Visualization and Critical Digital Pedagogies

Visualization and Critical Digital Pedagogies:

Insights from Anthropology and Musicology

By

Anna Apostolidou and Michalis Cholevas

Cambridge
Scholars
Publishing

Visualization and Critical Digital Pedagogies:
Insights from Anthropology and Musicology

By Anna Apostolidou and Michalis Cholevas

This book first published 2023

Cambridge Scholars Publishing

Lady Stephenson Library, Newcastle upon Tyne, NE6 2PA, UK

British Library Cataloguing in Publication Data
A catalogue record for this book is available from the British Library

ISBN (10): 1-5275-2904-5
ISBN (13): 978-1-5275-2904-5

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

LIST OF VIDEO EXAMPLES

Note that all the figures, video examples and other visual material presented in the book can be accessed by following the QR Code below, or via the site https://www.makampedia.com/visualbook.

FOREWORD

"Imagine," a journalist once wrote, "that video games were invented and popularized before books." He asks us to think of a culture where everybody is gaming; alone, with others, in clans and communities. Then, all of a sudden, written paper things called 'books' with preset storylines come along. They produce a worldwide reading frenzy that worries each and everyone. Teachers find the new 'books', to chronically under-stimulate the senses. Without music and sound, without moving images and without the complex kinesthetics of gaming, they say, books require only the use of a small part of the brains to process them. Parents, in their turn, are worried about their kids withdrawing in a corner with such a book, reading in isolation from others, immersed in their own private world. And cultural critics, so the journalist ends, claim that book reading is a form of passive cultural consumption of material made and dictated by others, resulting in the long run-in submissive mindsets of people more eager to follow what others are presenting to them than to create and direct their own story. The accumulated worries and fears about books would subsequently lead to academic research and public hearings, all concluding that writing and reading dangerously undermine the depth and width of our cognitive, aesthetic, social and democratic capacities (Johnson 2005, 19).

In the book at hand, Anna Apostolidou and Michalis Cholevas build on a similar assessment of writing as being limited in its ability to evoke, convey and maintain the wide range of human experiences they find in their respective fields of anthropology and music. Following a careful and methodical path rather than the dramatic provocation sketched above, they explore what other forms of sharing experiences they can develop for their research and teaching. One cannot help but wonder, tongue-in-cheek, if this may be a particularly Greek thing, to question the qualities of writing. The old Plato already disapproved of writing as he was afraid that it would finish the need for memory and memorizing: "as men learn to write it will implant forgetfulness in their souls." But he was similarly suspicious of painting, which he considered as much a static means of representation from which one is unlikely to learn a lot. At this point, however, our ancient and modern

Greeks part, for Anna and Michalis do believe in the merits of visual language and visualizations—especially as accelerated by digitization—for interrogating the dominant epistemologies and aesthetics of their fields which are deeply intertwined with the written word and staff notation. These favour certain kinds of knowledge and practice, they argue, while hiding and silencing others. Although this is an observation that many critical scholars dispersed through time and place have made—and Anna and Michalis discuss their arguments extensively—what makes their own work stand out, is that they go beyond these reflections and actually practice the alternatives.

Being an ethnographer, this has meant for Anna the use of visual forms to connect with research participants, amongst others through photo-voice, video-diaries or social media posts; all instruments that enable people to share their experiences in ways that match their own particular mode of expression, instead of being straightened into the written word. The radical consequence of such an approach is, evidently, that the research results need to come out of the written mold as well, and Anna has taken that cardinal next step in her project about surrogate parenthood. Recognizing that surrogacy has physical and emotional dimensions that are difficult, if not impossible to verbalize in academic writing, she developed a digital multimodal artefact, consisting of an aesthetically compelling articulation of dynamic storylines, images, poetry and interview fragments. Through this combination of artistic and anthropological methods, Anna demonstrates how productive and beautiful the intersection of arts and science can be. It leads to a more encompassing knowledge and sense of the experience of surrogacy, and more generally of the human condition. It also makes one see the connection with the work of Michalis, a performing musician and composer. For what can be further apart than a study of surrogacy and research about classical Ottoman music? Even for life-long friends, as the authors are, this seems somewhat of a stretch. Yet, there is a convincing connection in their artistic digital methods and critical mentality towards hegemonic systems of representation.

For Michalis, like for Anna, the written language of his discipline is wanting. Standard staff notation cannot capture the particular rhythms and melodic flows of the Ottoman Makam style. One therefore, conventionally, needs an ongoing face-to-face relation with a teacher, a Maestro as it were, to learn them. Concerned about the limited and decreasing numbers of such

maestros, Michalis set out to find another, less vulnerable way of examining and teaching the rich musical traditions of his field. Starting with simple audio wave representations of classical Makam pieces to thoroughly analyse their structures and drifts, he then enhanced the peculiarities of the rhythms and melodies by digitally representing them with differently-sized colours and forms. On the screen, the music thus becomes something you can hear and see, understand and learn, analyse and communicate at the same time. Michalis created, in other words, a digital convergence of different ways of knowing the music that does not require a maestro on your side. Of course, there always will be a need for human teachers, but enhanced digital representation offers them an extra, invaluable layer to their sessions and classrooms.

Undeniably, the apparent paradox to the current work of Anna and Michalis is that it is a book. For two researchers who emphasize the visual as an epistemology that has, in their research, superiority over the written, a book may seem an odd choice that contradicts their claims. But as paradoxes go, this is a justifiable tension. For starters, at the most straightforward level, the book is full of images and hyperlinks to their digital pieces. This makes it as much an 'how to do it' book, as it makes it a critical contribution to their disciplines. More pragmatically and professionally, standard academia, in which both authors find themselves, requires that one writes once in a while to convince the leadership and the colleagues that one still belongs there. But most importantly, Anna and Michalis seek to diminish the authority of the written word, as they say, but not to completely and forever do away with it. Both recognize that visualization also offers a particular dimension of knowledge, but not a comprehensive one; like sensing or performing or writing present other particular ways of knowing.

One is never able to know everything in one go or form. That seems to be the quintessence of what they talked about in thirty years of dialogue; about art, about pedagogy, about methods, curiosity, experimentation and innovation. What could be better to curate and represent such an inspiring and creative old friendship than the old medium of the book?

Liesbet van Zoonen
Professor of Cultural Sociology, Erasmus University Rotterdam
Leader of the Graduate Program for Artistic and Creative Research
of the Dutch art schools

PREFACE

The book at hand is a wormhole in time. Writing it took place during the academic year of 2022-2023 but its conception is to be traced thirty years back, when the authors first became classmates and close friends at the Experimental Music High School of Pallini in Athens, Greece. At the time the digital turn was an obscure concept, the roots of which could only be discerned in the futuristic adventure movies we used to devour in cinema theaters; nothing could have prepared us for what was to come. The pictorial turn on the other hand was then in full bloom; only it was happening so far away from us, geographically and culturally, that not even its distant echoes would be able to reach us—not until many years and several diplomas later.

Almost everything has changed in the world and in our lives since then. Many countries, research foci and collaborators have recalibrated the dynamics of our individual interests and our relationship with one another. Recently, through many twists and turns of career and personal quests we both found ourselves working in the broad field of the digital humanities. Michalis turned from performing musician and theoretical physics postgrad to the teaching of Turkish music and the development of a project about the unresearched properties and visual potentials of Makam; Anna turned from social anthropology and gender to distance learning and digital poetry and attempted to experiment with multimodal fictional ethnography. If one thing remained unchanged it was the uncompromised need to experiment with meaningful pedagogies and the consequent refusal to take any field's disciplinary conformity for granted. This was probably a positional choice largely preset by idiosyncrasy and also by our school, which fostered untamed intellectual work, carved our unorthodox paths and determined our connection with each other throughout the years. All this may seem rather unimportant; yet it remains relevant to this book to the degree that our compatibility and our seamless communication the past three decades have amounted to yet another experiment: the creation of a book that hosts our ongoing dialogue and offers the reader a bird's-eye view to our common

concerns about the grand questions as to the meaning and purpose of art, education, and the sciences that tackle the human condition.

In the spirit of interdisciplinary collaboration, endemic in the digital humanities, we have kept the orientation of the book equally open to anthropology and musicology and have situated its methodological common ground on the wider territory of ethnographic inquiry. The subtle goal of the chapters that follow seek to map out the potential for experimental approaches and emerging pedagogies and push forward the primordial dialogic quality of the humanities.

The book then tries to bring together anthropology and practice-based music research in order to illustrate the innovative potential of digital visualization of research data and to provide a concise discussion on its implications for modern-day multimodal literacies and emerging pedagogies. It constitutes a contribution to the growing field of digital humanities since it brings out the critical and analytical properties inherent in visualizing practices along with their potential for cultivating autonomous learning in the paradigm of digital and hybrid education. What is more, we wish to remedy some deeply rooted historic traditions that the sweeping productivity of contemporary academia often dismisses. Therefore, we place emphasis on systemic oblivions and erasures that stem from the dominancy of the written text and the pentagram, and we seek to correlate current educational buzzwords with concepts that originate in the anthropology of education and illuminate certain genealogies upon which the current discourse around digital education unknowingly relies. In this effort, we wish to showcase that numerous examples that reign in contemporary pedagogical discussion, such as communities of practice and apprenticeship, collaborative learning and immersive environments are not actually “new” ways of approaching the generation, construction and transmission of human knowledge.

The chapters that follow draw on two cutting-edge research projects in order to offer a discussion on the representational capacities of critical digital methodologies and offer hands-on examples of the educational application of visual-centred techniques. Even though the book adopts an interdisciplinary orientation, its limitation (which is at once one of the challenges it seeks to address) lies in the enhanced literacies required to fully grasp the potential of multimodal writing, especially in reference to two disciplinary fields that heavily rest on west modernity’s textual and

pentagram writing traditions. In elaborating on the problems and challenges raised by digital visualization, the book's intended impact rests on a re-evaluation of research and teaching practices in the humanities and the engagement of more scholars and students in critical multimodal pathways of understanding disciplinary limitations, cultural bias and practice-related problems which stem from static representation of previous historical frameworks (O'Halloran 2015; Smits and Wevers 2023).

The basic structure we have followed is that of parallel lines of inquiry. Drawing on two distinctive yet kindred research projects, this book argues that the inherently analytical components of generating visual artefacts encompass specific traits that "do justice" to the objects of study as well as to the disciplinary genealogies that accompany musicology and anthropology as critical "western" disciplines that emerged in the modern era. Presenting examples from two different sets of ethnographically-informed data, the book demonstrates how visual stimuli, audio-visual specimens and digital artefacts best portray contemporary social practices while at the same time diminishing the writing authority of musicology and ethnography. The insights offered by the book are contextualized in the backdrop of the vivid discussion on online learning, emerging pedagogies and communities of practice as learning vehicles for the twenty-first century and it provides a strong theoretical and empirical foundation for the use of visualization as an instrument for cultivating multimodal literacies, especially for younger learners.

On the one hand, based on the research project "*Makampedia*: Visual analyses of Makam performances" (2016-2021), which seeks to collect, analyse and educationally utilise ethnographically informed digital transcriptions of musical performances, the book focuses on the necessity of developing dynamic music scores that place emphasis on the idiosyncrasies of Makam performances and their graphic visualizations both as a means of deeper learning engagement as well as a historically appropriate representational vehicle. The involvement of creative, instructional and performative properties of the score are discussed in the framework of a critique of transcriptions that heavily rely on the restrictions of the pentagram and inscribed in the emerging experimental orientation of digital humanities. On the other hand, the book is grounded on the research project "Ethnography and/as hypertext fiction: Representing surrogate motherhood" (2018-2021, funded by the Hellenic Foundation for Research

and Innovation & the General Secretariat for Research and Technology), which adopts a novel phenomenological approach to the research and writing of surrogate motherhood, and it posits that the complex political dynamics and personal stories that emerge from the ethnography of surrogacy are best rendered legible via the creation of a digital fictional artefact. This experiment employs design anthropology, remix and visualization practices (Navas, Gallagher and burrough 2021) as extra-textual tropes of ethnographic "writing" and illustrates how our inquisitive and learning modalities are informed by the widespread cultivation of visualization. Along with the theoretical and epistemological discussion on digitizing knowledge, and its contribution to emerging technologies that accommodate culturally sensitive pedagogies, the book offers external hyperlinks to specific illustrative examples useful for educators and scholars alike.

Musicians, anthropologists, visual artists and practitioners in the digital humanities will find here an experimental proposition for contemporary research and teaching, one that challenges the traditional modalities of writing and teaching in the humanities, while at the same time providing a concise critique and practical recommendations for future researchers and educators. We truly hope that the following pages can be used as a set of binoculars for visualizing alternative routes and trajectories for the humanities and for education at large.

ACKNOWLEDGEMENTS

Several cities, universities, friends and colleagues have crossed paths with the book at hand—it is impossible to name them one by one.

We wish to thank Liesbet Van Zoonen, Dimitra Kokotsaki, Ara Dinkjan and Kudsi Ergüner; as well as Norman Bryson, Chris Pinney and Susanne Küchler for their contribution to the inspiration and implementation of this book in various capacities and timeframes.

For thought provoking discussions and open-ended questions, we wish to thank students and colleagues from Codarts, the University of Macedonia, the National and Kapodistrian University of Athens, Panteion University, Open Hellenic University and University College London.

We would like to acknowledge the generous support of the Hellenic Foundation for Research and Innovation & the General Secretariat for Research and Technology for funding the project "Ethnography and/as hypertext fiction" (2018-2021), as well as the Codarts University of the Arts for supporting the creation of "*Makampedia*" (2016-2021).

Our gratitude for their affection and nurturing presence in our lives goes to Poulheria, Christos, Nasia, Nikos, and Ariadne Choleva; Frida, Tereza and Takis Kagialis; Litsa Papadopoulou and Despoina Apostolidou.

Last but not least, we ought to thank Charlie and Rallou for teaching us devotion, companionship and true love the way only a four-legged friend can.

CHAPTER ONE

INTRODUCTION: VISUALIZATION AND PEDAGOGIES OLD AND NEW

"Visualization is a primary human capacity;
one we take so much for granted that we forget how extraordinary it is."
Oliver Sacks

Looking back

In her inspiring essay "Aesthetics and Anaesthetics: Walter Benjamin's Artwork Essay Reconsidered", Susan Buck-Morss (1992) explores the relationship between aesthetics and anesthesia in the context of visual culture and argues that in contemporary society, images have become so ubiquitous and commodified that they no longer have the power to shock or disrupt our consciousness. Instead, they have become largely anesthetizing devices, producing a numbing effect that weakens our capacity for critical thought and political action. In her illuminating writing, the author argues that the visualization technologies of western modernity, such as photography and film, have the potential to both enhance and desensitize our sensory experience. On one hand, these technologies allow us to see and appreciate details and perspectives that we had never had access to before. On the other hand, they have brought about a sense of detachment or distance from the subject matter, leading to a kind of visual and often intellectual anesthesia.

Her observations, closely following Walter Benjamin's philosophical work, arose in regard to the cultural ramifications of modernity's visually immersing works of art. To explain the shift from aesthetics to anesthesia

Buck-Morss draws on Benjamin's concept of the "aura" as the unique, irreproducible quality that a work of art possesses by virtue of its history and materiality. It is what gives a work of art its power to affect us, to inspire awe or wonder, repulsion or discomfort. But in the age of mechanical reproduction, Benjamin posits, the aura has been eroded, as images can be infinitely replicated and distributed without losing their fidelity. This has led to a culture of mass-produced images that lack the power to move or provoke us.

Fig. 1-1. The camera as a trigger of new visual technologies in the twentieth century

Buck-Morss suggests that the key to avoiding this numbness, which is by now construed as endemic to contemporary culture, is to approach visual media with a critical and reflective attitude. She highlights the importance of alertness, reflexivity and critical thinking in our engagement with the technologies of vision as one possible way out of a sensorial and political impasse. As she argues, by approaching images with an open and reflective attitude, we can deepen our aesthetic experience and avoid the numbing effects of anesthesia. Rather than simply accepting what we see at face value, we need to actively question and interpret the images we encounter. Only by engaging with visual media in this way, can we both appreciate their aesthetic qualities and avoid the numbing effects of anesthesia that

followed the massive proliferation of images at the turn of the twentieth century (Figure 1-1).

How then is this pondering relevant to digital visualization in the humanities one century later? Buck-Morss's principal contribution is that she demonstrated how the anesthetization of visual culture has serious political consequences, as it turns viewers into passive consumers of images rather than active participants in a democratic society. Responding to her call for a renewed engagement with aesthetics, we have decided in this book to offer an array of academic practices that recognize and actively engage with the power of images to shape our perception and understanding of the world. This complex task requires a shift away from the passive consumption of images—both "popular" and "academic"—and towards a committed interrogation of the ways in which images are manufactured, received and circulated. It also entails, in our view, an active involvement in the production of images, a participation in the very process of their crafting and circulation. What is more, it encompasses the defense of research-grounded visual representation as an analytical and political vehicle vis-à-vis the generalized cultural numbness that results from the dominancy of the commodified image and the computer-generated visualized analytics that permeate everyday perception. As participants in the shaping of digital humanities it is not enough to consume images, to reflect on them, to interrogate and discuss them in various contexts. Eschewing the effects of anesthesia requires a creative and generative drive to crafting visualizations and offering critical spectacles that constitute viable alternatives to the written word or the visually all-consuming environments of advertisement, gaming, cinema and virtual reality. Our parallel fields of work, presented herein, address this vital need and focus on ethnography-based examples from our own practice in order to discuss the cultural, educational and cognitive repercussions of our digitally mediated visual worlds.

Visualization and learning after the digital turn

When faced with the term "digital turn" we usually think about the widespread adoption and integration of digital technology into various aspects of human society, including communication, commerce, entertainment, and education. On the surface, the definition represents a shift from analogue and physical means of information processing and

storage to digital and virtual ones, enabled by advances in computing power and connectivity infrastructures. The digital turn has indeed transformed many industries and everyday activities, creating new opportunities and challenges for individuals, businesses, and governments (Westera 2012). Among its effects, such as connectivity, ubiquity, disruption of traditional industries and data-driven culture (Ruckenstein and Pantzar 2015), the digital turn is accompanied by a new politics of seeing, one that is strongly characterized by data visualization. Data visualization, with its foundations rooted in statistics, psychology, and computer science, offers practitioners in many fields a coherent way to share findings from original research, big data, learning analytics, and an examination on the role of data graphics in decision-making, sharing information, and propelling future research (Sosulski 2018). On a more profound level, however, this turn has brought about deep transformations that speak to the heart of the humanities, affecting issues of intellectual labour, authorship, production and dissemination of knowledge, greatly affecting emerging literacies and writing modalities alike (Collins 1995). Both music education (Camlin and Lisboa 2021; Rao and Meer 2013; Meer and Rao 2021) and anthropology (Underberg and Zorn 2013; Miller and Horst 2020) have identified the immediate consequences of the digital turn but the long-term implications of such a paradigm shift for our knowledge cultures have yet to be documented (Figure 1-2).

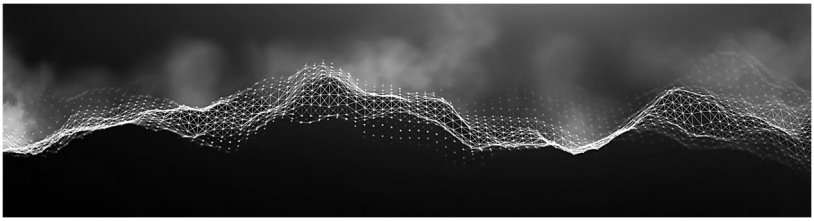

Fig. 1-2. Example of visualization of sound wavelength

One of the major ramifications of this shift entails the visualization practices in education that have grown increasingly important in the twenty-first century, as the amount of data available to us continues to grow and the need to communicate complex information to increasingly wider audiences and groups of learners becomes more pressing. These practices make their

appearance in diverse contexts of formal and non-formal education, including data categorization, virtual and augmented reality, design practices in the humanities as well as an array of visual storytelling techniques in physical and online classrooms. Especially with the proliferation of big data, data visualization has become an essential tool for understanding and communicating complex information within education and towards wider audiences. Tools like Tableau, D3.js, and Excel are used by businesses, researchers, and educators to create interactive visualizations that help people make sense of data, thus forging a whole new understanding of representing and acknowledging data as cultural artefacts and underlying the productive character of human knowledge. Influenced by the culture of consuming the news the past decades, infographics have also been recently established as a popular form of data visualization that uses visual elements like charts, graphs, and images to communicate complex information quickly and effectively. These are often used in journalism, marketing, and education with the pretext that they convey information in a visually appealing way and render complex information more accessible in a creative way. In addition, virtual and augmented reality technologies are being used more and more in education to create immersive learning experiences, including simulations and visualizations that allow students to explore complex concepts and ideas in a more interactive way (Figure 1-3). Popular techniques, such as visual storytelling use images, videos, and other visual elements to convey a narrative and push educators to recognize the power of storytelling to engage students and help them retain information. Overall, digital art and design have become essential skills in the twenty-first century, as more and more jobs require proficiency in design software (e.g., Photoshop, Illustrator, InDesign), allowing users to generate their own content, ranging from digital illustrations and graphics to web designs and user interfaces. Visual representation, either in the form of organized numerical data or in the form of image-centred narratives, has become so omnipresent and readily accepted, due to the ease and facilitation it appears to offer, that it has been forcefully emerging as a new dogma about truth and fact, which often obscures its subjective, biased and sometimes manipulated onset.

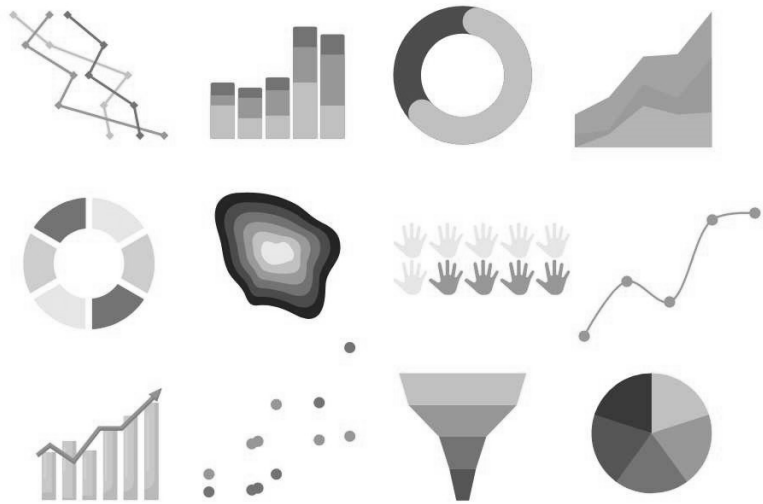

Fig. 1-3. Data visualization

Especially in the current environment of seamless learning, visualization is celebrated as a powerful tool that can support ubiquitous and networked learning by helping participants to make sense of complex information and concepts in imaginative and often ground-breaking ways. Both ubiquitous learning (i.e., learning that is available anytime and anywhere) and networked learning (i.e., learning that takes place in social networks and through collaboration with others) have been greatly impacted by visualization, as the latter helps learners to understand complex concepts and relationships by representing them in a visual format, often without the participation of an instructor. By visualizing information in this way, learners are encouraged to see patterns and relationships that might be difficult to understand through text alone (Figure 1-4).

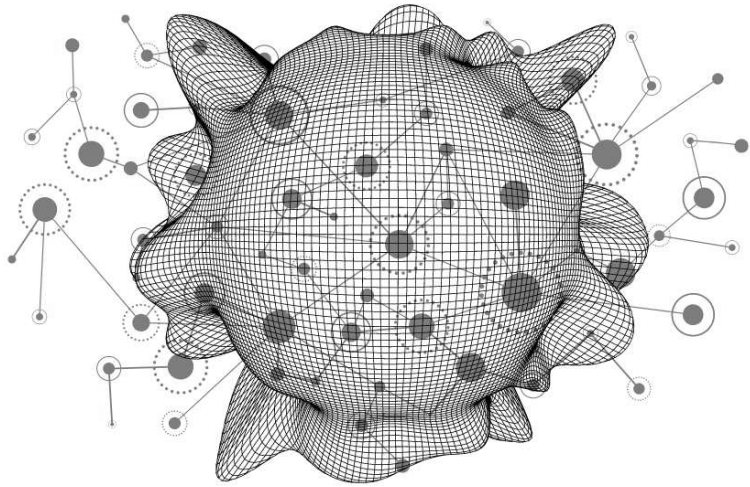

Fig. 1-4. Networked and ubiquitous learning

In a ubiquitous learning environment, visualization has been proven particularly fashionable because learners can access visual resources from anywhere, using mobile devices or other portable technologies. For example, they may use augmented reality to visualize information in their physical environment, or they may use virtual reality to explore complex systems or scenarios (Kravtsov and Pulinets 2020; Campana and Dominguez 2020). This enables learners to engage with visual resources in an immersive and interactive way and can potentially support deeper learning and critical deliberation. Similarly, in a networked learning environment, studies have shown that visualization has the potential to support collaboration and communication between learners who may use shared visualization tools to collaboratively create diagrams or models, or they may use visualization tools to communicate ideas and feedback to each other. This can help them build shared understanding and can therefore support the development of collaborative skills without relying primarily on written language (Zhi and Su 2015; Myller et al. 2009).

To keep up with these trends, many educational institutions are offering courses and degrees in data visualization, digital art and design, and related fields. These programs teach students how to use visualization techniques to create compelling visual narratives and communicate complex

information effectively. This has often contributed to the problematization of techniques and narrative politics on a more elaborate theoretical level, which touches upon the evident impact of the prolific visual culture on education. However, most courses, following the top-down discourse around digital education, largely rely on visualization "recipes" and the proliferation of "skills" without paying attention to the greater picture: the generative and immensely powerful aspect of communicating with visual, non-verbal tokens and their double-sward potential as anaesthetic devices and as amplifiers of critical capacity in contemporary knowledge cultures.

Visualization or illustration?

Before we begin unfolding the interconnections between visual culture, ethnography and music a note on terminology is in order. When we speak of visualization in this book, we do not refer to the strict term that applies solely to data visualization as the graphical representation of data and information.

Employing an array of techniques—from illustrated books to hastily drawn diagrams to intricate connections between ideas, visual stimuli, and textual typography—the humanities have always relied on tools for visual perception to be harnessed in the dynamic processes associated with the creation or discovery of new knowledge. Recently available methods known collectively as "digital visualization" are, in a sense, digital versions of these age-old tools in many areas of research, from the graphs generated by text analysis applications to virtual reality models of ancient buildings. Jessop (2008) offers an overview of the current application of visualization in the digital humanities before moving on to provide a genealogy of digital visualization within "traditional" humanities scholarship. Digital visualization as a scholarly methodology is here demonstrated as being part of a continuum of established academic practice rather than something that is in some way new, "revolutionary", or lacking in rigorous scholarly value (Jessop 2008). However, the author makes a crucial distinction which has guided our own hypotheses: digital visualization differs from a printed illustration in two related characteristics: it is interactive; it also allows manipulation of both the graphical representation and the data it is derived from (Jessop 2008, 283).

On the one hand, the rapidly growing process of visualization in the digital humanities entails converting complex data sets into easily graspable

and comprehensible visual representations that help to identify patterns, trends, and insights. This process heavily relies on the interaction of the visualized material both with the researcher who controls the dataset and with the reception by the user. Illustration, on the other hand, is traditionally understood as the art of creating images to accompany or enhance a text or narrative (Figure 1-5). Illustration can be used to depict abstract concepts or to provide visual representation of stories or ideas. Unlike data visualization, illustration is not necessarily focused on presenting data in an accurate or unbiased manner, but instead is often used to convey emotion or to accentuate the telling of a story. As recent research on public discourse indicates, the narrative using only data visualization elicits a stronger emotional impact than illustration-only visual support, as well as a significant change in the initial attitude about the topic presented (Garretón et al. 2023).

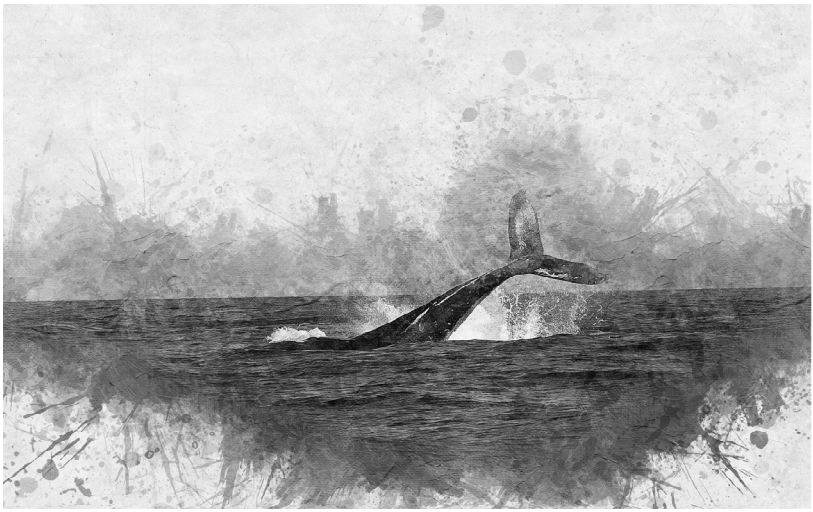

Fig. 1-5. Example of illustration

One more distinction needs to be made here, namely between visualization of numerical data and visualization of culture-based empirical research. Evidently, they both involve the use of visual representations to convey information, but they differ in their underlying data and purpose. The former typically entails the representation of quantitative information,

such as statistics, measurements, and numerical trends; typical examples of this kind of visualization include graphs, charts, and maps. The purpose of visualizing numerical data is to provide a clear and concise representation of complex data, enabling viewers to quickly understand patterns, relationships, and trends. Conversely, visualization of culture-based empirical research revolves around the representation of qualitative data, such as interviews, field notes, and ethnographic observations. Examples of this type of visualization include diagrams, sketches, and multimedia presentations but can also stretch to multimodal artefacts and other digitally aided writing modalities (Apostolidou 2022b). The purpose of visualizing culture-based empirical research is to provide a rich and detailed representation of cultural practices, beliefs, and traditions, inviting viewers to develop a nuanced understanding of a particular culture or community, or to offer a powerful commentary on the role that visual imagery plays in the political appropriation of a cultural phenomenon (Carastathis and Tsilimpounidi 2020).

While the techniques used for visualizing numerical data and culture-based empirical research may overlap, they partly require different approaches and methods. Visualizing numerical data often involves the use of software tools and statistical analysis, whereas visualizing culture-based empirical research relies on a more contextualized interpretive and/or artistic process. In order to choose and develop practices for generating visualizations we need to be adequately informed for the different types and available techniques and be prepared to synthesize various sets of data, using more than one way to render empirical cultural information in a visual format (Figure 1-6). These approaches are not mutually exclusive and do not affect solely the analytical and research aspect of knowledge construction. It is reasonable to expect that the readiness to employ and interpret computer-generated data in tandem with generating visual representations of sociocultural phenomena is a challenge that teachers in all levels of education will soon be faced with.