CHAPTER 4

Covid-19 Comics and the Data Visualization of Everyday Life

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During Covid-19 our pandemic lives became deeply entwined with data visualizations. From instructional handwashing infographics to calls to "flatten the curve," data visualizations were telling us how to live and predicting our possible futures.[1] As the cascade of open data relating to the Covid-19 virus grew over the course of the pandemic, so too did the charts and graphs claiming to decipher, decode, and translate this data for everyday understanding.

Alongside authorial graphics produced by the country's biggest newspapers, the CDC, and the World Health Organization, citizens and artists also leveraged data visualization conventions to express the turbulent, strange experience of everyday life under the virus. Tackling everything from top-level health statistics to daily behavior changes around handwashing, from

1 This chapter is based on collaborative work between Anna Feigenbaum, Alexandra Alberda, and Aria Alamalhodaei. Where noted, a previous version of the text appeared in Anna Feigenbaum and Aria Alamalhodaei, *The Data Storytelling Workbook* (London: Routledge, 2020).

cleaning the kitchen to understanding the importance of rising R numbers, these Covid-19 data comics evidenced the heightened role that health data came to play in our everyday lives since the onset of the Covid-19 pandemic.

In this chapter, we situate these Covid-19 data comics in relation to broader practices of graphic medicine as it intersects with critical data studies and data feminism. In doing so, our aim is to build a conceptual framework for innovating public health messaging around an ethos of empathy and in ways that can foster what Lulu Pinney calls "data know-how."[2] According to Pinney, data know-how is a way of doing "data literacy" out in the everyday world. It combines contextualizing data as a social practice with sharing data in ways that enable social change, agency, and empowerment. The examples we draw on toward the end of this chapter form part of a large-scale study of 15,000 "Covid comics" posted and shared over Instagram between January 2020 and March 2021.

Humanizing Data Visualizations and Data Feminism

The data comics emerging from Covid-19 often contrasted with more traditional approaches to data visualization in a number of ways. Traditional data visualization practices found in business, scientific, government, and news communications are often characterized by a sanitized, omniscient aesthetic. They tend to prioritize formal structure and cleanliness over emotion and empathy.[3] Such data visualizations have been termed "generic visuals" by Chris Anderson and his team at the University of Leeds, referring to "images with standardized formats and appearances, which perform particular design functions,

2 Lulu Pinney, "Is Literacy What We Need in an Unequal Data Society?," in *Data Visualization in Society,* eds. Martin Engebretsen and Helen Kennedy (Amsterdam: Amsterdam University Press, 2020), 223.

3 See Catherine D'Ignazio and Lauren F. Klein, "Feminist Data Visualization," in Workshop on Visualization for the Digital Humanities at IEEE VIS Conference 2016, available at *Kanarinka,* http://www.kanarinka.com/wp-content/uploads/2015/07/IEEE_Feminist_Data_Visualization.pdf.

and which circulate with increasing frequency in the news media."[4]

These kinds of visualizations can lead to data stories that feel aloof, turning humans into clean lines and oversimplified icons without providing any sense of personhood. Such traditional data storytelling practices also often perform what Donna Haraway refers to as the "god trick"[5] of seeing from everywhere and nowhere, as is common in many big data visualizations and social network analysis.[6] These kinds of macro-scale information visualizations have their place, but the ways that they make people feel are often not considered as part of their communicative effect. Helen Kennedy and Rosemary Lucy Hill write that "data are as much felt as they are experienced cognitively and rationally."[7]

Designers note the emotional importance of aesthetic decisions, but critical data studies researchers, according to Kennedy and Hill, have paid little attention to the emotional aspects of people's encounters with numbers and statistics in data visualizations. They argue that there has also been a lack of attention paid to nonexpert engagement with data, or what Nick Couldry and Alison Powell refer to as "big data from the bottom up."[8] And although this gap has begun to be filled by new scholarship in recent years, that data "is lived and experienced at the level of

4 Chris Anderson, "Generic Visuals in the News: The Role of Stock Photos and Simple Data Visualizations in Assembling Publics," research project, School of Media & Communication, University of Leeds, 2020, https://gtr.ukri.org/projects?ref=AH%2FT000015%2F1.

5 Donna Haraway, "Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective," *Feminist Studies* 14, no. 3 (1988): 575–99.

6 See D'Ignazio and Klein, "Feminist Data Visualization," and Helen Kennedy and Rosemary Lucy Hill, "The Feeling of Numbers: Emotions in Everyday Engagements with Data and Their Visualisation," *Sociology* 52, no. 4 (2018): 830–48.

7 Kennedy and Hill, "The Feeling of Numbers," 2.

8 Nick Couldry and Alison Powell, "Big Data from the Bottom Up," *Big Data & Society* 1, no. 2 (July 2014).

the everyday"[9] has perhaps never been more significant than it was in the time of Covid-19.

Inspired by such feminist critiques of data, many working in these areas want to see more "data humanism," not only in how audiences emotionally respond to visualizations, but also how they are produced, designed, and shared. Giorgia Lupi put it this way, "We are ready to question the impersonality of a merely technical approach to data, and to begin designing ways to connect numbers to what they really stand for: knowledge, behaviors, people."[10] Among other practices, Lupi advocates for visually communicating the complexity of data, sketching with data as part of the design process, capturing broader contexts and remembering that data — like people — is flawed. In their work on "data feminism," Catherine D'Ignazio and Lauren F. Klein call for, among other things, telling stories more horizontally, considering more about data contexts, visualizing messiness, embracing pluralism, elevating emotion, and embodiment, and evaluating the effectiveness of a visualization in relation to emotions.[11]

These signposted practices for humanizing data share many attributes with aesthetic and structural elements of the comics medium and graphic storytelling more broadly. Comics have been contentiously defined in a number of ways, including as "sequential art"[12] and later as "pictorial narrative."[13] However, the rise of single panels and hyperlinked webcomics disrupted these

9 Kennedy and Hill, "The Feeling of Numbers," 16.

10 Giorgia Lupi, "Data Humanism: The Revolutionary Future of Data Visualization," *Print,* January 30, 2017, https://www.printmag.com/article/data-humanism-future-of-data-visualization/.

11 See D'Ignazio and Klein, "Feminist Data Visualization," and Catherine D'Ignazio and Lauren F. Klein, *Data Feminism* (Cambridge: MIT Press, 2020).

12 See Will Eisner, *Comics and Sequential Art: Principles and Practices from the Legendary Cartoonist* (New York: W.W. Norton, 2008), and Scott McCloud, *Understanding Comics: The Invisible Art* (New York: HarperPerennial, 1993).

13 See Greg Hayman and Henry John Pratt, "What Are Comics?," in *Aesthetics: A Reader in Philosophy of the Arts,* eds. David Goldblatt and Lee Brown (Upper Saddle River: Pearson Prentice Hall, 2005), 419–24.

earlier definitions, challenging the idea of linearity as necessary to the comics form and highlighting the many different artistic and narrative styles that comics can take. Rather than pursue a tidy definition, Aaron Meskin proposes that "what we need is some grasp of the various styles, techniques, and purposes found in the art form, as well as a broad grasp of how to evaluate the variety of elements that are typically (but not necessarily) used in it, such as narrative, drawing, dialogue, and coloring."[14] Both in this chapter and in our broader research, we work with this approach to comics. Our interest is in how these elements from the comics medium can contribute to humanizing data and to creating more empathetic and effective "data comics."[15]

But What Is Data?[16]

Before diving into this emergent area of "data comics," it is likewise important to establish a clearer understanding of how we approach data in our research. Popular definitions of "data" vary both across and within fields. Those, like us, coming from a critical data studies and data feminism perspectives often disagree with definitions found in mainstream and popular texts. Take for example this definition from the UK government's open data initiative: "[Data is a] value or set of values representing a specific concept or concepts. Data become 'information' when analyzed and possibly combined with other data in order to extract meaning and to provide context. The meaning of data can vary depending on its context."[17] Often, as seen in this prominent UK

14 Aaron Meskin, "Defining Comics?," *Journal of Aesthetics and Art Criticism* 65, no. 4 (2007): 376.

15 See Benjamin Bach, Nathalie Henry Riche, Sheelagh Carpendale, and Hanspeter Pfister, "The Emerging Genre of Data Comics," *IEEE Computer Graphics and Applications* 37, no. 3 (2017): 6–13, and Feigenbaum and Alamalhodaei, *The Data Storytelling Workbook.*

16 A previous version appeared in Feigenbaum and Alamalhodaei, *The Data Storytelling Workbook.*

17 *Data.gov,* s.v. "data," https://web.archive.org/web/20170522074049/https://www.data.gov/glossary.

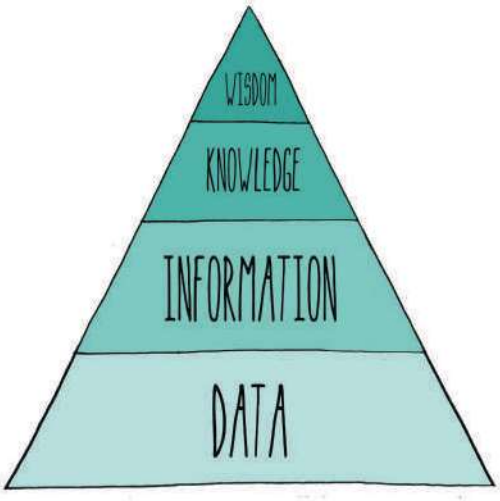

Fig. 1. DIKW Model illustrated by Alexandra Alberda. Courtesy of the artist.

government glossary, data is defined as a base material. Like feelings before we give them names, or food before it is cooked, data is said to be raw before it is processed into information (then knowledge, then wisdom in this popular DIKW model) (fig. 1).

Our work follows other critical data scholars and data feminists who contest the idea that data can ever exist in a raw, pure form. As Lisa Gitelman and Virginia Jackson argue in the introduction to the collection *"Raw Data" Is an Oxymoron,* people often act as if data can exist in a realm apart from humans.[18] But, just as a photograph is not an objective representation of reality, neither is data. A photo, they remind us, is shaped and framed by the photographer. Likewise, data requires human participation. Just like photography, data "needs to be under-

18 Lisa Gitelman and Virginia Jackson, "Introduction," in *"Raw Data" Is an Oxymoron,* ed. Lisa Gitelman (Cambridge: MIT press, 2013), 1–14.

stood as framed and framing."[19] For us data is never raw, but always entangled with humans and human values.

This is why we promote introducing comic techniques to data communication in order to help people focus on the human elements of statistical information and to better contextualize how data matters in people's everyday lives. Doing so enables data storytellers and their audiences to more clearly pinpoint what is at stake, and to communicate it both more effectively and more empathetically for audiences.

Statistical Chaos and Covid-19 Data

This need for humanizing data becomes even more prevalent in times of "statistical chaos." Through even a quick reflection one can clearly see statistical chaos at work in Covid-19 data. From the unknown timelines of lockdowns and vaccination trials to the fear of new strands and ever-increasing R numbers, the inability for the pandemic to be controlled or even (particularly in the early days) well understood by the medical establishment in turn created a sense of being out of control for the population. This makes the communication of statistics and other forms of numeric data particularly challenging.

In the press release for a 2020 event hosted by Bournemouth University, Royal Statistical Society and the Association of British Science Writers, An Nguyen said, "Statistics have been a staple of daily life and daily news since at least the latter half of the 20th century, but have never taken such a central place as they do during the pandemic."[20] Nguyen, who convened the symposium also explained:

> We are in a public health crisis where everything we do at individual, organisational and societal levels literally depends

19 Ibid., 5.

20 From the transcription of An Nguyen's intervention at the "Coronavirus, Statistical Chaos and the News" online symposium, Bournemouth University, December 4, 2020.

Fig. 2. Arthur Frank Illness Narratives illustrated by Alexandra Alberda. Courtesy of the artist.

> on what the numbers tell us[. …] Amidst much public confusion, anxiety, and fear, we seem to see numerical mis- and disinformation everywhere on both mainstream and social media[. …] At the same time, the pandemic has seen many excellent, cutting-edge, and breath-taking data journalism and communication projects around the world.[21]

21 Ibid.

People are flooded daily with new data that is being produced around the globe at an unprecedented speed, but we are too close to the chaos to step outside and reflect. What we will know about Covid-19 in a year or two will have a storyline or narrative that we were able to tell from within the current state of the pandemic. For in chaos, Arthur W. Frank writes, we can only tell stories "on the edges of the wound."[22] In his groundbreaking book *The Wounded Storyteller,* Frank outlines what he argues are the three most common illness narratives: restitution, quest, and chaos (fig. 2). The first structure is *restitution*. According to Alexandra Alberda, restitution refers to narratives that seek to return someone to a previous normal.[23] These narratives focus on restorable health conditions, such as recovering from a common cold. Restitution narratives frequently appear in advertisements for medicine that put forward social myths about overcoming illness, such as this medicine "cures all my pains."

Frank's second structure is the *quest narrative* or the "hero's journey," as it is often called in fiction. In this structure, the protagonist starts from a "normal" state that gets disrupted by serious illness. Alberda explains that protagonists in a quest narrative do not return to "normal." Rather, they are fundamentally transformed by the skills and experiences they gain along their journey.[24] In the public health sector, quest narratives often appear in campaigns for weight loss, quitting smoking, or recovery from alcohol abuse.

Frank's third narrative type is *chaos*. *Chaos* is the antinarrative, temporally disjointed and without a definite resolution. Some features of a chaos narrative, as defined by Frank, include troubles that go down to a "bottomless depth," a lack of control

22 Arthur W. Frank, *The Wounded Storyteller: Body, Illness, and Ethics* (Chicago: University of Chicago Press, 2013), 101.

23 See Aria Alamalhodaei, Alexandra Alberda, and Anna Feigenbaum, "Humanizing Data Through 'Data Comics': An Introduction to Graphic Medicine and Graphic Social Science," in *Data Visualization in Society,* eds. Martin Engebretsen and Helen Kennedy (Amsterdam: Amsterdam University Press, 2020): 347.

24 Ibid.

and a feeling of being swept away, stories that relate a spiral of suffering characterized by "and then, and then, and then" narrative progressions; they are hard for listeners to hear because they are threatening and can provoke anxiety and feelings of helplessness; they are emotionally battering, and the ill person's loss of control is amplified by the medical establishment's inability to control the disease.[25]

On an individual level, the chaos narrative is characterized by a "telling without mediation."[26] Protagonists are not yet able to reflect on themselves or their situation because they are amidst the chaos. Zoomed out from the individual, chaos narratives can also apply to collective events. In fact, Frank says he first began theorizing chaos narratives on reading testimonies of the Holocaust. In this larger contextual level, chaos narratives are a sign of systematic failure, of structures and infrastructures unable to cope with or respond to an illness or trauma that collectively unfolds.

The Covid-19 pandemic, on a global scale, revealed health inequalities around the world and unearthed hidden or previously dismissed forms of systematic racism and discrimination, including able-ism and age-ism.[27] On an individual level, the effects of Covid-19 seeped into every single person's life, forcing all of us to view ourselves against the pandemic's health statistics, its graphs and charts, and changing projections. We were called upon or interpellated into the statistical chaos that surrounded us, asked to continuously evaluate and reevaluate our own health conditions and that of our loved ones. We became lay experts in the risk factors of our lifestyles, assessors of our

25 Frank, *Wounded Storyteller,* 98–114.

26 Ibid., 98.

27 See Kathryn Haynes, "Structural Inequalities Exposed by COVID-19 in the UK: The Need for an Accounting for Care," *Journal of Accounting & Organizational Change* 16, no. 4 (2020): 637–42; Michael Marmot and Jessica Allen, "COVID-19: Exposing and Amplifying Inequalities," *Journal of Epidemiology and Community Health* 74, no. 9 (2020): 683–88; and Whitney N. Laster Pirtle, "Racial Capitalism: A Fundamental Cause of Novel Coronavirus (COVID-19) Pandemic Inequities in the United States," *Health Education & Behavior* 47, no. 4 (2020): 504–8.

access to services, regulators of our neighborhood restrictions. As statistical chaos meets the chaos of this not-yet-controllable illness, together we are left to try and make sense of the world's first data visualized pandemic. We are "datafied citizens," as Veronica Barassi suggests,[28] in this upside-down data world.[29]

Data Comics[30]

Across different fields, research has repeatedly shown that features of the comics medium can help increase the effectiveness of communicating and comprehending complex data.[31] For example, comics use relatable icons that can provoke identification with readers, are able to narrate experience without words, can capture scales of illness, represent pain, show the internal fears of clinical encounters, and in doing so make visible the emotional and cognitive dimensions of living through illness.[32] In addition, hand-drawn comics can give us access into personal knowledges through the drawn lines and aesthetic choices of their creators. This is a feature that other forms of communication do not usually provide audiences. Audience engagement with the mark-making of the artist stimulates an emotive connection that is not as easily facilitated in technical representations.

28 Veronica Barassi, "Datafied Citizens in the Age of Coerced Digital Participation," *Sociological Research Online* 24, no. 3 (2019): 414–29.

29 See Jonathan Gray, "Three Aspects of Data Worlds," *Krisis: Journal for Contemporary Philosophy* 1 (2018): 3–17.

30 A previous version appeared in Feigenbaum and Alamalhodaei, *The Data Storytelling Workbook.*

31 See M.K. Czerwiec et al., *Graphic Medicine Manifesto* (University Park: Pennsylvania State University, 2015); Gary Ashwal and Alex Thomas, "Are Comic Books Appropriate Health Education Formats to Offer Adult Patients?" *AMA Journal of Ethics* 20, no. 2 (2018): 134–40; and Matthew N. Noe and Leonard L. Levin, "Mapping the Use of Comics in Health Education: A Scoping Review of the Graphic Medicine Literature," *Graphic Medicine,* July 24, 2020, https://www.graphicmedicine.org/mapping-comics-health-education/.

32 See Susan M. Squier, "So Long as They Grow Out of It: Comics, the Discourse of Developmental Normalcy, and Disability," *Journal of Medical Humanities* 29, no. 2 (2008): 71–88.

Comics have been found to be especially beneficial when trying to connect people with complex or sensitive data, such as health data. The use of graphics to represent decision-making in health has repeatedly been proven useful for patient communication.[33] Comics can effectively communicate risk factors and social issues surrounding an illness. Readers can relate to events and experiences, connecting them to their own and creating empathy.[34] Although comics have different histories and take on different aesthetics throughout the world, they are a cross-cultural medium, prevalent in popular cultures. These features lend comics well to humanizing data. Yet, as data visualization researcher Benjamin Bach and his colleagues argue (in a paper written as a comic), "Although comics are familiar to everyone, they are vastly underexplored for data-driven storytelling."[35]

Alberda summarizes the reasons for why comics can work well for data storytelling around three principles: comics are approachable, accessible, and relatable.[36] By approachable, Alberda refers to how comics are prevalent in popular culture and are created and read in many cultures. Generally speaking, in relation to accessibility, the comics medium is often used in literacy training. Iconography can be used to represent local, regional, and national identities. And visuals are often more

33 See Patricia F. Anderson, Elise Wescom, and Ruth C. Carlos, "Difficult Doctors, Difficult Patients: Building Empathy," *Journal of the American College of Radiology* 13, no. 12 (2016): 1590–98; Yuichi Furuno and Hiroyasu Sasajima, "Medical Comics as Tools to Aid in Obtaining Informed Consent for Stroke Care," *Medicine* 94, no. 26 (2015); Michael J. Green and Kimberly R. Myers, "Graphic Medicine: Use of Comics in Medical Education and Patient Care," *BMJ* 340, no. 7746 (2010): 574–77; and Sarah T. Hawley et al., "The Impact of the Format of Graphical Presentation on Health-Related Knowledge and Treatment Choices," *Patient Education and Counseling* 73, no. 3 (2008): 448–55.

34 See Matthew P. McAllister, "AIDS, Medicalization, and the News Media," in A*IDS: A Communication Perspective,* eds. Timothy Edgar, Mary Anne Fitzpatrick, and Vicki S. Freimuth (New York: Routledge, 1992), 195–221.

35 Benjamin Bach et al., "The Emerging Genre of Data Comics," *IEEE Computer Graphics and Applications* 37, no. 3 (2017): 6.

36 Alexandra Alberda, "Learning from Comics," in Feigenbaum and Alamalhodaei, *The Data Storytelling Workbook,* 161–62.

effective than text alone because imagery can get closer to cultural and emotional meanings. Finally, comics are relatable because they tell the human side of a health issue and have been shown to help build communities.

Looking at each of these aspects in further detail, we can see how comics are approachable, accessible, and relatable. The familiarity of the medium makes comics *approachable*, because the reader has control over how long to engage with the work. Comics express messages through words and images. As opposed to videos or television, when reading comics we process the message at our own speed. In terms of connecting with storytelling in comics, Michael J. Green and Kimberly R. Myers hypothesize that comics may make people feel "more focused and in control"[37] and "less isolated and more hopeful"[38] through this individual pacing.

This structural aspect of comics also contributes to its potential for enhancing data-driven storytelling. Bach and colleagues suggest that making use of panels can help break complex processes into less complex units, helping guide the reader through transitions.[39] For example, panels might be used in a data-driven comic story to move from detail to broader context, or as a way of drilling down from broader picture to smaller detail.

Comics are likewise *accessible* in that they are usually presented in an easy-to-understand format. They often connect with readers by employing iconography that has a local, regional, or national identity, using recognizable images that can often get closer to meaning than text can alone. Because of their familiarity and ability to make information more comprehensible, comics have been found to be a useful medium for getting information out to the general public.[40]

37 Green and Myers, "Graphic Medicine."
38 Ibid.
39 Bach et al., "The Emerging Genre of Data Comics."
40 Sarah McNicol and Lydia Wysocki, "Comics in Qualitative Research," in *SAGE Research Methods Foundations,* eds. Paul A. Atkinson et al. (London: SAGE, 2019), n.p.

This unique combination of words and images often makes comics more *relatable* than other graphic forms. In the case of health, "comics can offer patients and family members opportunities for self-awareness, reassurance, empathy, companionship and ways to explore the impact of illness on family relationships."[41] Not only is it important that the disease and health data are depicted accurately, but that patient and family experiences are also represented fairly.[42] Through the use of emotive stories, people can make stronger connections with the data, helping them to make sense of their own personal experiences with a particular issue or illness.

Much of the reason for the approachability, accessibility, and relatability of comics is that, as a medium, comics are often characterized by the presence of multiple messages. Subtext, performative encounters, and conflicted feelings can be represented graphically in comics. For example, comics can represent a conversation along with the hidden, unspoken meaning behind the words — something that is almost impossible to do with text alone. In this way, the reader simultaneously has access to both the words and the thoughts of the characters. This view inside of someone's inner world illustrates that what we say out loud is not always what we feel inside.[43]

Data indicates that the pandemic led to increased anxiety and reduced well-being, and so this exploration of how our interpersonal interactions differs from our inner mental states and feelings has become of heightened importance.[44] Uncertainty and the need to be hypervigilant to guard our health and the health of others contributes to feelings of irritability, being overwhelmed, exhaustion, burnout, and anxiety.[45] Many people

41 Ibid.

42 See Green and Myers, "Graphic Medicine."

43 Ibid.

44 Emma Hepburn, *How to Stay Calm in a Global Pandemic* (Paris: Hachette, 2020).

45 See ibid.; Walter Cullen, Gautam Gulati, and Brendan D. Kelly, "Mental Health in the COVID-19 Pandemic," *QJM: An International Journal of Medicine* 113, no. 5 (2020): 311–12; and Betty Pfefferbaum and Carol S.

try to mask or contain these feelings at home and at work, which can lead to further stress.[46] Gaining emotional intelligence over our own and others' feelings has thus become central to wellness practices in workplaces and daily live. Covid-19 comics were being circulated and reprinted on these issues, often capturing what we cannot explain in words.

Graphic Medicine

This layered storytelling style is particularly helpful for communicating the uncertainty of health and medical data — both as claims to truth and in relation to the human experiences that data captures.[47] With regard to the pandemic, as different people responded to preventative health measures, testing, vaccinations, illness, and treatment differently, the plurality of meaning in comics could also work to convey a diversity of human experiences, as promoted by feminist designers calling for humanizing data.[48]

Many of these kinds of data comics that emerged during and about Covid-19 could be classified under the umbrella term "graphic medicine." Some prolific artists producing work during the pandemic were already explicitly aligned to this community of comics, others were becoming part of the growing field, whether through their own associations or through researchers pulling their work under this rubric to give some context and history to the practice of telling health stories through elements of the comics medium. For example, in the preface to *Covid Chronicles: A Comics Anthology,* Kendra Boileau notes the effect

North, "Mental Health and the COVID-19 Pandemic," *New England Journal of Medicine* 383, no. 6 (2020): 510–12.

46 See Hepburn, *How to Stay Calm in a Global Pandemic*, and Salima Hamouche, "COVID-19 and Employees' Mental Health: Stressors, Moderators and Agenda for Organizational Actions," *Emerald Open Research* (2020).

47 A previous version appeared in Feigenbaum and Alamalhodaei, *Data Storytelling Workbook.*

48 See McNicol and Wysocki, "Comics in Qualitative Research," and Lupi, "Data Humanism."

that the rise of graphic medicine has had on trade publishing: "A book like *Covid Chronicles* is a great example of how Graphic Medicine so effectively conveys ideas of scale and connection."[49]

Graphic medicine sits at the intersection of the comics medium and health care. In 2007, the term "graphic medicine" was coined by Ian Williams, a physician, writer, and comics artist.[50] Today, "graphic medicine" refers to both a graphic genre and a critically acclaimed organization. The phrase provides an umbrella term to bring together a growing number of comics that engage with health care, illness, disability, patient education, treatment and patient experiences, and practitioner experiences. Works classified as graphic medicine cross a variety of comics genres, including webcomics, graphic pathographies, informational comics, comics strips, single panels, and video/audio installations.

Advocates of graphic medicine see the potential of enhancing effective communication through the direct, collaborative involvement of patients, practitioners, and artists. Graphic memoirs specifically bring out the participatory and humanizing elements of graphic medicine. These memoirs, or graphic pathographies, include acts of personal storytelling about the lived experience of illness or disability. This often involves representing how people encounter and make sense of data in relation to illness, and in doing so exploring complex personhood and stigmatized health identities. In this regard, Christina Maria Koch writes, "The visual-verbal medium of comics is particularly apt in showing how intricately mental states are bound up with lived bodily experience and an embodied sense of self."[51]

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49 Kendra Boileau, "Preface," in *COVID Chronicles: A Comics Anthology,* eds. Kendra Boileau and Rich Johnson (University Park: Pennsylvania University Press, 2021), x–xi.

50 See Green and Myers, "Graphic Medicine."

51 Christina Maria Koch, "When You Have No Voice, You Don't Exist? Envisioning Disability in David Small's *Stitches*," in *Disability in Comic Books and Graphic Narratives,* eds. Chris Foss, Jonathan W. Gray, and Zach Whalen (London: Palgrave Macmillan, 2016), 29.

In the comics medium, hypervisualization allows artists to represent the somatic and psychological experience of one's changing health and responses to it, from what it feels like to receive a diagnosis to the fear of telling others about your illness. Comics classified as graphic medicine often include quantitative data as a way of connecting the clinical representation of data with the human experience of becoming a patient in relation to that data. In this way the data about an illness or set of patients (or in the case of the pandemic, an always "potential patient") is juxtaposed with the routine and often mundane experiences of everyday life.

Graphic medicine and graphic pathographies, in particular, work to emphasize the human side of health experiences that play out alongside the clinical lexicon upheld by healthcare systems.[52] In the case of Covid-19, this can be thought of, for example, as a contrast between reading daily positive case statistics and the experience of being tested or taking a loved one for a test. Giving narrative to numbers through these comics elements can help practitioners move beyond sanitized, authorial, or generic data visualizations. Instead, their data stories can come to tell complicated, contested, and, perhaps most importantly, chaotic data stories. For the remainder of this chapter we turn to look at a small set of examples from our research sample of Covid-19 data comics that illustrate key features of the comics medium and graphic medicine.

Covid-19 Comics: Statistical Chaos

Liz Fosslien's data comics, drawn under her collaborative pen name "Liz and Mollie," captured the disruption of the pandemic

52 See Anthony Farthing and Ernesto Priego, "'Graphic Medicine' as a Mental Health Information Resource: Insights from Comics Producers," *The Comics Grid: Journal of Comics Scholarship* 6, no. 1 (2016): art. 3; Ernesto Priego, "Comics as Research, Comics for Impact: The Case of Higher Fees, Higher Debts," *The Comics Grid: Journal of Comics Scholarship* 6, no. 1 (2016): art. 16; and M.K. Czerwiec et al., *Graphic Medicine Manifesto* (University Park: Pennsylvania State University, 2015).

through an ongoing series of single-panel illustrations shared primarily across Instagram. This work draws from comics the placement of word and image, shared internal thoughts and dialogue, simplified iconography, and a mark-making aesthetic that resists the sanitization often found in more traditional graphic design and digital illustration. At the same time, these works draw from data visualization the use of charts and graphs to represent variables, a simple contrasting color scheme and clear data annotations that echo the kinds of choices made by data journalist. Yet the playful aesthetic and humor draw on the cartooning tradition, remixing to create some of the most widely shared and circulated Covid-19 data comics.

In *A Chronology of 2020,* Liz and Mollie capture the spiraling and time disorientating experience of the pandemic in an image that plays intertextually with what is popularly referred to as the "groundhog day" effect of lockdowns. This visualization resonates with graphic medicine illustrations of recovery and what it is like to live with undiagnosed and/or chronic health conditions. In other panel illustrations, they mobilize pie charts to contrast self-expectations versus reality, combining graphical summaries with the layered perspective common in the comics medium. They likewise utilize line graphs and bar charts to capture the personalized experience of becoming datum. The chaos of our quantified pandemic selves is reflected back to us through simple narration and resonant iconography.

Also telling stories from the edges of chaos,[53] cartoonist and hospital administrator Katy Doughty created a webcomic called "We Might Not Ever Know the True Toll of Covid-19."[54] As part of her hospital job, Doughty was responsible for updating her hospital's online Covid-19 guide. Her webcomic illustrates her reflections on the messiness of Covid-19 data and its collection. In one stark panel, the bars of a bar graph tumble and fall over each other like the planks of a broken fence. Some of them

53 See Frank, *Wounded Storyteller.*

54 Katy Doughty, "We Might Not Ever Know the True Toll of COVID-19," *The Nib,* September 21, 2020, https://thenib.com/the-true-toll-of-covid-19/.

fall into a bloodred mound at the bottom of the graph, paired with the caption "The truth is Covid-19 statistics are a mess."[55] Doughty's somber text relates the struggle of keeping up to date with the death count. Two panels show neat rows of hospital beds. The first filled with blank outlines of bodies reads, "Most case statistics in the U.S. don't include information about race and the CDC had to be sued before releasing the data that they do have."[56] The following panel shows the same scene, this time the beds are filled with black and brown bodies. Here the paired caption text narrates, "The data is sparse, but damning. Latinx and Black people are three times as likely to get Covid-19 as white people, and twice as likely to die from it."[57]

Doughty's sequential artwork on the statistical chaos of Covid-19 makes strong use of the gutter, the space between panels where the reader is left to imagine the narrative unfold. The work that is done in the gutter is one of the key features of comics that researchers have found effective in getting information to stick and increase audience empathy and engagement.[58] Doughty also uses a stripped-back color scheme, resonant iconography, and layers of text to convey the contrast between what we see on the "data surface" versus the realities behind the scenes. Doughty's data comic legitimates the human experience of chaos, while making visible data that is absent, uncounted, or hidden. Most importantly, it does this in a way that spotlights — rather than shies away from — the systematic failures and vulnerabilities revealed by all that what we cannot yet count.

Doughty's piece has a much more serious tone than the work from Liz and Mollie, but both humanize data by resisting sani-

55 Ibid.
56 Ibid.
57 Ibid.
58 See McCloud, *Understanding Comics*; Green and Meyers, "Graphic Medicine"; Michael A. Chaney, ed., *Graphic Subjects: Critical Essays on Autobiography and Graphic Novels* (Madison: University of Wisconsin Press, 2016); and Sathyaraj Venkatesan and Sweetha Saji, "Rhetorics of the Visual: Graphic Medicine, Comics and Its Affordances," *Rupkatha Journal on Interdisciplinary Studies in Humanities* 8, no. 3 (2016): 221–31.

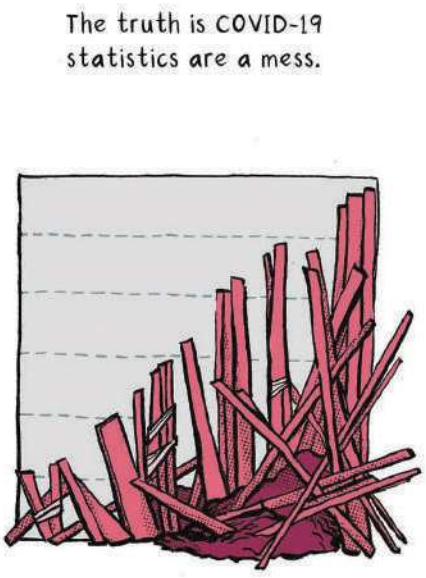

Fig. 3. Katy Doughty, *We Might Not Ever Know the True Toll of COVID-19,* 2020. Courtesy of the artist.

tization, disrupting the omniscient voice of statistical authority, and telling stories about mess.[59] By accepting that we are in chaos rather than trying to find resolutions, these data comics are able to focus on what we can know — both cognitively and emotionally (fig. 3).

Covid-19 Comics: Empathy, Context, and Social Change

Monique Jackson's "Corona Diary" project on Instagram highlights the importance of human stories and testimony. The "Corona Diary" is a documentary project that shares and reflects on Jackson's experience as a Black woman with long Covid as she navigates the UK's medical infrastructure. Her posts illus-

59 See D'Ignazio and Klein, "Feminist Data Visualization."

Fig. 4. Monique Jackson, Instagram: @_coronadiary, #UnheardCovid series, 2020. Courtesy of the artist.

trate what Frank discusses as the emotional battering of chaotic illness narratives. Her image and text illustrations illuminate the effects of difficult diagnostics, fraught clinical encounters, and chronic pain.[60] In one panel, Monique sits in front of her computer screen. The floor is covered in trash, clothes, and dirty dishes. A cup of tea sits on the desk beside her. Inviting the reader into her inner world, the image is paired with caption text reading, "I felt as though I was just about pulling it together to work from home. I was hoping that the chaos inside would not be visible to those who I spoke with on the screen."[61]

In a special collaborative series on #UnheardCovid, Jackson uses composite characters to represent people often left out of

60 See Squier, "So Long as They Grow Out of It."

61 Transcription from Monique Jackson's Instagram project "Corona Diary," https://www.instagram.com/_coronadiary/?hl=en.

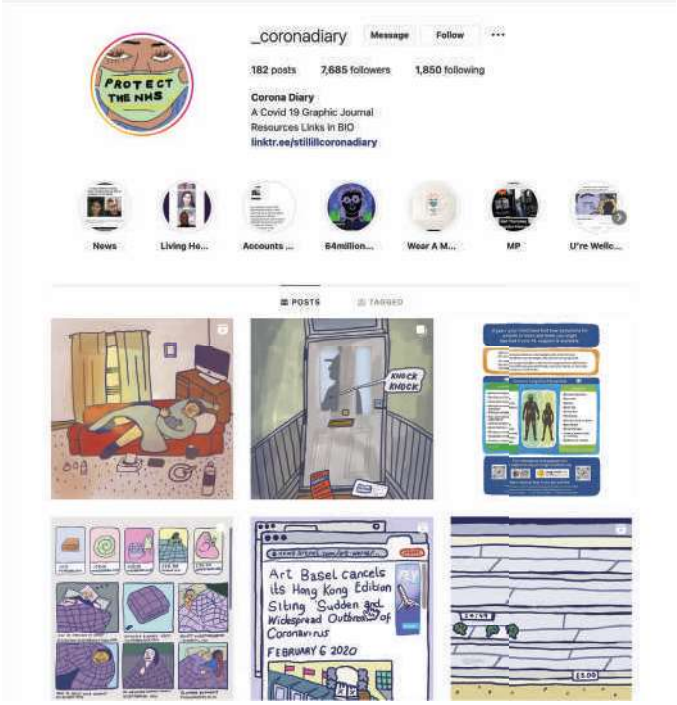

Fig. 5. Monique Jackson, Instagram: @_coronadiary, #UnheardCovid series, 2020. Courtesy of the artist.

public narratives around Covid-19. For this project she partnered with the @risingartagency. Together they responded to the question: Who is left out of the conversation? "I asked followers for feedback and there was a lot!" Jackson explains on her Instagram account. "I picked 9 answers then spoke either directly to people who identified under these categories or alternatively found online quotes from those in response to the pandemic." The series includes a teacher, a pregnant person, a child, a homeless person, a medic, a disabled person, an evicted migrant, someone with long Covid, and someone shielding. The visual illustrations layer character onto these demographic categories (fig. 4).

For example, the panel representing homeless voices shows a dog and a light-skinned man in a large, hooded coat sitting on the pavement. The legs of a passerby behind him hint at his invisibility. A speech bubble gives him voice, "There is a huge chance of catching Covid [...] as a male on the streets you are only expected to live until 48."[62] In the Instagram caption accompanying this image, Jackson cites this to "Paul quotes by Tortoise Media" and pairs the comic with a bio link to an app that supports rough sleepers. In doing so, Jackson creates contextualization and offers data as a know-how resource.[63] Throughout the #UnheardCovid series, Jackson's composite figures with what Avery Gordon calls "complex personhood,"[64] an understanding that demographic categories are not static data objects, but social processes of dividing up people that have real effects on how we see each other and ourselves. These categories of vulnerability mark but cannot fully define us (fig. 5).

A more explicit incorporation of statistical data can be found in Mona Chalabi's work. Chalabi's illustrations are able to expand a person beyond "their disease." She has been taking authorial data sources and literally giving them humanness through illustration posted on her Instagram account.[65] Many of Chalabi's comics present the same types of demographics data conveyed via the official data and data visualizations of major organizations (CDC, WHO), yet her use of relatable, everyday human figure illustration are able to foster a more empathetic connection with the viewer, conveying the vulnerability humans rely on to create meaningful connections. Like the figures in #UnheardCovid, Chalabi's humanized data demographics add layers to their individual labels. For example, in a panel titled "Protect people who are vulnerable to disease," Chalabi pairs CDC data on the percentages of the US population of people with various vul-

62 Ibid.

63 See Pinney, "Is Literacy What We Need in an Unequal Data Society?"

64 Avery F. Gordon, *Ghostly Matters: Haunting and the Sociological Imagination* (Minneapolis: University of Minnesota Press, 2008).

65 See Mona Chalabi's Instagram account, https://www.instagram.com/monachalabi/.

nerabilities through illustrations of figures against a plain white background. Chalabi depicts "people who are undocumented" as two women, one brown-skinned and one white-skinned, both in long aprons, suggesting that they are workers, possibly service workers. Her illustration of "those who have chronic diseases" shows a young, brown-skinned man in trendy clothing, visually contrasting stereotypical images of chronic illness and hinting toward the invisibility of many people's chronic conditions. Providing complex personhood through these aesthetic choices, Chalabi brings empathy and context to her data comics.

Throughout her work, Chalabi uses a range of techniques from the comics medium and from practices of data visualization. For example, she often compares and contrasts datasets to reveal social inequities and injustices. In an illustration based on data from Michigan in the United States, Chalabi pairs two datasets side by side. On the left of the panel a high-rise apartment building with 100 windows is used to represent population percentages. Fourteen of the rows are occupied by dark brown-skinned figures, depicting 14 percent of Michigan's population as Black residents. On the right there are rows of coffins, laid out in the same 10×10 grid. Here dark-brown figures occupy four rows of coffins, representing 40 percent of Covid-19 deaths that are Black people. In the caption text on Instagram, Chalabi further contextualizes this data: "There are lots of reasons why black people face a higher fatality rate from this diseases, but here are some of them: *a higher likelihood of exposure to Covid-19 (black people are more likely to work in service jobs, or jobs without sick pay, so physical distancing often just isn't an option)."[66]

From a health inequalities perspective, Chalabi's data comics bring in social and economic factors that underlie what we see in the surface data collected about disease. This provides the viewer with layers of data, addresses problem of hidden and unavailable data (as we see in Doughty's webcomic discussed above), and speaks toward what we can know in the face of

66 Ibid.

all we cannot amidst the chaos of disease and the power relations that shape medical infrastructures and their data worlds. "There still isn't national data on the racial disparities in Covid-19," Chalabi writes in the introductory text to this illustration, "but in the meantime, we have numbers from some parts of the country."

As seen in this example, Chalabi's data comics are heavily reliant on conventions from data visualization, particularly in her use of pictograms (symbols representing numbers or percentages) and more complex forms, such as waffle charts and matrix charts. Her simplified color schemes, clearly annotated data points, and referencing of data sources all demonstrate best practices in traditional data visualization. Chalabi also at times utilizes the affordances of Instagram as a platform for showcasing sequential art. For example, in a post on infection rates, the click-through function takes the reader on a narrative journey through data projections on rising death counts. Here Chalabi utilizes what data visualization researchers Edward Segel and Jeffrey Heer refer to as a balancing of author-driven and reader-driven in a user-driven click-through that goes as the reader's pace.[67] Such intentional narratively formatting is considered best practice in the field.

At the same time as Chalabi's work exemplifies a number of best practices in data visualization, she also utilizes graphic conventions that help create both cognitive and emotional or embodied connections with her readers. Her illustration style evokes empathy and reflection through its careful use of identifiable, yet detail-oriented, everyday iconography and creative visual metaphors. At times her data comics include elements of collage, that is, photo cutouts outlined in a bright color and layered onto a hand-drawn data visualization element. This intertextuality brings her authorial statistics further into the every-

67 Edward Segel and Jeffrey Heer, "Narrative Visualization: Telling Stories with Data," *IEEE Transactions on Visualization and Computer Graphics* 16, no. 6 (2010): 1139–48.

day, recirculating and remixing data through images that are accessible and relatable to readers.

Following Pinney, Chalabi's data comics contextualize data as a social practice, revealing how things are counted, what is not counted, and some of the power relations behind this. They do so in ways to provide "know-how" in the form of resources for those fighting for social change, "enabling those affected by power imbalances to ask critical questions."[68] Chalabi's groundbreaking work was recently celebrated by the British Science Association, which awarded her an honorary fellowship for her work communicating data on Covid-19.

Conclusion

This chapter has aimed to introduce Covid-19 data comics and situate them in relation to the emergent fields of graphic medicine, critical data studies, and data feminism. Our broader research is interested in the potential of data comics to improve public health communication in times of statistical chaos and chaotic illness.[69] We have focused on examples that illustrate how the comics medium can help foster empathy and provide "know-how,"[70] in relation to contextualizing data as a social practice, particularly around issues of health inequalities, communicating information in ways that encourages critical and reflective questioning.

Research shows that engaging with visual resources can make people feel more focused and in control. Visual graphics and illustration are often better at tapping into the emotional and social dynamics of illness to make people feel less isolated.[71] Such graphic storytelling offers opportunities for self-awareness, reassurance, empathy, and companionship, allowing people to explore the effects of illnesses together. As such, Covid-19

68 Pinney, "Is Literacy What We Need in an Unequal Data Society?," 227.
69 See Frank, *Wounded Storyteller.*
70 See Pinney, "Is Literacy What We Need in an Unequal Data Society?"
71 See McAllister, "AIDS, Medicalization, and the News Media," and Green and Myers, "Graphic Medicine."

data comics have much to teach us about the potentials of this medium for broader public health campaigns.[72]

Those working in the fields of both health communication and data visualization can further explore these potentials for humanizing data through the comics medium. More can be done to expand on conventions, for example, by bringing visual metaphor, resonant icons, gesture, experiential scales, and internal emotional worlds into the visual communication of scientific and statistical reporting. Future projections are another existing form of data visualization that could be further explored using simple animated illustrations that invite users to put themselves into the story. This approach can help develop agency, offering an opportunity for people to see themselves as active contributors to shared public health goals. Drawing from the success of small-scale studies, broader-scale research can be conducted to see if these approaches generate more audience empathy, translate into data know-how, and potentially lead to positive behavioral change and social action.

72 See Ciléin Kearns and Nethmi Kearns, "The Role of Comics in Public Health Communication during the COVID-19 Pandemic," *Journal of Visual Communication in Medicine* 43, no. 3 (2020): 139–49; McNicol and Wysocki, "Comics in Qualitative Research"; and Green and Myers, "Graphic Medicine."

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