Challenges, in: Eurographics Conference on Visualization (EuroVis) - STARs (2015).

<sup>31</sup> Stahnke, Julian / Dörk, Marian / Müller, Boris et al.: Probing Projections: Interaction Techniques for Interpreting Arrangements and Errors of Dimensionality Reductions, in: IEEE Transactions on Visualization and Computer Graphics 22 (2016), pp. 629–638.

<sup>32</sup> Dörk, Marian / Pietsch, Christopher / Credico, Gabriel: One View is not Enough: High-level Visualizations of a Large Cultural Collection, in: Information Design Journal 23 (2017), pp. 39–47.

<sup>33</sup> Brüggemann, Viktoria / Bludau, Mark-Jan / Dörk, Marian: Zwischen Distanz und Nähe. Formen der Betrachtung und Bewegung in (digitalen) Sammlungen, in: Geipel, Andrea / Sauter, Johannes / Hohmann, Georg (eds.): Das digitale Objekt: Zwischen Depot und Internet, Deutsches Museum Studies 7, Munich 2020, pp. 115–123.

<sup>34</sup> Sedig, Kamran / Parsons, Paul: Interaction Design for Complex Cognitive Activities with Visual Representations: A Pattern-Based Approach, in: AIS Transactions on Human-Computer Interaction 5 (2013), pp. 84–133.

*zoom* (see Fig. 5a) operates at a global abstraction level, modifying the representation by altering encoding and varying the displays of granularity.<sup>35</sup> In contrast to data operations that encompass an entire dataset, *focus+context* techniques visualize details only for a selected subset of the data while preserving their immediate surroundings within the same viewport (see Fig. 5b).<sup>36</sup> Other approaches utilize separate views – such as *overview+detail*<sup>37</sup> (see Fig. 5c) and *coordinated views*<sup>38</sup> (see Fig. 5d) – or *sequential views* (“overview first, zoom and filter, then details on demand”<sup>39</sup>) to interact with complex data at multiple granularities.

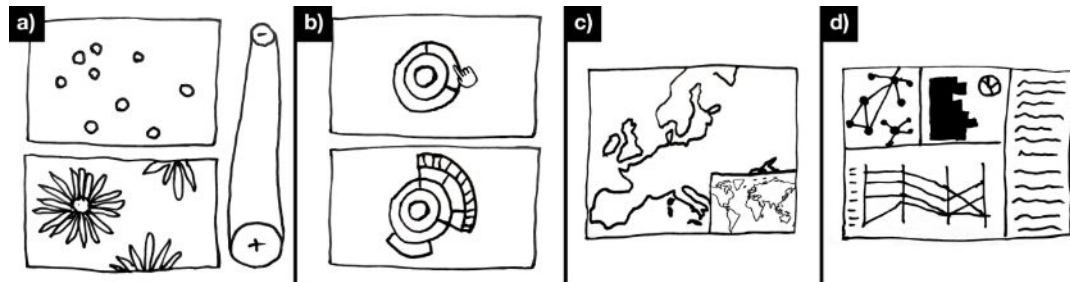


Figure 5: a) *Semantic zoom*: zooming not only scales the visualization geometrically but also increases the detail semantically; b) *Focus+context*: focusing on selected parts of a visualization adds additional information for a focused element or subset while keeping the context of the original view intact; c) *Overview+detail*: two separate views display different scales of overviews and details next to each other; d) *Coordinated views*: multiple visualizations are displayed next to each other and selecting an element in one view selects the same elements in all other views.

As these techniques require viewers to mentally bridge multiple views, which may result in additional cognitive effort, there have been attempts to devise “smoothly integrated elastic multivariate views”<sup>40</sup> to support comprehensive exploration. Design guidelines for *fluid interactions* include direct manipulation, smooth animated transitions without discontinuities, cohesive and coherent models of visual representation and open-ended interaction possibilities.<sup>41</sup> Focusing specifically on cultural collection visualizations through the lens of the fold as articulated by Gilles Deleuze, we propose a framework for deeply incorporating three essential qualities into the creation and critique of humanistic

<sup>35</sup> Perlin, Ken / Fox, David: Pad: An Alternative Approach to the Computer Interface, in: Proceedings of the 20th Annual Conference on Computer Graphics and Interactive Techniques (1993), pp. 57–64.

<sup>36</sup> Cockburn, Andy / Karlson, Amy / Bederson, Benjamin B.: A Review of Overview+Detail, Zooming, and Focus+Context Interfaces, in: ACM Comput. Surv. 41 (2009), pp. 2:1–2:31.

<sup>37</sup> Cockburn et al., A Review of Overview+Detail, 2009.

<sup>38</sup> Roberts, Jonathan C.: State of the Art: Coordinated & Multiple Views in Exploratory Visualization, in: Fifth International Conference on Coordinated and Multiple Views in Exploratory Visualization (2007), pp. 61–71.

<sup>39</sup> Shneiderman, The Eyes Have it, 1996.

<sup>40</sup> Tominski, Christian / Andrienko, Gennady / Andrienko, Natalia et al.: Toward Flexible Visual Analytics Augmented through Smooth Display Transitions, in: Visual Informatics 5 (2021), pp. 28–38.

<sup>41</sup> Elmqvist, Niklas / van de Moere, Andrew / Jetter, Hans-Christian et al.: Fluid Interaction for Information Visualization, in: Information Visualization 10 (2011), pp. 327–340.

visualizations to better account for the underlying complexity and abstraction levels of the data: coherence, elasticity and infinity.<sup>42</sup>

## Design process

In this research, we are testing possibilities for both open exploration and guided storytelling within a comprehensive and complex photo archive related to the Jewish diaspora. Our ultimate goal is to develop a web platform that features multiple interlinked data visualization experiences. To ensure that our visual representations are both appropriate and sensitive, we have integrated ethical considerations and collaborative visualization design<sup>43</sup> into our design process. This involves conducting co-design workshops with stakeholders, visualization professionals and interested laypersons and implementing their results and other ideas into our prototypes. Our concepts are also design- and data-driven, as working with large datasets requires familiarity with the data on multiple levels. In this context, computational exploration of the data can reveal broader patterns, structural phenomena and outliers. Overall, our design process is characterized by a combination of analog and digital methods, which enables us to a) engage a diverse audience in the process, b) create and document a variety of design ideas and c) critically reflect on the data and cataloging process, our prototypes and insights from different perspectives.

During the project, two co-design workshops were conducted that brought together a diverse group of participants to jointly consider pathways into the archive. Based on the workshop results, promising design directions were extracted as a basis for initial concept sketches. These directions address themes such as “multiplicity of entry points,” “storytelling vs. exploration,” “selection and serendipity,” “similarity” and “repetition” (see Fig. 6).

<sup>42</sup> Brüggemann, Viktoria / Bludau, Mark-Jan / Dörk, Marian: The Fold: Rethinking Interactivity in Data Visualization, in: Digital Humanities Quarterly 14 (2020), online at: <https://www.digitalhumanities.org/dhq/vol/14/3/000487/000487.html> [December 29, 2024].

<sup>43</sup> Ehmel, Fabian / Brüggemann, Viktoria / Dörk, Marian: Topography of Violence: Considerations for Ethical and Collaborative Visualization Design, in: Computer Graphics Forum 40 (2021), pp. 13–24.

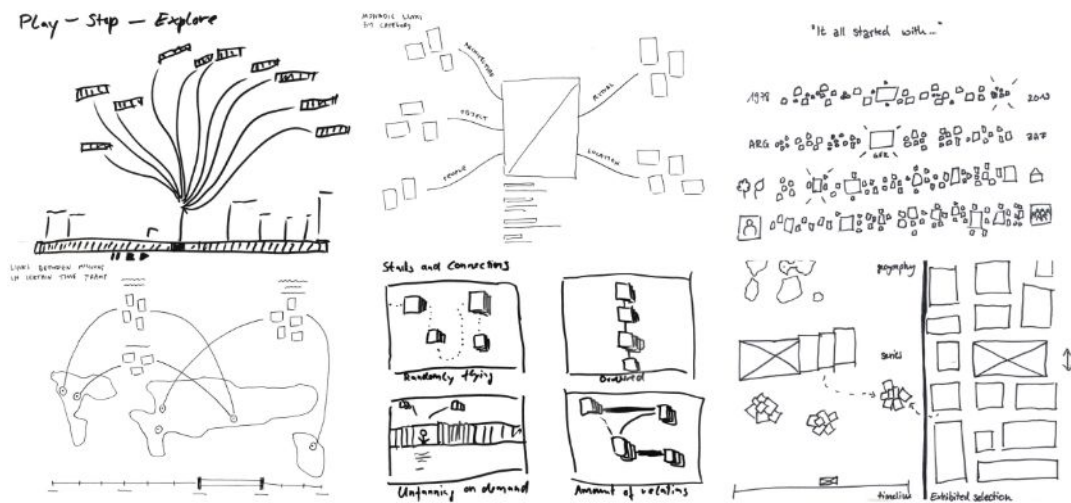


Figure 6: Sketches capturing recurring themes and translating them into initial interface design ideas.

In parallel, we adopted a visual data exploration approach by generating access points to the data through digital prototyping. For example, we arranged all photographs in a single display along a timeline. The resulting prototypes serve to evaluate concepts, explore experimental design approaches and facilitate communication with project partners. We are guided by design research that considers prototyping as a tool for knowledge production and exchange, envisioning prototypes as sandcastles that stimulate imagination through speculation.<sup>44</sup> While some prototypes were directly inspired by workshop ideas and themes, others were created to facilitate the cataloging process, generate statistical overviews for data exploration or test experimental approaches such as fragmenting images into fractal-like shapes.

The results generated during workshops, sketching sessions or prototyping, along with project reports and publications, are archived in a visual diary format, which we call *research artifacts*. This format displays a spectrum of diverse project outcomes and serves as a method to track our progress and communicate it to our collaboration partners. From an information visualization and design research perspective, a final prototype is not the only relevant outcome; rigor is derived from observing the process in relation to directions not followed.<sup>45</sup> Consequently, the research artifacts act as reminders, sources of visual inspiration and documentation throughout the project.

In the following sections, we present three prototypical outcomes in detail. These outcomes were primarily developed using web-based JavaScript frameworks and libraries such as D3.js, Vue.js and Svelte, in combination with the Omeka S application program interface (API) and Python-based Jupyter Notebooks for data analysis. Although these libraries and frameworks require coding skills and a significant investment of time for

<sup>44</sup> Hinrichs, Uta / Forlini, Stefania / Moynihan, Bridget: In Defense of Sandcastles: Research Thinking through Visualization in Digital Humanities, in: Digital Scholarship in the Humanities, Volume 34, Issue Supplement\_1 (2019), pp. i80–i99.

<sup>45</sup> Meyer, Miriah / Dykes, Jason: Criteria for Rigor in Visualization Design Study, in: IEEE transactions on visualization and computer graphics, 26(1) (2019), pp. 87–97.

implementation, they provide considerable design freedom that is beneficial for hand-crafted experimentation.

The *Animated Journey Map* (see Fig. 7) integrates a world map with a timeline. We use the sequential order and expressiveness of an animated timeline as a narrative tool to depict the story of Brenner's journey.<sup>46</sup> The aim of this approach is to provide a temporal and geographic overview of his photographic oeuvre, serving as an entry point for further exploration of the entire archive. The visualization employs automatic animations that guide viewers through time, following Brenner as he travels around the world. Simultaneously, samples of photographs from each location are visually presented. For the design, we chose a more unconventional map projection (*Transverse Mercator projection*<sup>47</sup>) that omits political borders, encouraging an uncommon perspective on the world for most viewers and evoking a subtle sense of disorientation.

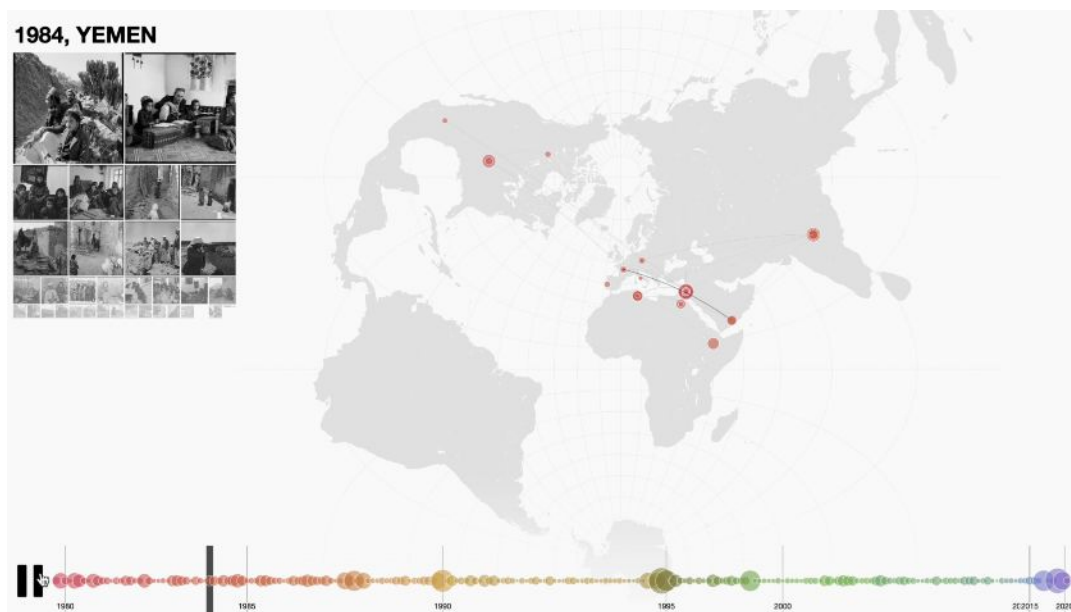


Figure 7: The animated journey map runs an animation through time and space based on a timeline (bottom) and a map (center). In the top left, previews of photographs from each country visited are shown.

When the page first loads, an animation automatically progresses chronologically through all the years, displaying previews of the photographs on the side. Each trip to a specific country is represented by a circle on the timeline and the map, with the size of the circle indicating the number of photographs taken in that location. As the timeline advances, a new circle is added to the map and a line is drawn from the previous location to the new one. The animation can be paused, and users can individually select the timeline position by dragging the slider. Hovering over a circle in the timeline or on the

<sup>46</sup> Brehmer, Matthew / Lee, Bongshin / Bach, Benjamin et al.: A Design Space and Considerations for Expressive Storytelling, in: IEEE Transactions on Visualization and Computer Graphics, vol. 23, no. 9 (2017), pp. 2151–2164.

<sup>47</sup> Snyder, John P.: Map Projections Used by the US Geological Survey (No. 1532), US Government Printing Office, Washington, DC 1982, p. 53.



map highlights visits to the same country in the timeline, allowing viewers to see when places were revisited.

In the *Monadic Wall*, we adopt a monadic exploration approach that challenges the distinction between the whole and its parts by encouraging a relational perspective.<sup>48</sup> Instead of starting from an overview or a comprehensive representation of the archive's contents, the visualization presents an individual photograph as its vantage point. To the right of this starting image, a wall of smaller images unfolds, arranged by their similarity to the initial image regarding location, date and keywords. Although the photos that comprise the wall may initially depict scenes from the same location and time, as one scrolls to the right, they gradually diverge from the starting image, revealing different places in Poland or Eastern Europe and different points in time (see Fig. 8).

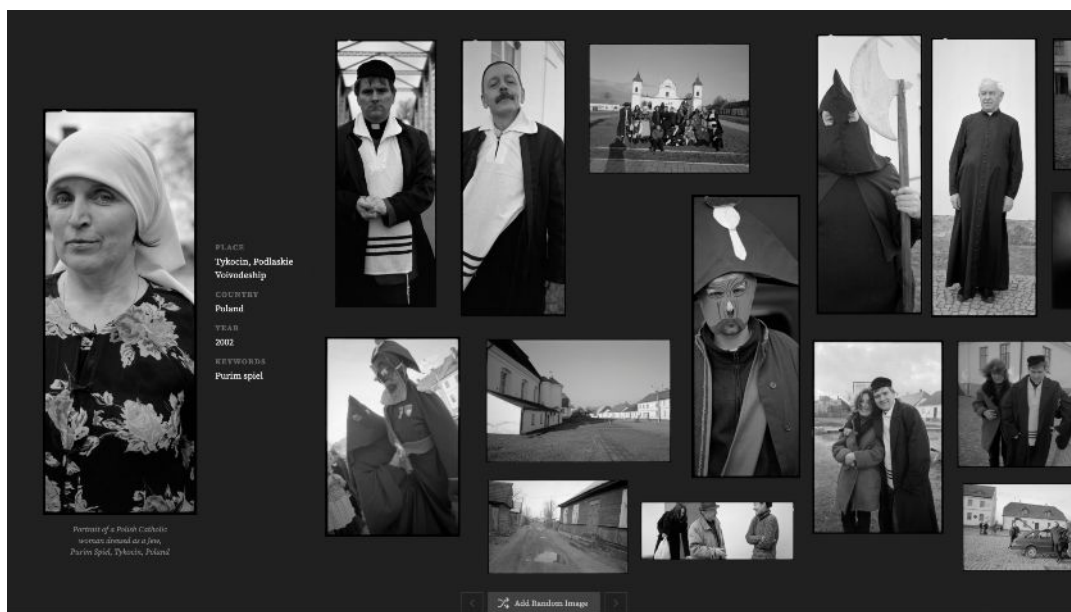


Figure 8: A large image is presented on the left, with a wall of related images unfolding to the right.

Each photograph on the Monadic Wall can be selected as a new starting image to explore the archive from its vantage point. As this process is repeated, a personalized path through the archive emerges. Scrolling to the left enables users to retrace their steps and understand the links between each pair of previously selected images. Additionally, the metadata presented next to the most recent image in the pathway can be used to refine the wall to a specific facet. For example, selecting “2002” will hide images taken in other years and focus the view solely on differences in location and keywords.

<sup>48</sup> See Latour, Bruno / Jensen, Pablo / Venturini, Tommaso et al.: “The Whole is Always Smaller than its Parts’—A Digital Test of Gabriel Tardes’ Monads,” in: *The British Journal of Sociology* 63, no. 4 (2012): pp. 590–615; Dörk, Marian / Comber, Rob / Dade-Robertson, Martyn: “Monadic Exploration: Seeing the Whole through its Parts”, in: *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (2014), pp. 1535–1544; Bludau, Mark-Jan / Dörk, Marian / Heidmann, Frank: *Relational Perspectives as Situated Visualizations of Art Collections*, in: *Digital Scholarship in the Humanities*, 36 (2021), pp. iii7–ii29.

Finally, *Stereoscopic Journals* is a concept that combines the textual material from Frédéric Brenner's diaries with accompanying photographs (see Fig. 9). After being scanned and transcribed, the photographer's personal diaries underwent close reading and design reflection. Their content corresponds to different phases of his artistic production, featuring linear and ethnographic travel accounts from earlier journeys, which later evolve into more discontinuous, graphic and abstract annotations. All the diaries are closely connected to the photographs, providing a more intimate perspective by disclosing the context, personal reflections and techniques behind them. These firsthand narratives offer valuable keys for interpretation and serve as a framework for narrative pathways throughout the archive. An interface concept was developed around them, drawing inspiration from intermedial forms of narration in both digital and printed realms, akin to the photo-novel genre<sup>49</sup> and William Burroughs' "cut-ups."<sup>50</sup>



Figure 9: The interface juxtaposes photo series (left) and diary passages (right).

The bipartite interface juxtaposes a vertical stream of photographs with a vertical stream of text. Contextual connections between text passages and photographs are marked by semantic links, represented by dots. Scrolling through one column causes the other to scroll synchronously, following the corresponding anchors. In this way, the two media types illuminate each other along a linear narrative timeline that resembles a journalistic account. A non-linear encounter can emerge from the photographs' metadata and the relevant entities (e.g., people or locations) annotated in the text. Highlighted in black, these entities act as filters that allow readers to focus on one entity at a time upon selection. The scrollbar on the right-hand side of the page also provides orientation and a diagrammatic synthesis that tracks changes in the interface.

<sup>49</sup> Baetens, Jan / Bleyen, Mieke: Photo Narrative, Sequential Photography, Photonovels, in: Grishakova, Marina / Ryan, Marie-Laure (eds.): Intermediality and Storytelling, Berlin, New York 2011, pp. 165–182.

<sup>50</sup> Robinson, Edward S.: Shift Linguals. Cut-Up Narratives from William S. Burroughs to the Present, Leiden 2011.

## Conclusion

The visualization of cultural heritage collections requires sensitivity and interdisciplinary collaboration to achieve meaningful data and visual representations. The Frédéric Brenner archive raises questions of modeling, contextualizing and narrating photographic works of the Jewish diaspora, leading to numerous facets that must be considered and bridged – in our terms, a multitude of *granularities of dispersion and materiality*. In reporting on our research and design process and presenting initial prototypes, we provide insights into various approaches for creating meaningful representations of the archive, focusing on both data structure and visual and interactive formats. In the future, we aim to integrate these and additional approaches into a platform designed to facilitate both open exploration and guided narration. Weaving storytelling into the interactive experiences will be further enhanced through an interconnected glossary of culturally, religiously and conceptually relevant terms. Additionally, we will continue to reflect on our designs and approaches through close collaboration and workshops, incorporating an evaluation process of the project outcomes that involves relevant stakeholders and audiences.

In addition to the general ambitions of digital cultural heritage, a photographic archive documenting the Jewish diaspora necessitates a careful balance between experimentation and sensitivity. This process demands a nuanced approach to data processing and interface design, blending conceptual, theoretical and practical considerations to honor the cultural and material richness of the collection. While automated approaches offer promising tools for metadata generation, ethical concerns necessitate careful human oversight to preserve not only accuracy but also cultural integrity. Cataloging workflows must navigate compromises between human effort, technical feasibility and projected utility, while personal data require careful handling. Despite these considerations, data are inherently influenced by observer-dependent considerations,<sup>51</sup> and the resulting metadata naturally entail interpretations, omissions and inaccuracies that must be conveyed to viewers. Close collaboration with stakeholders and community members is essential to ensure that the resulting designs remain authentic and respectful, fostering critical reflection. Ultimately, digital interfaces for this unique archive should integrate high-level perspectives with opportunities for intimate engagement, preserving the artistic ethos of the archive while enabling meaningful exploration.

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<sup>51</sup> Drucker, Johanna: *Humanities Approaches to Graphical Display*, in: *Digital Humanities Quarterly*, 5(1) (2011), online at: <https://www.digitalhumanities.org/dhq/vol/5/1/000091/000091.html> [March 6, 2025].

### **About the authors**

*Viktoria Brüggemann is a researcher at the UCLAB at the University of Applied Sciences (FH) Potsdam, Germany. As a digital cultural scientist, Viktoria's research interests lie in visualizing cultural heritage collections, seeking to create platforms that combine novel representations with deep cultural sensitivity.*

*Mark-Jan Bludau is a researcher at the UCLAB and a PhD student at the University of Rostock. His work focuses on fluid interaction techniques for exploratory data visualization and the visualization of cultural heritage data.*

*Sarah Kreiseler is a museum director in Lower Saxony. During her doctoral studies, she inventoried a collection of photographic art reproductions on glass plate negatives from the Museum für Kunst und Gewerbe Hamburg. Additionally, she supervised the Close-Up Cloud project, which focused on visualizing these works. Her research interests include photo-materiality, visualizing cultural collections and decolonizing collections.*

*Silvia Casavola is a communication designer who recently completed her master's degree at Politecnico di Milano. Her thesis, titled "Stereoscopic Journals: Designing Visual and Interactive Solutions for Narrative Paths Through a Digital Archive," focused on innovative approaches to digital storytelling. She has since joined the UCLAB as a designer and researcher for the GraDiM project.*

*Jona Pomerance is an interface designer and student researcher at the UCLAB. His recent work has focused on creating visualizations that enable both narrative and exploratory experiences, combining visual and auditory modalities.*

*Marian Dörk is a research professor for Information Visualization and Management at the University of Applied Sciences Potsdam. His research and teaching focus on data visualization with a particular sensitivity towards social, cultural and technological transformations. Since 2015, he has co-directed the UCLAB. His current research projects investigate how visual interfaces can bridge narration and exploration within cultural collections.*