Datamorphism: Data Art of the Other-Than-Human

xCoAx 2025
13th Conference on Computation, Communication, Aesthetics & X
Dundee, UK
2025.xCoAx.org

To comprehend our era of ecological crisis, novel forms of artistic engagement with other-than-humans are urgently needed. A common mode through which art engages with the other-than-human is anthropomorphism. We analogously introduce the concept of "datamorphism" as a bridge connecting data, the other-than-human, artistic practice, and audience perception of data art. Specifically, datamorphism describes how data properties and our understanding of data shape the form and reception of data-artworks and the other-than-human represented. We establish criteria that define datamorphism and examine an exemplary artwork featuring data-driven representations of other-than-humans. Our research reveals that the concept of datamorphism enables us to systematically analyse data art and its reception and may support artists in representing other-than-human beings and phenomena beyond anthropomorphic (and perhaps anthropocentric) interpretations.

1. Introduction

On a Sunday afternoon, a visitor strolls through a contemporary art exhibition. A painting catches their attention: Colours of varying hues and saturation form complex patterns on a canvas devoid of discernible content, and the visitor's emotional response is unguided and individual. Then the visitor reads the description of the artwork. What they thought were abstract patterns created by the artist's imagination are, in fact, representations derived from a dataset. The artist did not decide upon each stroke freely; instead, they referred to numerical data to shape the artistic visual representation. Knowing that the artwork is based on data, one might expect the visitor's perception of the art to shift. They may attempt to understand the mapping from the data to the visual representation, constructing theories on what the data could signify. Furthermore, as the data points to a real-world phenomenon, the visitor perhaps believes they are perceiving and understanding an objective truth.

We introduce datamorphism to describe the perceptual shift that occurs when viewers learn that an artwork is data-based. Datamorphism includes examining how data morphs in art and whether there are common patterns in audience perception, particularly regarding

Moritz Alan Huson
Film University Babelsberg Konrad Wolf, Potsdam, Germany
moritz.huson@filmuniversitaet.de

Lena Gieseke
Film University Babelsberg Konrad Wolf, Potsdam, Germany
l.gieseke@filmuniversitaet.de

Keywords data art, data visualization, computational art, anthropomorphism, post-humanism

DOI 10.34626/2025_xcoax_014

Fig. 1. *"More Than Us"* by Julie Freeman (Freeman 2022). This artwork translates climate data into an animated composition where geometric shapes, inspired by Suprematist art, move through data landscapes both randomly and purposefully, illustrating the interplay between chance and pattern in complex data. We introduce the concept of datamorphism to explore the complex relationships between data, its artistic representation, and the audiences perception in such data art. All image rights are with Julie Freeman and Hiscox.

perceived truthfulness. For artists, datamorphism represents the challenge of artistically rendering complex data and engaging viewers affectively. In developing the concept of datamorphism, we draw inspiration from anthropomorphism in art and its approach to making other-than-human entities understandable and creating empathy for them by attributing human traits (Dolins 2017).

Suppose an artwork represents over 5000 data points from the Kepler Space Telescope, illustrating the sizes, orbital periods, and types of exoplanets. While the raw data itself may be incomprehensible to a casual viewer, the artwork summarises, abstracts, interprets, and visualises it. Although scientific details may be overlooked, the viewer may intuitively sense the vastness and complexity of galaxies. The abstract nature of the painting transforms into an interpretive space of exoplanets for the viewer to explore, blurring the line between data and phenomenon.

While methodologically, datamorphism aligns with anthropomorphism by morphing other-than-human entities from a particular vantage point (in the case of anthropomorphism, by attributing human traits; in datamorphism, by driving representations through the scope of data), there is potential in datamorphism for including other-than-human agency. Bruno Latour's Actor-Network Theory (Latour 2005) serves as the theoretical foundation for this potential, attributing agency, impact, and relationships to non-human entities. We recognise other-than-human beings and phenomena as equal actors.

Our main contribution is the novel concept of datamorphism through which we examine how data-based art mediates between abstract information and human perception, while challenging anthropomorphic aesthetics. Datamorphism helps to understand both the perceptual shifts in viewers and the artistic potential to create meaningful connections with other-than-human phenomena through data. To investigate and establish the concept of datamorphism, we build a theoretical foundation by discussing anthropomorphism and art (Section 2), data, dataset sizes, data types, and data's relevance (Section 3) before defining datamorphism and its properties (Section 4). We conclude with a critical discussion of our research (Sections 5 and 6).

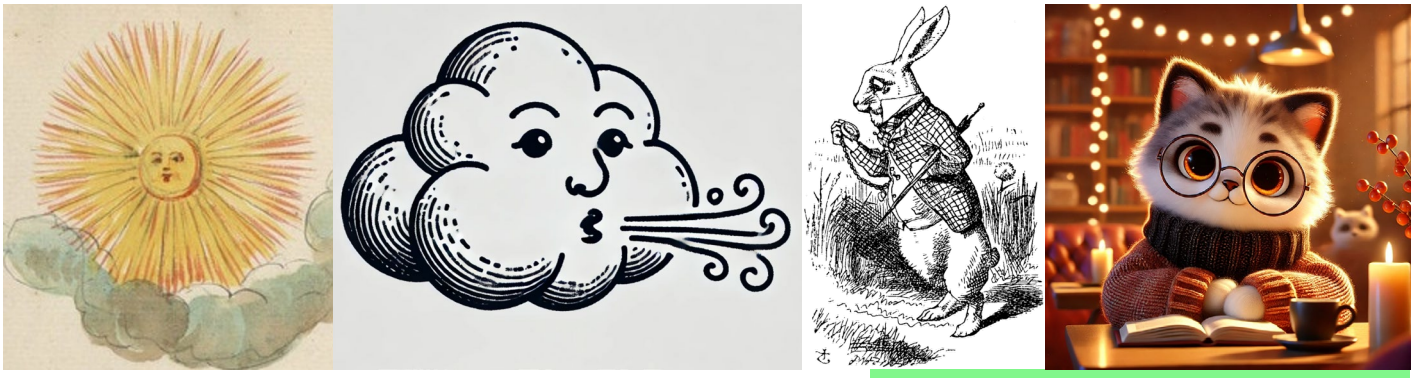

Fig. 2. Artistic examples assigning human traits to the other-than-human, historic and contemporary, from left to right: Thesaurus of Alchemy, ca. 1725, author unknown, public domain; ChatGPT 4o result of “cloud with a face blowing wind” prompted by the authors; The White Rabbit in Alice’s Adventures in Wonderland, 1865, John Tenniel, public domain; ChatGPT result of “a cute anthropomorphised cat” prompted by the authors.

2. Art of the Other-Than-Human

We explore datamorphism as an artistic concept inspired by anthropomorphism. To establish this connection, we first examine anthropomorphism in art history and then identify technological and scientific advancements and their integration in art as the origins of datamorphism.

2.1. Anthropomorphism in Art

Anthropomorphism can be defined as “[t]he attribution of human traits, motivations, and persona-like qualities to nonhuman animals and/or inanimate objects” (Dolins 2017). The term “anthropomorphism” originated in Greece, where it was negatively connoted as the attribution of human attributes to gods (De Wall 1999). In the context of other-than-human entities, various forms of anthropomorphism exist. One can distinguish more broadly between anthropomorphism “that inaccurately applies exaggerated human characteristics to nonhuman animals” and anthropomorphism that “is used as a critical tool to investigate and construct a framework for understanding both humans and nonhuman animal species” (Dolins 2017).

Anthropomorphism has played a significant role in art and religion (Hollander 2016; Silbergeld 2016; Gheorghiu and Paladino 2024). In stories, other-than-human beings are often used as symbolic representations, such as animal doubles serving as reflections in Norse mythology (Ramos 2014) or to teach moral values in children’s books (Dolins 2017). A prevalent form of anthropomorphism in contemporary stories involves attributing human traits and psychology to animals (Figure 1, the two examples on the right), as seen in literature, such as Alice’s Adventures in Wonderland by Lewis Carroll, The Chronicles of Narnia by C.S. Lewis or complexly structured in The Metamorphosis by Franz Kafka. There are numerous examples in films like Finding Nemo (2003), Ratatouille (2007) or Paddington Bear (2014). Aside from animals, planetary processes such as weather or day-night cycles are also rich with anthropomorphism (Figure 2, the two examples on the left). Crying skies, heaven’s tears,

or the sun and clouds with faces are commonly used poetic descriptions of weather phenomena. In *Wuthering Heights*, Emily Brontë writes: "..., the storm came rattling over the Heights in full fury". In Shakespeare's *Macbeth,* we find: "Come, seeling night, Scarf up the tender eye of pitiful day, And with thy bloody and invisible hand Cancel and tear to pieces that great bond Which keeps me pale!"

Anthropomorphism helps in understanding other-than-humans by shaping our perception of them through the projection of human traits; however, it also exposes the limitations of an anthropocentric viewpoint. Everything around us appears to look and behave like us. Regardless of the subject of an artwork, it is always the result of one or more individuals exploring some aspect of themselves or the world through their subjective experience. The artwork is then also received and interpreted through the individual's subjective experience. Thus, even explicitly anthropocentric art is inherently shaped by the subject engaging with it — there is no singular, intersubjective human experience as such. As embodied beings, we may never fully grasp what it is like to be another species, as illustrated in Thomas Nagel's essay on the subjective experience of a bat (Nagel 1974). We are bound to understand others, human and other-than-human, from our individual human perspective.

2.2. Origins of Datamorphism

In "The Science of Animal Locomotion" Eadweard Muybridge documents his use of the camera to explore the locomotion of various animals (Muybridge 1987). By taking photographs of a galloping horse at regular intervals, Muybridge contributed to two data-driven perspectives for artists to explore. First, by using a camera, he shifted the image creation process away from an individual's interpretation and skill (as is the case in comparison to painting, for example), towards making the image a result of intricate technology. Second, he created a moving image representation that differs in its reception from our unmediated perception of the same event. The images enable us to comprehend the movement, decoupled from the temporality that photography overcomes. Fleeting movements too fast for an unmediated examination become static, inviting intersubjective analysis. While the subject of Muybridge's photographs can still be perceived by humans from an unmediated vantage point, photography constructs novel perspectives. For example, satellite imagery introduced a hitherto unseen perspective on Planet Earth. They provide scientific insight and influence culture too: "In the new consciousness of the counterculture, the NASA photographs of the entire Earth taken from space fuelled a sublime impression of interconnectedness and inter-

dependence between humans and the planet, fostering cybernetic visions of ecological harmony (Franke 2013)" (Ballatore 2014).

Using such data (e.g., photographs, satellite images) resulting from technological advancements does not interfere with anthropomorphism, though. Anthropomorphism relates and contextualises the other-than-human, while technology simply serves as a tool for any form of relating. Art abounds that is neither anthropomorphic nor especially anthropocentric, and that does not incorporate or engage with digital technology. Consider Maria Sybilla Merian's drawings of insects and flowers, John Ruskin's studies of lichen, the works of Cannupa Hanska Luger, the Crochet Coral Reef project, or the paintings of Abie Loy Kemarre, to name a few. Even if art emphasises the other-than-human and artists try to free themselves from a human perspective, we can only remain firmly rooted in our human perspective. Still, if a non-anthropocentric and non-anthropomorphic aesthetic is desired, science and technology can offer means and data to explore previously unseen perspectives. The work of the experiential art collective Marshmallow Laser Feast exemplifies the inclusion of technological and scientific advancements within artistic practice. Their work allows audiences to experience the sensory Umwelt of various creatures and plants (Feast 2024). The concept of Umwelt, introduced by German biologist Jakob von Uexküll, posits that each living being has its own subjective perception of the world based on its physiology (Schroer 2019). Through scientific research, Marshmallow Laser Feast has created experiences that offer speculative windows into the perception of an owl, a mosquito or a tree. These artistic explorations do not induce the lived experience of other beings; instead, they highlight perspectives distinct from our own.

While anthropomorphism offers a bridge to relate to the other-than-human by attributing human traits, technologies and scientific approaches provide data that can shift our perspective and offer alternative ways of experiencing and depicting other-than-humans.

3. Data

Having examined anthropomorphism in art and technological developments as foundations for datamorphism, we now investigate its core element: data. The following discussion explores how the perception of art may shift if it is based on data, analyses different types of data, and examines the broader personal and cultural beliefs that shape our understanding of data.

3.1. The Status of Data

Data have become omnipresent: “[d]ata are everywhere and piling up in dizzying amounts” (Gitelman and Jackson 2013). While data typically describe phenomena, they are increasingly prescriptive, influencing what we see online, who we date, and the policies governments adopt.

The rise of Artificial Intelligence (AI), a prominent technology of the twenty-first century, further emphasises data’s crucial role in modern society, as AI is only possible through the vast amount of available data. Our increasing reliance on data hinges on our perception of what data are. Gitelman and Jackson suggest that while data might seem to precede facts and form the foundation of knowledge, identity, and communication, this perspective can lead to “an unnoticed assumption” about data’s transparency and self-evident nature. They warn that an uncritical enthusiasm for data and its accumulation “can become a faith in [...] their objectivity” (Gitelman and Jackson 2013). This “unnoticed assumption” determines what we conclude from data. Statements are often deemed credible if supported by data, even if the underlying data are not understood. For instance, a data visualisation may lead to what Kosminsky and colleagues aptly describe as “[b]elief at first sight” (Kosminsky et al. 2019).

In computing, data are machine-readable representations of real-world phenomena or simulations. Manovich suggests that to represent a phenomenon with data, one must make three crucial decisions: “[w]hat are the boundaries of this phenomenon?”, “[w]hat are the objects we will represent?”, and “[w]hat characteristics of each object will we include?” (Manovich 2019). These defining questions illustrate the influence of the data collection process and emphasise that data are not neutral, all-encompassing representations that are passively uncovered by scientists, for example. Data are actively generated representations based on assumptions about a subject. They are often considered to be “the fundamental stuff of truth itself” (Gitelman and Jackson 2013). In the following, we explore the implications of this authority that data hold when one engages with them in an art context.

3.2. Data art

What if data were treated similarly to paint, clay, or sound? In her Ph.D. thesis, Julie Freeman defines data as an art material (Freeman 2018). She argues that “data can help illuminate and make sense of things we cannot see, feel, or hear with our human senses,” making it a medium that allows artists to explore the world beyond our senses.

If we consider the work of a painter as arranging paint on a surface, then the work of a data artist might involve translating data in a way that renders them perceptible. We follow Freeman's definition of data art as "[t]ranslations of digital data to create cognitive, physical, and/or sublime artworks." The definition of what constitutes an artwork remains elusive (Viégas and Wattenberg 2007; Eschenbacher 2023). We classify artistic visualisations as data visualisations created by artists with artistic intent, noting that while this may appear tautological, it actually identifies a distinct and meaningful category of work.

Overall, a data visualisation, according to (Kosara 2007; Eschenbacher 2023), must meet three basic requirements: it must be data-driven, have a visual output, and be readable with the intent to communicate information. The authors put visualisations on a spectrum between pragmatic (focused on exploration and analysis) and artistic approaches, with the latter emphasising aesthetics and emotional engagement while still being grounded in data. Artistic visualisations specifically aim to spark curiosity and reflection while expressing particular viewpoints, differentiating them from their more analytical counterparts (Kosara 2007; Viégas and Wattenberg 2007; Eschenbacher 2023).

Perhaps a reason data are not widely considered an art material is their formlessness on the one hand, and being a formal-logical entity on the other hand. Traditional art forms like painting and sculpture are inherently visual, and music is inherently auditory. Data are often simply numbers on a computer screen, offering little of the sensory stimulation that artists otherwise might be used to. In artworks, data need other art materials to embody them. But just as a photograph of a forest can be considered both artistic and informative, so too could a data set describing the nutritional exchange between the trees of the forest, provided it is presented in a way that engages the audience. We may ask, "How is a data representation of some phenomenon or process different from other kinds of cultural representations humans used before?" (Manovich 2019).

We argue that there are no fundamental differences between data representations and other cultural representations. As discussed in Section 3.1, data are collected or created by humans and, with that, are similarly constrained by human assumptions as, for example, photographs or paintings. Nonetheless, data have the potential to reveal perspectives beyond human-centric viewpoints, challenging our traditional ways of understanding the world. We concretise this potential of data art in the following section.

4. Introducing Datamorphism

We introduce datamorphism as a theoretical concept within the field of data art. Datamorphism describes how certain data properties, as well as our understanding of data, uniquely shape both the form and reception of a given data artwork and the other-than-human phenomena represented in it. Similar to how anthropomorphism describes the projection of human traits onto the other-than-human, datamorphism describes the projection of values like truth or universality onto data-artistic depictions of the other-than-human. These values depend on our understanding of data and our data literacy, and they should be examined further at a societal level.

We argue that datamorphism is a necessary concept in discourses surrounding data art. On the one hand, datamorphism highlights data's potential as a source for artistic practice, fostering novel perspectives and understanding of the other-than-human. On the other hand, datamorphism summarises and communicates existing side effects and hidden biases in our work with and reception of data. We must be aware of our seldom-questioned trust in data as an unbiased encapsulation of truth and their broader societal influence. Furthermore, in times of mass extinction, it becomes crucial to rethink how we think of other-than-human beings and phenomena. Novel, creative representations in art and culture are urgently needed to foster a broad ecological consciousness in society.

4.1. Properties of Datamorphism

To further understand datamorphism, we define a set of specific properties, namely, the dataset size, a dataset's meta-communication, machine-generated, perceptible and non-perceptible data, and the data mapping. In the following, we discuss each property in detail.

Dataset Size

A dataset is "a collection of data taken from a single source or intended for a single project" (Merriam-Webster n.d.). The quantity of data collected—measured in data points—varies. A dataset might contain thousands of data points about a single insect, or data on thousands of insects at a single moment. Some datasets are complex and continually expanding.

Datamorphism becomes more pronounced with larger datasets. Data on the movements of a single animal is not significantly different from our own observation of that animal; we can relate to an individual. However, comprehending the movement of thousands of animals, the

scale of trillions of bacteria, or the galaxy goes beyond our perception. As Edmund Burke's "A Philosophical Enquiry into the Origin of Our Ideas of the Sublime and Beautiful" notes, "Greatness of dimension is a powerful cause of the Sublime" (Freeman 2018). The enormity and complexity of datasets can provide unique perspectives in data art. The size of a dataset also influences the "so-called truth" (Freeman 2018) we can derive from it. Freeman argues that data visualisations based on different sample sizes present different "views," e.g., from five participants' data compared to from 50,000 participants, and they conclude that the larger sample size substantially increases the likelihood of broadly applicable results (Freeman 2018).

Meta-Communication of a Dataset

The effect and impact of datamorphism depend on an audience's recognition of an artwork as data art and their existing relationship to data in general and the specific dataset in question. Meta-communication refers to the elements in an artwork or its accompanying materials that reveal the presence and characteristics of its underlying dataset. An artist must carefully balance communicating the data-driven nature of their work, its information, and broader context while maintaining the elusive quality that many artists aspire to.

While not an example of an other-than-human dataset, Jason Salavon's "*Home for Sale*" demonstrates the issue of and need for meta-communication. The artwork "[shows] a series of realtor photos of single-family homes for sale in different cities around the U.S." (Viégas and Wattenberg 2007). These were constructed through an averaging technique whereby the pixels of many photos of for-sale houses in different U.S. cities were averaged to create a single image per city. While viewing the images without knowledge of how they were created can be just as intriguing as viewing them with background information in mind, we argue that the potential for a datamorphic reception is only present in the informed reception. An informed reception opens a projection space for the viewer: knowing how the images are aggregates of photographs, a viewer can attempt to deduce meaning. Images such as "*Homes for Sale, Seattle/Tacoma*", which features more blues and greys than the other images in the series, hint at the cloudy weather Seattle is known for. While this deduction can also be made without knowledge of the production process, the presence of data lends the image a degree of accuracy, of authenticity and "realness," characteristic of datamorphism. Data lend the work a degree of authority it may otherwise not possess. It is up to the creativity of the artists and their artistic vision to reveal and communicate their data, which we see as a necessary step for datamor-

phism. We argue that datamorphism is largely an explicit cognitive process where interpretations are made based on the understanding and judgment of the data as a meaningful representation.

Machine-Generated Data

We define machine-generated data as information produced directly from computer processes or applications, generated independently from human intervention at the moment of the data collection. Data generated by taking a photograph or recording an observation involves human agency at the point of creation. In contrast, browser cache data, generated by a computer without direct human involvement, is considered machine-generated. Viewing photography as data collection, nonhuman photography exemplifies the relevance of machine-generated data in datamorphism.

Joanna Zylinska's "*Nonhuman Photography*" discusses how "in the age of CCTV, drone media, medical body scans, and satellite imaging, photography is increasingly decoupled from human agency and human vision"(Zylinska 2024). In the photography project described in the introduction of the book, the photographer James Balog documents the retreat of a glacier. By attaching microcomputers to cameras that he fastened onto rocks, photographs could be taken over several years, something Balog could not do without the help of the technology in use. He created a time-lapse of the retreating glacier, with photographs generated by the computers and the cameras. In doing so, he created a representation of a glacier that goes beyond the anthropocentric perception of time - the resulting photographs, taken by a machine, were not subjected to a human photographer's decision on when to take the picture. The resulting aesthetic is part of datamorphism.

In Véronique Ducharme's "*Encounters*", the movement of animals is automatically photographed. Using remote hunting cameras that trigger the exposure in response to motion and heat, wild animals are photographed without any physical presence of humans. The resulting images, while a result of human invention and artistic intention, also depend on factors beyond the immediate control of the artist. They hand over part of their agency to the functionality of a machine and to the movements of other-than-humans in their habitat.

Machine-generated data arise from a collaboration between human intention and machine processes. Although humans may anthropomorphise or impose their own interpretations during the conceptualisation and design of data collection, the resulting machine-generated data add another layer to the definition of datamorphism. This

is because the data are produced through automated processes that are not influenced by human perception or subjective interpretation at the moment of data creation. Consequently, machine-generated data offer a seemingly less biased representation of phenomena, or rather, one that is decoupled from human agency in the moment of data collection.

Perceptible and Non-Perceptible Data

The type of data artists select shapes not only their vision for the artwork but also the perspectives it can reveal and its potential forms of representation. We differentiate between perceptible and non-perceptible data and their level of abstraction, each of which we further explain in the following.

If we wish to gather data on a forest, we could decide to count the number of trees. Using our understanding of what a tree looks like, we may then walk through the forest, using our visual sense—our eyes—to discern the individual trees, taking note of each one we come across. Later, when we share our findings with others, they will be able to imagine the individual trees, provided they know what a tree looks like. We refer to such data representations of phenomena that humans can perceive with their senses as data of the perceptible.

In contrast, data of the non-perceptible shall refer to data representations of phenomena we are cognisant of, but unable to perceive and therefore collect without technological assistance. For example, through scientific discovery, we have become aware of the presence of fungi in the air (Fröhlich-Nowoisky et al. 2009). However, we cannot observe this directly through our senses, relying on technology to measure the types of fungi and the amounts present. Technology allows us to measure and become aware of phenomena we otherwise would neglect. It also demands trust in and understanding of the technology used to acquire the data and the scientific process more generally. One could argue that part of COVID-19 or climate crisis denial stems from the complexity and perceptual allusiveness of these issues; one cannot see the virus or the climate crisis directly. An artistic representation of climate data, such as rising global temperatures, may alarm us less than a picture of a burning forest, even though both may indicate the same phenomenon. The former represents non-perceptible data, which requires abstract thinking to become legible, while the latter offers an intuitively understandable visual of the effect.

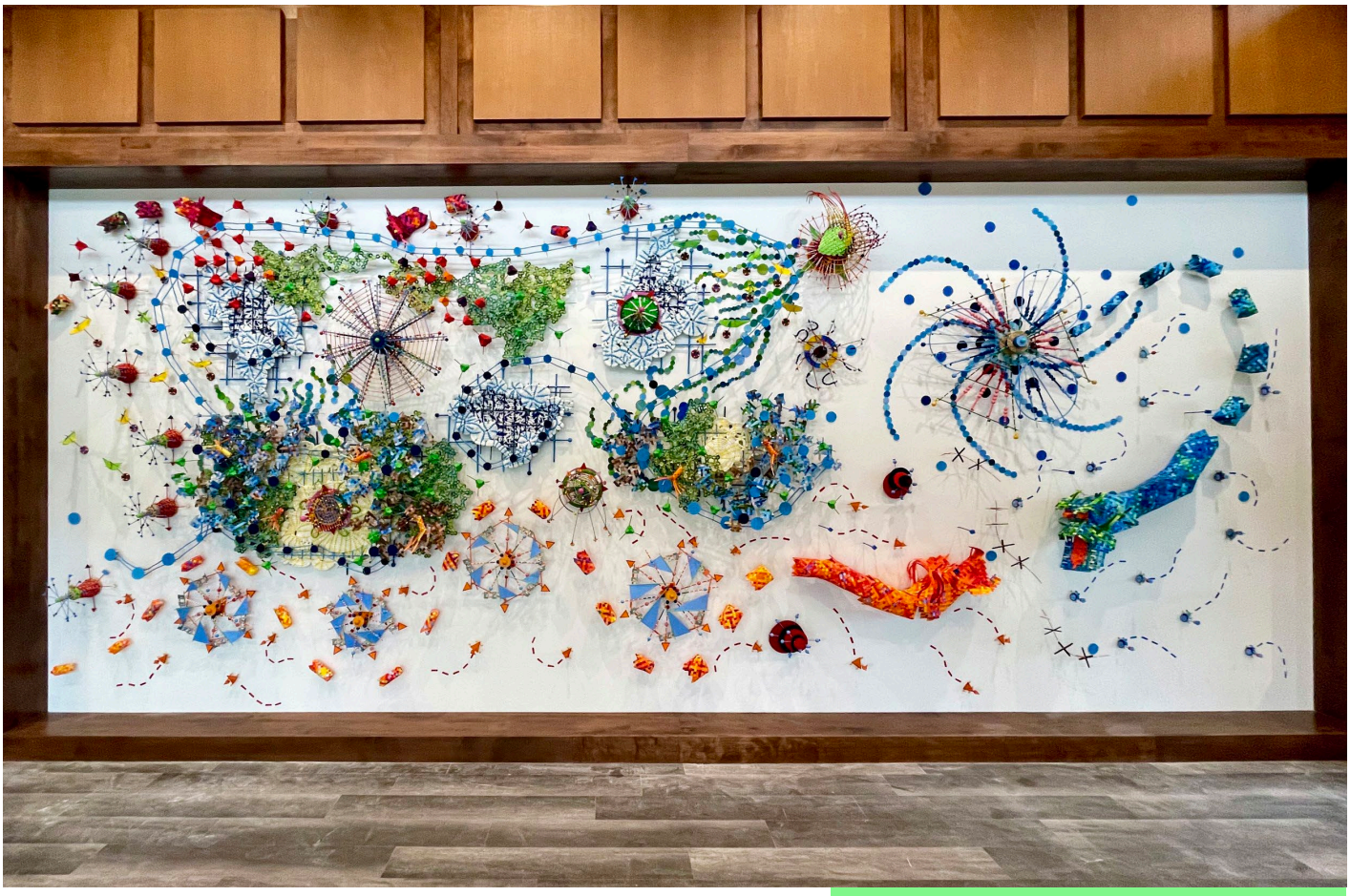

Fig. 3. *"Changing Waters"* by Nathalie Miebach (Miebach, 2022). The artwork consists of a large wall piece and 4 woven pillars that examine the Gulf of Maine's biological, geophysical, and seasonal transformations through the lens of weather and buoy data.
All image rights are with Nathalie Miebach.

Data Mapping

Data are often formal representations without immediate aesthetic form, such as raw data that are numerical, table-based, coded or symbolic. A data artist generates a translation that maps the formal data properties onto specific artistic parameters such as colour, positions on a canvas, or notes of a musical scale. There are numerical datasets that suggest a mapping: the latitude and longitude values of a bird's location over time could be mapped to the x- and y-coordinates of a canvas. The speed of the Earth spinning could correlate with the speed of an animation. In these examples, we map certain properties from the world's space (the location of a bird, the speed of the Earth's turning) onto the space of the artwork (the location on the canvas, the speed of the animation), while the underlying data type (location, speed) remains unchanged. Beyond these straightforward data mappings, many data artworks present a more complex relationship to the underlying data that can be challenging for the audience to decipher. Similarly, artists face the challenge of interpreting formal data creatively while maintaining a meaningful connection to the formal data, ensuring their work does not appear arbitrary.

Consider Nathalie Miebach's "Changing Waters" (Miebach, 2022): a sculpture that was created through an artistic translation of weather and buoy data of the Gulf of Maine (Fig. 3). Here, the mapping of data

to sculpture is not immediately apparent. The sculpture creates an appealing tension between its real-world data source and its abstract representation. The abstraction consists of shapes and colours that allow for some form of recognition of what we know about weather and oceans. This phenomenon is similarly found in traditional abstract art that transforms its subjects into non-representational forms. The abstraction in data art often highlights the disconnect between data and human perception. While we learn through experience to interpret some everyday numbers, like relating forecast temperatures to physical comfort, we typically lack intuition for understanding formal data beyond these familiar contexts. While one might question whether Miebach's artwork strays too far from its source data for meaningful representation, this criticism overlooks how humans also struggle to comprehend raw data directly. The artistic interpretation may convey insights more effectively to non-experts. Datamorphism includes and describes this tension between a data artwork's abstract aesthetic, the data and the concrete phenomena the data represents.

The interplay between dataset size, meta-communication, data types and mapping reveals complexities extending beyond common definitions of data art. The novel concept of datamorphism comprehensively captures these multifaceted relationships between data, artistic representation and its perception.

4.2. Exemplary Datamorphism in "The Lake" by Julie Freeman

As an example of datamorphism, we analyse Julie Freeman's artwork *"The Lake"* (2005) (Freeman 2018), as shown in Fig. 4. *"The Lake"* is based on data from the other-than-human, which in this specific case refers to fish.

For this artwork, Julie Freeman utilised real-time data from tracking sixteen fish in a lake for six weeks to create an abstract animation and soundscape. The work was installed in a cylindrical tower measuring 9 meters in height, creating an immersive audiovisual environment for viewers positioned in the tower below. Each fish was assigned a set of seven environmental sound samples, recorded from underwater and lakeside locations. The sound samples were triggered and modulated based on the fish's location, position, speed, and direction. For instance, if a fish's speed changed significantly, the corresponding sound sample's rate was adjusted. The interactions between the fish, whether in proximity to others or isolated, also influenced the music, creating a "complex emergent soundscape" coupled with visual effects.

The dataset size (sixteen fish), while not so large as to be perceived as referring to some "truth," goes beyond what is consistently ob-

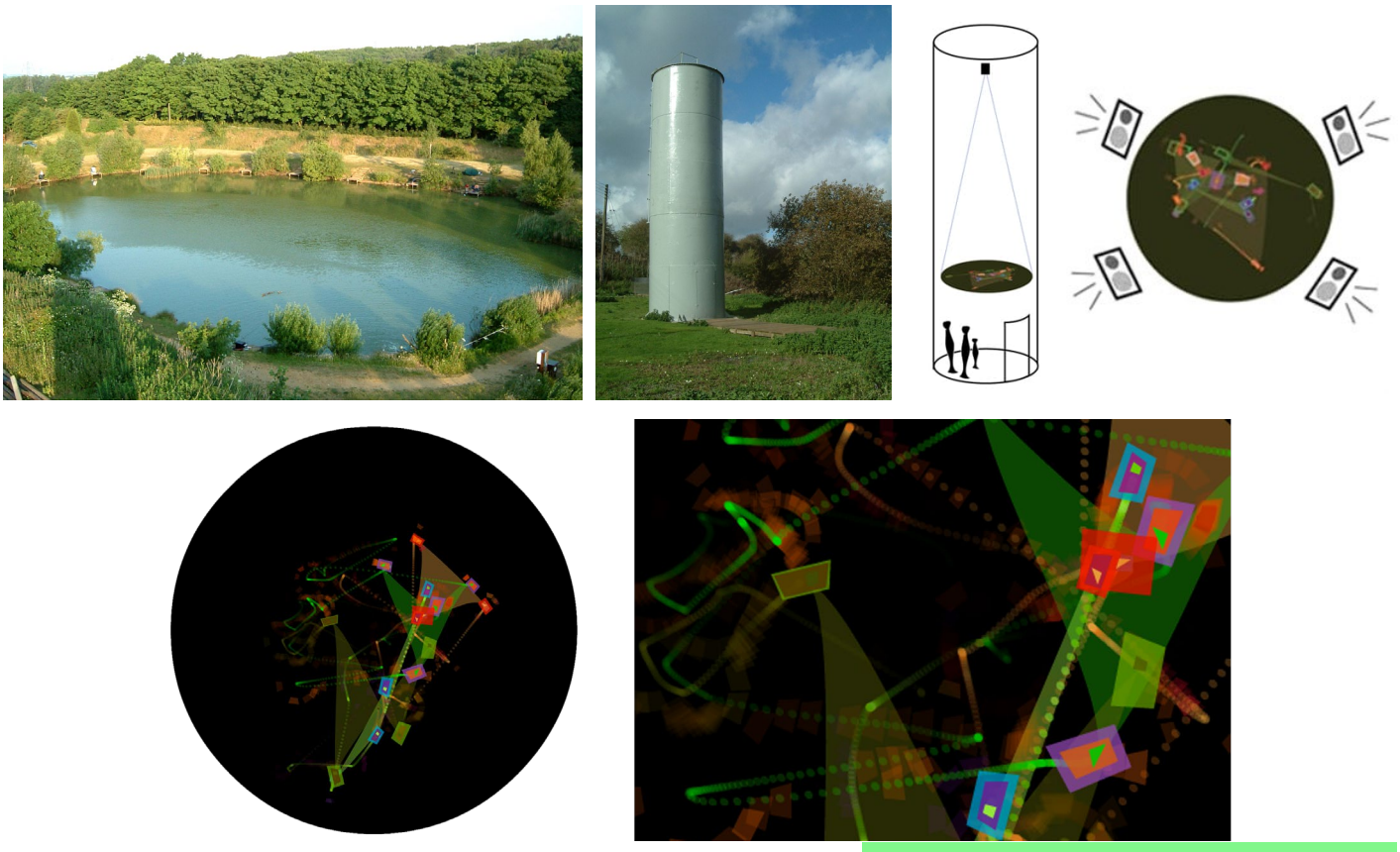

Fig. 4. *"The Lake"* by Julie Freeman (Freeman 2005). The artwork is a site-specific installation (presented in the cylindrical silo next to the pond, seen in the top row, middle image) and pioneering example of data art that incorporates live biological data in real time. It exemplifies datamophism by examining data's role in abstracting the other-than-human (in this case, fishes in the pond, seen in the top row, left image), their artistic representation (images in the bottom row) and our understanding of it.
All image rights are with Julia Freeman; images are used with permission.

servable by an individual. If just one fish leaves the viewer's field of view, an observation by the viewer's eyes becomes unattainable. The data collected on the fish's "location, position, speed, and direction [...]" constructs a specific and accurate representation that differs from what we can perceive. The potential to detect and project onto patterns and irregularities emerges, visualising what otherwise might have remained invisible, creating datamorphism. However, the used movement data are data of the perceptible rather than data of the non-perceptible. While we cannot readily observe a precise numerical representation of the movements of the fish, we can observe fish from our unmediated human perspective. The artwork consists of an abstracted audiovisual portrayal of the fish. Short of empirical evidence, we can only speculate how an audience might perceive the artwork and its data source. As the artwork was viewed near the pond the fish inhabited, trust in the data's authenticity seems likely.

Julie Freeman created *"The Lake"* through a datamorphic lens. Rather than, for example, interpreting a common anthropomorphic hero's journey of a fish, Freeman constructs a framework wherein the natural behaviour of fish becomes artistically expressive. The artist's approach avoids anthropomorphising the fish, instead allowing their movements and behaviours to emerge through the data translation process. The resulting representation derives directly from the captured data and, with that, from the fish, rather than solely from imposed human interpretations.

5. Discussion & Future Work

We introduce the concept of datamorphism to enhance understanding of how certain data properties, their relationships, and our knowledge of data shape both the form and reception of a given data artwork, as well as the other-than-human phenomena represented in it. We are inspired by the definition and mechanisms of anthropomorphism when developing datamorphism. While datamorphism shares some characteristics with anthropomorphism, the two concepts are fundamentally distinct. However, they do not necessarily exclude each other. Our discussions throughout the text may appear critical of anthropomorphism; yet, viewing it solely as positive or negative is overly simplistic. One can argue that attributing human traits can cultivate empathy, solidarity with the other-than-human, and a sense of connectedness. In this research, however, we strive for a change of perspective, seeking new ideas to foster solidarity and understanding of the other-than-human. We do so through a post-humanist lens, recognising the agency and presence of the other-than-human that transcend the constraints of an anthropocentric view. Currently, we are not aware of any systematic evaluation comparing the effects on perception of anthropomorphic representations and representations that carefully avoid a human-centred approach. Furthermore, rejecting our human perspective is neither possible nor inherently desirable. Similarly, the notion of truly objective data is ultimately illusory. Our interpretations are inevitably shaped by our human experience. Nevertheless, there is value in deliberately expanding our understanding and consciously attempting to reduce the human perspective to challenge our innate biases and reveal aspects of reality we might otherwise overlook.

While existing research on data art explores many of the aspects we discuss, datamorphism offers a comprehensive framework that uniquely addresses the complex interrelationships between data, artistic expression, and audience perception, while also acknowledging the intuitive and affective characteristics. However, our definition of datamorphism requires further theoretical contextualisation, refinement and expansion. Conducting studies centred around audience receptions of data art could help identify common patterns in interpretation and test how helpful the current definition of datamorphism is for understanding the ontology of data art. Qualitative interviews with artists about their data art practice might help in understanding how data shape artists' perspectives on the phenomena they engage with. Analysing the existing discourse around data in art contexts would provide further insight into the multitude of perspectives that artists take on this rapidly evolving art material.

Datamorphism, grounded in theory, emerges in practical data art explorations. We hope the analogy to anthropomorphism, a prominent and practical concept in art of the other-than-human, inspires and supports artistic engagements with data of the other-than-human. This form of artistic datamorphic work may begin with an exploration of the data types mentioned in Section 4.1.

Overall, our work establishes the foundation for datamorphism, opening new pathways for theoretical and practical development alike.

6. Conclusion

How societies apprehend and ascribe value to the other-than-human is in constant flux. Our views are shaped by politics, cultural practices, including art, and scientific consensus. Digital data have risen to prominence in modern society and play a significant role in how we navigate the world. Projects such as the Max-Planck-Institute's initiative "ICARUS" or Google and NOAA's use of AI to help decipher whale communication (Allen et al. 2024) demonstrate the potential for data-driven methodologies in studying other-than-humans. Artists have also turned their attention to this development and use data in their art practices. Agreeing with "the nonhuman turn" (Grusin 2015), artworks have been created that centre the other-than-human, by artistically engaging with data collected from them. Questioning data's perceived authority and implicit claims to objective truth, we examine how this particular art material might influence both artists' and audiences' perspectives, as well as the aesthetics of data artworks concerned with the other-than-human. Datamorphism, inspired by anthropomorphism, helps describe how data, their cultural perception and one's individual understanding thereof, open up new ways of perceiving other-than-human beings and phenomena in data artworks. We hope that datamorphism will aid scholars and artists in describing and thinking about data art's potential for novel perspectives on the other-than-human world.

References

Allen, Ann N., Matt Harvey, Lauren Harrell, Megan Wood, Angela R. Szesciorka, Jennifer L. K. McCullough and Erin M. Oleson. 2024. "Bryde's Whales Produce Biotwang Calls, Which Occur Seasonally in Long-Term Acoustic Recordings from the Central and Western North Pacific." *Frontiers in Marine Science* 11: Article 1394695. https://doi.org/10.3389/fmars.2024.1394695.

Ballatore, Andrea. 2014. "The Myth of the Digital Earth Between Fragmentation and Wholeness." Wi: *Journal of Mobile Media* 8.

De Waal, Frans B. M. 1999. "Anthropomorphism and Anthropodenial: Consistency in Our Thinking About Humans and Other Animals." *Philosophical Topics* 27 (1): 255–80. Accessed August 16, 2024. http://www.jstor.org/stable/43154308.

Dolins, Francine. 2017. "Anthropomorphism". ResearchGate. Accessed August 16, 2024. https://www.researchgate.net/publication/318133576_Anthropomorphism.

Eschenbacher, Anna. 2023. "Visualizing Critical Infrastructures for Citizens: A Combination of Knowledge Transfer and Art." Master's thesis, Filmuniversity Babelsberg Konrad Wolf. Accessed January 12, 2025. https://doi.org/10.60529/373.

Feast, A. M. L. 2024. "Marshmallow Laser Feast: Works of Nature". Accessed August 16, 2024. https://www.acmi.net.au/whats-on/marshmallow-laser-feast-works-of-nature.

Franke, Anselm. 2013. "Earthrise and the Disappearance of the Outside." *The whole earth: California and the disappearance of the outside.* 12–18. Berlin: Stenberg Press.

Freeman, Julie. 2005. "The Lake". Accessed February 14, 2025. https://translatingnature.org/projects/the-lake/.

Freeman, Julie. 2018. "Defining Data as an Art Material." PhD thesis, Queen Mary University of London.

Freeman, Julie. 2022. "More Than Us". Accessed February 14, 2025. https://translatingnature.org/projects/more-than-us/.

Fröhlich-Nowoisky, Janine, Daniel A. Pickersgill, Viviane R. Després and Ulrich Pöschl. 2009. "High Diversity of Fungi in Air Particulate Matter." *Proceedings of the National Academy of Sciences*.

Gheorghiu, Dragoş and Vincent C. Paladino. 2024. *Anthropomorphism, Anthropogenesis, Cognition*. Archaeopress. Accessed August 16, 2024. https://doi.org/10.2307/jj.16487856.

Gitelman, Lisa and Virginia Jackson. 2013. "Introduction". In *'Raw Data' Is an Oxymoron*. Cambridge, MA: MIT Press. https://doi.org/10.7551/mitpress/9302.003.0002.

Grusin, Richard A. (ed.) 2015. T*he Nonhuman Turn.* Minneapolis: University of Minnesota Press.

Hollander, Martha. 2016. "The Anthropomorphic Lens: Anthropomorphism, Microcosmism, and Analogy in Early Modern Thought and Visual Arts." *Renaissance Quarterly* 69 (1): 255–56. https://doi.org/10.1086/686357.

Kosara, Robert. 2007. "Visualization Criticism—The Missing Link Between Information Visualization and Art." *Proceedings of the 11th International Conference Information Visualization*, 631–36. https://doi.org/10.1109/IV.2007.130.

Kosminsky, Doris, Jagoda Walny, Jo Vermeulen, Søren Knudsen, Wesley Willett & Sheelagh Carpendale. 2019. "Belief at first sight. Data visualization and the rationalization of seeing." *Information Design Journal* 25 (1): 43-55. https://doi.org/10.1075/idj.25.1.04kos

Latour, Bruno. 2005. *Reassembling the Social: An Introduction to Actor-Network-Theory.* Oxford: Oxford University Press.

Manovich, Lev. 2019. "Data", in Heike Paul (editor) *Critical Terms in Futures Studies*, Palgrave.

Merriam-Webster. n.d. "Dataset." Accessed August 17, 2024. https://www.merriam-webster.com/dictionary/dataset.

Miebach, Nathalie. 2022. "Changing Waters". Accessed February 14, 2025. https://www.nathaliemiebach.com/work/new-portfolio-item-1-nntag.

Muybridge, Eadweard. 1887. *The Science of Animal Locomotion (Zoopraxography): An Electro-Photographic Investigation of Consecutive Phases of Animal Movements*. University of Pennsylvania.

Nagel, Thomas. 1974. "What Is It Like to Be a Bat?" *The Philosophical Review* 83 (4): 435–50. Accessed August 16, 2024. https://doi.org/10.2307/2183914.

Ramos, Eduardo. 2014. "The Dreams of a Bear: Animal Traditions in the Old Norse-Icelandic Context". Master's Thesis, University of Iceland. https://skemman.is/handle/1946/19330.

Schroer, Sara A. 2019. "Jakob von Uexküll: The Concept of Umwelt and Its Potentials for an Anthropology Beyond the Human". *Ethnos* 86 (1):132–152. Accessed August 16, 2024. https://doi.org/10.1080/00141844.2019.1606841.

Silbergeld, Jerome. 2016. "Trading Places: An Introduction to Zoomorphism and Anthropomorphism in Chinese Art". In Jerome Silbergeld and Eugene Y. Wang (editors) *The Zoomorphic Imagination in Chinese Art and Culture*, 1–20. Honolulu: University of Hawaii Press. https://doi.org/10.1515/9780824872564-004.

Viégas, Fernanda B., and Martin Wattenberg. 2007. "Artistic Data Visualization: Beyond Visual Analytics". In Douglas Schuler (editor) *Online Communities and Social Computing. OCSC 2007*, 182–91. Lecture Notes in Computer Science 4564. Berlin, Heidelberg: Springer. https://doi.org/10.1007/978-3-540-73257-0_21.

Zylinska, Joanna. 2024. *Nonhuman Photography*. Cambridge, MA: MIT Press.