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CONCEPTUAL ANALOGUES: COMING TO TERMS WITH DATA VISUALISATION

“Humanist data visualisation can make a profound contribution to stimulate a form of curiosity that recognizes and appreciates the entangled shimmer of the world.”

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This paper aims to critically examine central concepts associated with data visualisation and proposes a type of metaphor that fuses theoretical principles with practical experiences. Data visualisation can be characterised as the graphical representation of both quantitative and qualitative data, primarily to facilitate analysis and communication. Recent progress in data visualisation coincides with expanding technical capabilities to process information and to render detailed and dynamic graphics. Especially within the realms of big data, analytics, and machine learning, visualisation is often framed as a crucial interface mediating between human and computational intelligences. Data visualisations are increasingly being employed beyond the confines of science and engineering. Harnessing both the perceptual powers of the human visual system to discern patterns and the computational capacities to process large datasets, visualisations transform complex and comprehensive phenomena into graphical and thus graspable forms.

Data visualisation, while closely associated with computational thinking, has a long history that predates modern computing. Its defining feature of creating graphical marks connects it to the earliest human traces. Long before the advent of computers, humans engaged in recording and recounting significant phenomena using various sensory modalities, many of which can still be regarded as forms of visualisation. From cave paintings depicting hunting stunts to knotted strings capturing financial transactions and events,¹ humans across diverse cultures and time periods have devised graphical means to represent recorded information. It is therefore essential to acknowledge and appreciate the continuities of visualisation within

1. Gary Urton, *Inka History in Knots* (Austin 2017).

the broader context of graphical knowledge practices elsewhere and elsewhere.²

During the modern period, a range of innovative visualisation techniques emerged to represent complex information on various subjects, such as trade, wars, social, and economic transformations.³ As these visualisation techniques evolved, they played a critical role in shaping understanding, informing decision-making processes, and fostering awareness across various domains, revolutionising how data was perceived, analysed, and managed. One prominent historic example is Florence Nightingale's rose diagram, which used visualisation to highlight hygiene issues during the Crimean War (1853–1856), revealing the correlation between poor sanitary conditions and high mortality rates among soldiers. This data-driven approach effectively communicated the urgent need for improved sanitation and ultimately contributed to significant advancements in public health and healthcare policy. The growing popularity of print media and continuous rise of literacy rates further facilitated their dissemination. Around the turn of the 19th century, figures like W.E.B. Du Bois and Otto Neurath harnessed data visualisation to address social issues, demonstrating its potential to drive change. Du Bois used visualisations to depict African Americans' social and economic conditions, challenging stereotypes and fostering understanding.⁴ Similarly, Neurath, along with Marie Neurath and Gerd Arntz, developed a coherent visualisation system to present complex information accessibly, informing policy decisions and

2. Johanna Drucker, *Graphesis* (Cambridge 2014).

3. Michael Friendly and Howard Wainer, *A History of Data Visualization and Graphic Communication* (Cambridge 2021).

4. Whitney Battle-Baptiste and Britt Rusert, *W.E.B Du Bois's Data Portraits* (Princeton 2018).

raising public awareness on social change in post-World War I Austria.⁵ The work by Nightingale, Du Bois, and Neurath continues to influence contemporary data visualisation practices.

While visualisation has a long history that precedes computers, the advent of computing and algorithmic procedures for generating data graphics has undoubtedly introduced new dimensions and opportunities in the field. Early examples from the beginnings of computing demonstrate the transformative impact of computer-generated visualisations on various domains. One of the pioneering efforts in computer-generated visualisation was John Tukey's (1962) development of exploratory data analysis, which laid the foundation for modern statistical graphics.⁶ Since then, visualisation found many applications in the sciences.

As the new millennium unfolds, computational data visualisations are also increasingly introduced to various fields of the humanities, feeding the need to reconsider the vocabulary of data visualisations. The kinds of terms invoked to discuss and design visualisations have great implications on how the world is seen through their lens and subsequently shaped. In order to expand the possibilities for humanist data visualisation, the intent with this article is to draw on conceptual analogues, i.e., terms that integrate philosophical principles and tangible experiences in the physical world. It really "matters what stories make worlds, what worlds make stories."⁷ For instance, employing metaphors such as pipelines or sandcastles for data visualisation evokes distinct notions of what it means to create

5. Nader Vossoughian, Mapping the Modern City: Otto Neurath, the International Congress of Modern Architecture (CIAM), and the Politics of Information Design. *Design Issues*, 22[3] (2006), pp. 48–65.

6. John Tukey, The future of data analysis. *The Annals of Mathematical Statistics* 33[1] (1962), pp. 1–67.

7. Donna J. Haraway, *Staying with the Trouble* (Durham 2016), p. 12.

and use visualisations and the role of people in this process. The underlying assumption is that specific words used to describe data visualisations can either encourage or discourage certain perspectives and methods for creating digital interfaces. It is a worthwhile exercise to examine these key terms and reconsider the language used when speaking about the people, practices, and principles of visualisation.

In current arenas of visualisation research and design, data visualisation is commonly defined as the “use of computer-supported, interactive, visual representation of data to amplify cognition.”⁸ While diagrams tend to represent abstract ideas in the form of mind maps and flowcharts, data visualisations are distinct in that they are algorithmically generated, interactive graphics based on data. In this sense, visualisations give visual form to something that is present in the form of datasets, but not yet visible and by becoming visible and explorable they promise to aid our thinking. For example, by turning dates into timelines and contacts into networks, a data visualisation transforms datasets into perceptible shapes and arrangements that are ideally conducive to intellectual work. Hence, visualisations can set the table for analytical and interpretative work with data. Of course, as a medium that enhances our human senses, visualisation also runs the risk of shaping and possibly biasing our understanding of data in specific, unintended ways.⁹ Contemporary visualisation research pays particular attention to the design and study of visualisation techniques for a wide range of data types, domains, and tasks.¹⁰ Interaction techniques equip data visualisations

8. Stuart K. Card, Jock D. Mackinlay, and Ben Shneiderman, *Information Visualization*, in: *Information Visualization: Using Vision to Think*, ed. Stuart K. Card, Jock D. Mackinlay, and Ben Shneiderman (San Francisco 1999), pp. 1–34.

9. Marshall McLuhan, *Understanding Media: The Extension of Man* (Cambridge 1994).

10. Isabel Meirelles, *Design for Information* (Dover 2013); Tamara Munzner, *Visualization Analysis and Design* (Boca Raton 2014).

with the capacity to alter views, see details, make amendments, and carry out analytical tasks. Advances in mobile computing, digital fabrication, and immersive technologies are transforming the ways we interface with data.¹¹ Furthermore, recent visualisation research raises methodological questions about the adequate evaluation of visualisation techniques often in the specific settings of their use.¹² These concerns are shaped by the particular needs in various domains, where visualisations are being taken up to carry out visual analysis.

The digital humanities pose such a distinct domain, where interdisciplinary collaborations between humanist scholars and visualisation researchers have intensified over the past decade. Scholars in literature and art history, to name just two, are experimenting with digital methods, of which visualisation is of particular interest due to its dual quality: “for exploration of data and for communication of findings.”¹³ This interest is reciprocated by visualisation researchers, who eagerly embrace the unique challenges posed by humanistic interpretation for visualisation design. For example, in literary studies a range of visualisation techniques have

11. E.g. Bongshin Lee, Raimund Dachsel, Petra Isenberg, and Eun Kyoung Choe (ed.), *Mobile Data Visualization* (London 2021); Yvonne Jansen, Pierre Dragicevic, Petra Isenberg, Jason Alexander, Abhijit Karnik, Johan Kildal, Sriram Subramanian, and Kasper Hornbæk, Opportunities and Challenges for Data Physicalization. *Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems* (2015), pp. 3227–3236; Ronell Sicat, Jiabao Li, Junyoung Choi, Maxime Cordeil, Won-Ki Jeong, Benjamin Bach, and Hanspeter Pfister, Dxr: A toolkit for building immersive data visualizations. *IEEE Transactions on Visualization and Computer Graphics* 25[1] (2019), pp. 715–725.

12. Kyle Wm. Hall, Adam J. Bradley, Uta Hinrichs, Samuel Huron, Jo Wood, Christopher Collins, and Sheelagh Carpendale, Design by Immersion. *IEEE transactions on visualization and computer graphics* 26[1] (2019), pp. 109–118; Heidi Lam, Enrico Bertini, Petra Isenberg, Catherine Plaisant, Sheelagh Carpendale, Empirical Studies in Information Visualization. *IEEE Transactions on Visualization and Computer Graphics* 18[9] (2012), pp. 1520–1536; Miriah Meyer and Jason Dykes, Criteria for Rigor in Visualization Design Study. *IEEE Transactions on Visualization and Computer Graphics* 26[1] (2019), pp. 87–97.

13. Isabel Meirelles, Visualizing Information, in: *The Shape of Data in Digital Humanities*, ed. Julia Flanders and Fotis Jannidis (London 2018), pp. 167–177.

been developed that approach written text at different scales to support new forms of reading text.¹⁴ Similarly, there has been a keen interest to access and explore digitised cultural collections through the lens of visualisations and visual interfaces.¹⁵ Each field within the digital humanities possesses its own visual conventions and intellectual traditions, which visualisation design and research must accommodate in order to be effective within the collaborative efforts.

As the field of data visualisation experiences a humanist reorientation, there is a burgeoning interest in the political and epistemological implications of data visualisation. This has led to the formulation of critical, ethical, and feminist principles for visualisation research and design.¹⁶ To realise these aspirations and unpack the positivistic backpack of predominantly computational visualisation research, it is necessary to reassess the basic concepts and conventions for their application in the humanities.¹⁷ A crucial starting point involves challenging the key terms that every visualisation addresses: the subjects of visualisation (data), the intended audiences (users), and the actions they can perform (tasks). This triad is increasingly scrutinised, as scholars recognise the importance of interrogating these concepts to create more inclusive,

14. Stefan Jänicke, Greta Franzini, Muhammad Cheema, and Gerik Scheuermann, On Close and Distant Reading in Digital Humanities. *Eurographics Conference on Visualization* (2015), pp. 83–103.

15. Florian Windhager, Paolo Federico, Gunther Schreder, Katrin Glinka, Marian Dork, Silvia Miksch, and Eva Mayr, Visualization of Cultural Heritage Collection Data. *IEEE Transactions on Visualization and Computer Graphics* 25[6] (2019), pp. 2311–2330.

16. Marian Dörk, Patrick Feng, Christopher Collins, and Sheelagh Carpendale, Critical Infovis. *Extended Abstracts of the SIGCHI Conference on Human Factors in Computing Systems* (2013) pp. 2189–2198; Catherine D'Ignazio and Lauren F. Klein, Feminist Data Visualization. *VIS4DH: 2016 Workshop on Visualization for the Digital Humanities* (2016); https://dspace.ceid.org.tr/xmlui/bitstream/handle/1/955/Feminist_Data_Visualization.pdf, access: July 17, 2024, 1:55pm; Michael Correll, Ethical Dimensions of Visualization Research. *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems* (2019), pp. 1–13.

17. Johanna Drucker, Humanities Approaches to Graphical Display. *Digital Humanities Quarterly* 5[1] (2011).

diverse, and human-centered visualisations. By reevaluating these foundational aspects, the field of data visualisation can better align with humanistic values and principles, ultimately resulting in more ethically and critically informed research and design.

Johanna Drucker's proposal to view data as actively and purposefully collected 'capta' marks a significant step towards a humanist reevaluation of data visualisation.¹⁸ This shift comes as scholars have grown increasingly critical of the "aura of truth, objectivity, and accuracy" often promised with growing volumes of data.¹⁹ Such criticisms eventually led to the formation of critical data studies as a research area, where questions of power in data are raised.²⁰ One way to productively think of the contexts of data collection is to turn the attention to 'data settings' as the situations in which specific circumstances and decisions shape the data.²¹ This reframing emphasises the impact that contextual and situational factors have on data collection and interpretation. By viewing datasets as data settings, we acknowledge that data is not inherently objective, neutral, nor discrete. Considering data setting encourages us to critically examine the assumptions, limitations, and potential biases inherent in data, as well as the methods used to collect, analyse, and visualise it. Considering the central role of data in visualisation, these critical reconsiderations of data are necessary and, thankfully, in progress. By reevaluating such key terms, visualisations can

18. Ibid.

19. danah boyd and Kate Crawford, Critical Questions for Big Data. *Information, Communication & Society* 15[5] (2012), pp. 662–679.

20. Craig Dalton and Jim Thatcher, What Does a Critical Data Studies Look Like, and Why Do We Care? *Society and Space* 29 (2014); <https://www.societyandspace.org/articles/what-does-a-critical-data-studies-look-like-and-why-do-we-care>, access: July 17, 2024, 1:55pm; Rob Kitchin and Tracey Lauriault, Towards Critical Data Studies, in: *The Programmable City Working Paper 2*, ed. Jim Thatcher, Josef Eckert, and Andrew Shears (Lincoln 2014).

21. Yanni Alexander Loukissas, *All Data are Local* (Cambridge 2019).

be reframed not merely as technical procedures, but as acts of enunciation that acknowledge their position within power relations.²²

Similarly, a reconsideration of the term ‘user’ is urgently necessary, as it often perpetuates gender biases and implies a degree of dependency.²³ The visualisation pipeline exemplifies this framing, positioning users at the end of a linear process with limited power or influence.²⁴ A more human-centered approach should emphasise agency and curiosity, using alternative terms that encompass the entire visualisation process, from data collection and visualisation design to interactive exploration and critical reflection. The notion of the flaneur has been one such attempt to convey critical and creative aspirations for the design and use of visual interfaces.²⁵ The early history of computing has been largely shaped by analogies derived from work settings such as offices and libraries. Consequently, the central concepts – from the desktop with its files and folders to databases with indices and keys – echoed an orientation towards work. While information seeking research contributed to a human-centered understanding of the search process,²⁶ most of the prevailing concepts for search interfaces arguably resemble filing cabinets serving utilitarian goals of overcoming knowledge gaps, uncertainty,

22. Johanna Drucker, Information Visualization and/as Enunciation. *Journal of Documentation* 73[5] (2017), pp. 903–916.

23. Adam Bradley, Cayley MacArthur, Mark Hancock, and Sheelagh Carpendale, Gendered or Neutral? *Proceedings of the 41st Graphics Interface Conference GI '15* (2015), pp. 163–170.

24. Card, Mackinlay, Shneiderman, Information Visualization, pp. 1–34.

25. Marian Dörk, Sheelagh Carpendale, and Carey Williamson, The Information Flaneur. *CHI '11: Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (2011), pp. 1215–1224.

26. Brenda Dervin, An Overview of Sense-making Research. *International Communication Association Annual Meeting* (1984); <https://web.archive.org/web/20211011000201/http://faculty.washington.edu/wpratt/MEBI598/Methods/An%20Overview%20of%20Sense-Making%20Research%201983a.htm>, access: July 17, 2024, 1:55pm; Carol C. Kuhlthau, Inside the Search Process. *Journal of the American Society for Information Science* 42[5] (1991), pp. 361–371; Thomas D. Wilson, Information Behaviour. *Information Processing & Management* 33[4] (1997), pp. 551–572.

and even pathologies.²⁷ However, research on serendipitous,²⁸ everyday,²⁹ and exploratory³⁰ information seeking actually yielded a much more colourful and complex perspective on search practices, which hardly influenced the design of search interfaces.

Inspired by the literary figure of the flaneur,³¹ the notion of the information flaneur promises a much more productive and profound way of thinking about information seeking as an attempt to reconsider deficiency-based notions of users through the lens of this conceptual analogue.³² Following a flaneur's attitude toward the city, the information flaneur would see beauty and meaning as well as issues and tensions in digital information spaces. Translating the flaneur into a poetic persona for interface design is a deliberate proposition against pathological and passive notions of users and towards a more active and experiential approach to information practices.³³ The flaneur opens up a new perspective on users that highlights curiosity, reflection, and imagination. For this enterprise, key characteristics from the flaneur can be borrowed as an inspiration to envision novel interfaces to be playful, pleasurable, and/or provoking.³⁴ The flaneur has been described as an urban wanderer

27. David Bawden and Lyn Robinson, The Dark Side of Information. *Journal of Information Science* 35 [2] (2009), pp. 180–191.

28. Sandra Erdelez, Information Encountering. *Bulletin of the American Society for Information Science*, 25[3] (1999) pp. 25–29.

29. Pamela J. McKenzie, A model of Information Practices in Accounts of Everyday-Life Information Seeking. *Journal of Documentation* 59[1] (2003), pp. 19–40.

30. Gary Marchionini, Exploratory Search. *Communications of the ACM* 49[4] (2006), pp. 41–46.

31. Walter Benjamin, The Flâneur, in: Walter Benjamin, *Charles Baudelaire: A Lyric Poet in the Era of High Capitalism* (New York 1973), pp. 35–66.

32. Marian Dörk, Sheelagh Carpendale, and Carey Williamson, The Information Flaneur (2011), pp. 1215–1224.

33. Jarkko Kari and Jenna Hartel, Information and Higher Things in Life. *Journal of the American Society for Information Science and Technology* 58[8] (2007), pp. 1131–1147.

34. Dörk, Carpendale, Williamson, The Information Flaneur, pp. 1215–1224.

leisurely walking through streets and squares while interpreting and re-imagining city life.³⁵ This proves to be a useful lens with which to synthesise research on the cognitive, perceptual, and affective aspects of everyday information seeking in order to inform the design of visual interfaces. This conceptual analogue helps frame the information seeker as a curious explorer, critical spectator, and creative mind. From news feeds to library catalogues, the question becomes how interfaces could be designed to encourage open-ended and profound interactions with a wide range of digital information spaces. The information flâneur proposes a model for information seeking that conceptualises interaction with information spaces at varying levels of exploration and immersion and derived explorability as a new guiding principle for the design of digital interfaces. Since its formulation, the conceptual analogue of the information flâneur has aided the communication during collaborative design of navigable visualisations³⁶ of faceted databases,³⁷ unstructured texts,³⁸ and cultural collections.³⁹

To carry out analytical and interpretative tasks with data visualisations, interactivity is a crucial component, which also sets them apart from static diagrams. While questions of visual

35. Benjamin, *The Flâneur*, pp. 35–66.

36. Pauline Junginger, Dennis Ostendorf, Barbara Avila Vissirini, Anastasia Voloshina, Timo Hausmann, Sarah Kreiseler, and Marian Dörk, *The Close-Up Cloud: Visualizing Details of Image Collections in Dynamic Overviews*. *International Journal for Digital Art History* 5 (2020), pp. 6.2–6.13.

37. Marian Dörk, Nathalie Henry Riche, Gonzalo Ramos, and Susan Dumais, *PivotPaths: Strolling Through Faceted Information Spaces*. *IEEE Transactions on Visualization and Computer Graphics* 18[12] (2012), pp. 2710–2719.

38. Marian Dörk and Dawn Knight, *WordWanderer: A Navigational Approach to Text Visualisation*. *Corpora* 10[1] (2015) pp. 83–94.

39. Flavio Gortana, Franziska von Tenspolde, Daniela Guhlmann, and Marian Dörk, *Off the Grid*. *Open Library of Humanities* 4[2] (2018), p. 30.

encoding⁴⁰ have been of central importance for the study and design of visualisations, there has also been considerable interest in the role of interaction for visual information seeking and data analysis.⁴¹ However, during the design and study of visualisations visual encoding tends to be prioritised over interactivity, which may go back to the visualisation pipeline that has relegated user input to its very end.⁴² While considerable attention is devoted to the visual encoding, i.e., mapping data dimensions to graphical features, the interaction techniques and animated transitions are often an afterthought. Likewise, the interpretation of visualisations is most often focused on the visual layer often disregarding the dynamic properties and interactive capabilities of a visualisation. To elevate the place of interactivity in data visualisation, we turn to the fold according to Deleuze.⁴³ Our interpretation of the fold presents a conceptual analogue that makes a valuable proposition about the relationship between encoding and interaction as two intertwined and interdependent layers of any data visualisation.⁴⁴

The fold offers a new language for the creation and interpretation of interactive visualisations that takes the philosophical construct of the fold as a starting point that espouses complexity in knowledge systems. The fold offers three complementary operations – explication, implication, and complication – that can be read as

40. Jaques Bertin, *Semiology of Graphics* (Wisconsin 1983).

41. Ben Schneiderman, Direct Manipulation: A step Beyond Programming Languages. *IEEE Transactions on Computers* 16[8] (1983), pp. 57–69; Niklas Elmqvist, Andrew Vande Moere, Hans-Christian Jetter, Daniel Cernea, Harald Reiterer, and TJ Jankun-Kelly. Fluid Interaction for Information Visualization. *Information Visualization* 10[4] (2011), pp. 327–340.

42. Card, Mackinlay, Shneiderman, *Information Visualization*, pp. 1–34.

43. Gilles Deleuze, *The Fold* (London 1993).

44. Brüggemann, Viktoria, Mark-Jan Bludau, and Marian Dörk, The Fold: Rethinking Interactivity, in *Data Visualization. DHQ: Digital Humanities Quarterly* 14(3) (2020).

a concrete program for the design of interactive visualisations in which informational density and complexity can be dynamically and iteratively expanded and reduced. The fold is an evocative invitation to think and speak about the form and function of any data visualisation as “an elastic body [with] cohering parts that form a fold, such that they are not separated into parts of parts but are rather divided to infinity in smaller and smaller folds that always retain a certain cohesion.”⁴⁵ Building on coherence, elasticity, and infinity as central qualities, we can formulate design principles that make interactivity an integral component of visualisation: consistent coupling, constrained fluidity, and linked perspectives.⁴⁶ The philosophical and practical notions of the fold thus open a vocabulary for a critical framework of visualisation design that integrates what is shown with how it can be changed through interactive means. With the fold’s operations the interactive mechanisms of a visualisation can be identified and examined with regard to their role in transforming the appearance and arrangement of the visual elements. The qualities provide an interpretative lens onto visualisations, something that has been sorely lacking for the interpretative and critical appraisal of interactive visualisations.

The ideas of the fold already permeate the design of many interactive visualisations, for example, of text concordances⁴⁷ and time series.⁴⁸ The fold has already been used as a conceptual foundation for the design of an elastic interface for the reference library of German

45. Deleuze, *The Fold* (1993), p. 6.

46. Bludau, Brüggemann, Busch, and Dörk, *The Fold*.

47. Martin Wattenberg and Fernanda B. Viégas, *The Word Tree*. *IEEE Transactions on Visualization and Computer Graphics* 14[6] (2008), pp. 1221–1228.

48. Patrick Riehmann, Joshua Reibert, Jens Opolka, and Bernd Froehlich, *Touch the Time*. *Proceedings of the 20th EG/VGTC Conference on Visualization* (2018).

novelist and poet Theodor Fontane.⁴⁹ The visual interface is constructed in such a way that it provides interactive control to shift between several degrees of detail and abstraction, from individual pages to entire books and their authors. By incorporating the ideas of the fold, the resulting prototype supports a new kind of interplay between distant and close reading with a continuous navigation along several granularity levels.

The encounter between visualisation researchers and humanities scholars offers a great opportunity for mutual learning and joint experimentation. While many collaborative visualisation projects exhibit a certain service orientation – as in, visualisation for the humanities – there is a growing appreciation of the mutual exchange of insights and methodologies.⁵⁰ Still, the central notion of collaboration also carries in its second dictionary definition the militaristic cooperation with an enemy. Surely, in the encounters between humanities and visualisation, there can be tensions between qualitative interpretation and quantitative analysis, but these can give rise to fruitful research exchanges that can draw out the unique qualities of source material.⁵¹ For example, a research collaboration at the interface between visualisation and poetry has resulted in an innovative poem visualisation that translates the sonic qualities of poetry into a topology overlaid over the text allowing for multiple ways of engagement.⁵² It is not just that visualisation thus enables

49. Mark-Jan Bludau, Viktoria Brüggemann, Anna Busch, and Marian Dörk, Reading Traces, in: *Eurographics Conference on Visualization* 39[3] (2020), pp. 77–87.

50. Adam James Bradley, Mennatallah El-Assady, Katherine Coles, Eric Alexander, Min Chen, Christopher Collins, Stefan Jänicke, David Joseph Wrisley, Visualization and the Digital Humanities. *IEEE Computer Graphics and Applications* 38[6] (2018), pp. 26–38.

51. Uta Hinrichs, Stefanie Forlini, and Bridget Moynihan, Speculative Practices. *IEEE Transactions on Visualization and Computer Graphics* 22[1] (2016), pp. 429–438.

52. Nina McCurdy, Julie Lein, Katharine Coles, and Miriah Meyer, Poemage: Visualizing the Sonic Topology of a Poem. *IEEE Transactions on Visualization and Computer Graphics* 22[1] (2016), pp. 439–448.

new forms of reading, seeing, or appreciating culture, but it also offers different kinds of instruments for scholarly work. In this sense, data visualisations can be compared to sandcastles that provoke, speculate, and mediate during the process of cross-disciplinary and collaborative knowledge generation.⁵³

The notion of sandcastles invokes the idea of cross-disciplinary and collaborative knowledge generation with visualisation that prompts new perspectives and interpretations. Sandcastles are openly visible, subject to change, and conducive to casual communication. These kinds of qualities that we are familiar with from personal, haptic experience can be associated with data visualisation to spark a different perspective on their use in collaborative settings. Reframing collaborative visualisation design and research as ‘sandcastling’ thus makes an inviting and open gesture referring to a physical practice that is legible with plain sight and can be pursued together. This image of visualisation stands in stark contrast to the visualisation pipeline signifying a static, secluded, and sealed apparatus to be maintained by professionals in service to those who are merely using the system without an understanding of its inner workings. Sandcastles, however, imply a productive and playful interdependence between different actors and with this also between conceptual, aesthetic, and technical expertises. This interdependence speaks to a shift away from service towards synergy in the collaboration between visualisation and humanities. Shaping the understanding of such socio-technical constellations, the terminology can promote certain perspectives and practices.

53. Uta Hinrichs, Stefanie Forlini, and Bridget Moynihan, In Defense of Sandcastles. *Digital Scholarship in the Humanities* 34 (2018), pp. i80–i99.

Conceptual analogues – metaphors that combine theoretical principles with practical experiences – are particularly potent communication aids to reconsider the basic vocabulary of data visualisation (capta and data settings), to formulate poetic personas (information flaneur), to suggest design principles (fold), and to reflect research methodologies (sandcastling). Conceptual analogues have the potential to step into intellectual universes, while remaining connected to concrete everyday practices. By offering an evocative and accessible vocabulary, conceptual analogues can help cross disciplinary boundaries to formulate and convey aspirations for visualisation design and research. Conventions and dichotomies can be challenged by revisiting information seeking as strolling, coupling visual encoding more closely with interactive capabilities, and framing playful collaboration as playing in the sand. Especially in collaborations with humanists invoking expertise from multiple fields, conceptual analogues can support the joint development of coherent frameworks that are not impeded by technical concern but imbued with shared aspirations and commitments.

On the flipside, drawing from the humanities for the design and study of visualisation invokes a range of pitfalls associated with the tensions between practical and theoretical ambitions. First, there is always the risk of getting lost in a proverbial rabbit hole of ever more intricacies and complications. There is also the risk of reducing sophisticated concepts into mere design material that disregards critical distinctions and developments. Lastly, drawing from the philosophies of the past risks remaining stuck in a land dominated by stale, male, and pale philosophers, while visualisation may need philosophies for the future that represent the full diversity of humanity today and speak to the issues of tomorrow.

Moving forward from the fruitful engagements with the conceptual analogues, humanist visualisation needs to connect more closely with current epistemological thinking and writing about the big questions concerning ‘life, the universe and everything.’ For example, Anna Tsing et al. offer a colourful coral reef gleaming with inspirations to recognise and appreciate the “Arts of living on a damaged planet.”⁵⁴ Engaging with current thought in the environmental humanities is an urgent matter of concern to come to grips with the multiple crises of the world: “To survive, we need to relearn multiple forms of curiosity. Curiosity is an attunement to multispecies entanglement, complexity, and the shimmer all around us.”⁵⁵ Humanist data visualisation can make a profound contribution to stimulate a form of curiosity that recognises and appreciates the entangled shimmer of the world. To remain relevant, visualisation research and design must intertwine with epistemological advances in related disciplines such as cultural and literary studies. This requires a continuous reflection of the vocabulary used in visualisation design and research, ensuring that it remains attuned to the evolving landscape of human understanding and inquiry.

54. Anna Lowenhaupt Tsing, Nils Bubandt, Elaine Gan, and Heather Anne Swanson, *Arts of Living on a Damaged Planet* (Chicago 2017).

55. Tsing, Bubandt, Gan, and Swanson, *Arts of Living on a Damaged Planet*, p. G11.

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