

Negotiating visualization minimalism: a preliminary analysis of Twitter conversations

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ABSTRACT

Concepts related to visualization minimalism, such as ‘chartjunk’ and ‘data-ink’, have received significant attention in the visualization literature and have been subject to intense debate and disagreement. Much of the focus has been on determining whether and how non-essential visual elements influence comprehension and performance of users. Less attention has been placed on the perspectives of visualization practitioners, including the ways in which such concepts are used and understood within the context of a community of practice. In this paper, we investigate conversations on Twitter regarding visualization minimalism, focusing on the ways in which design knowledge is negotiated and applied. Our findings suggest that there is a vibrant community of practice engaged in deliberations on topics relating to visualization minimalism. We suggest more research should focus on visualization practice and the social dimensions of how design knowledge is negotiated and used.

Index Terms: Visualization—Minimalism—Social media analysis—; Human-centered computing—Visualization—Visualization design and evaluation methods

1 INTRODUCTION

Minimalism is a well known design philosophy for visual data communication. Concepts related to visualization minimalism, such as ‘chartjunk’ and the ‘data-ink ratio’, are some of the most familiar concepts for data visualization practitioners [16]. These concepts have received significant attention in the literature and have been subject to intense debate and disagreement [1–4, 7, 9, 11, 13, 17]. While several of the studies have investigated the influence of embellishments on users experimentally (e.g., on memorability and recall), few have focused on the perspectives of practitioners who decide when and how to make use of concepts like chartjunk in their design practice.

A prior interview study with data visualization practitioners has surfaced several important points about their perspectives on visualization minimalism [17]. Findings suggested that practitioners view chartjunk and related concepts in highly varied and pluralistic ways, being strongly influenced by their underlying philosophies and the context of the design situation. Although research studies on chartjunk suggest when and how its use is appropriate (e.g., to increase memorability or engagement), most practitioners were only somewhat familiar with the research findings, and usually in ways that could not be clearly articulated. In addition to any research influences on design practice, there were clearly other influences that were personal and situated. These included descriptions of personal style and preference, skill (or lack thereof) in creating embellishments, constraints from clients and branding, and underlying philosophical commitments about the value and purpose of visualization.

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This prior study indicates that interpretations of minimalism are not consistent across practitioners. Visual elements that are viewed as essential, extra, or ‘junk’ differ from one practitioner to the next. Some scholars have argued that the term ‘chartjunk’ should be removed entirely, opting instead for more precise language (e.g., see [1]). While a set of terms that better describe visual elements that are not ‘data ink’ could indeed be helpful, there is often value to terms that are ambiguous and open to interpretation. Based on several studies with design practitioners in different disciplines, Stolterman [22] suggests that practitioners are inclined to appreciate and use concepts that are intriguing and open for interpretation and reflection on how they can be used. He provides examples of such concepts in the context of interaction design: ‘affordance’, ‘persona’, and ‘probe’—terms that are popular and have also been subject to debate. This prior work suggests that a concept is not useful in design due to its precise definition, nor is it the ease with which instances of the concept can be identified and universally agreed-upon (e.g., what is and is not chartjunk). Rather, there is utility in the openness of the term—in the ability of practitioners to reflect on it and interpret it in ways that fit the design situation and their personal design philosophies. Experienced practitioners develop a repertoire of design precedent, and an ability to make judgments about what constitutes good design in situations of uncertainty and ambiguity. These kinds of concepts function as conceptual tools that can be used across a variety of contexts. Despite the ambiguity of terms like chartjunk and the data-ink ratio, one survey suggests that they are two of the most familiar and frequently used concepts by data visualization practitioners [15].

1.1 Data Visualization Community of Practice

Professional roles for data visualization designers have grown significantly, taking a noticeable place within the larger ecosystem of established design disciplines (e.g., interaction design, instructional design, user experience design) [15]. This growth has led to the emergence of several initiatives, including the Data Visualization Society and its Slack workspace, practitioner-focused conferences, several blogs and podcasts, and active participation on social media platforms like Twitter and Reddit. The growing popularity of data visualization in professional settings has led to the emergence of a community of practice—i.e., a group of people sharing a passion for data visualization, wanting to learn how to do it better as they interact regularly [23]. Viewing data visualization practitioners as a community of practice provides a theoretical lens with significant richness through which the practice of data visualization—especially the social dimensions—can be investigated, characterized, and articulated.

Communities of practice can be very different from one another, although they tend to thrive on diversity, debate, and tension as much as they do on homogeneity, agreement, and conformity [23]. Communities of practice also develop a shared repertoire of tools, techniques, concepts, and methods, although these do not need to be static, fixed, or universally agreed-upon. In fact, one of the sustaining features of a community of practice is the continual negotiation of meaning—both in terms of what makes the craft meaningful, and what individual items within the repertoire mean. Based on this theoretical perspective, we can recognize that data visualization

practitioners should have a shared repertoire of tools and methods, but that debate and negotiation about them is expected.

Drawing on findings of design practice in various disciplines (e.g., [5, 14, 15, 20–22]), and from the theoretical perspective of a community of practice, we expect that visualization practitioners (i) will appreciate and use concepts that are both ambiguous and open for interpretation, and (ii) will discuss and negotiate these concepts in a socially mediated fashion within the broader community of visualization practice. We have focused on the topic of visualization minimalism since it is known to be familiar and relevant to a wide audience. To investigate the ways in which minimalism is discussed, we analyzed data from Twitter, as it is both widely used and publicly accessible.

2 METHOD

We collected and analyzed Twitter threads discussing data visualization minimalism. We used Postman Collection for the Twitter API v2 to do a full-archive search of Twitter for the year of 2021. We searched using specific keywords, including ‘data-ink’, ‘chartjunk’, ‘minimalism’, and ‘Tufte’ [12] [10]. We also included synonyms and antonyms for ‘minimalism’ (e.g., simple, clear, clean, fancy, flashy, overdone, embellish) along with hashtags #datavis, #dataviz, or #datavisualization. This process resulted in 4497 threads. Because we are interested in conversations about minimalism, we removed tweets with fewer than 2 replies, which left 305 threads. We then manually examined each conversation and shortlisted 51 threads. We excluded tweets that were not relevant to visualization minimalism, were not in English, were redundant (having a duplicate conversation id), or where only the poster replied to their own tweet. Our final dataset consisted of 51 threads that had at least 2 replies from different people and were specifically about visualization minimalism.

We then analyzed the threads to look for different types of conversation taking place on Twitter. As an aim of this work is to understand how design knowledge is shared and negotiated within a community of practice, we focused our preliminary analysis on the types of conversations taking place about visualization minimalism. As a preliminary typology, we focused on agreements, disagreements and negotiations occurring within threads. We engaged in a hybrid, inductive/deductive coding process. We coded each thread in a deductive fashion using this preliminary typology, looking for instances of people agreeing with each other, providing a counter argument, or reaching an agreement. During the analysis, we noticed the phenomena of asking questions as a common occurrence. This resulted in ‘inquiry’ being added as an emergent code. Finally, those who participated in the conversation meaningfully were given a participant id, and those who posted emoticons only or gave irrelevant replies were not counted.

3 FINDINGS

Our analysis confirms that there are indeed conversations taking place about the meaning and use of concepts related to visualizations minimalism. 137 people participated in the 51 conversations in our dataset, which covered 1 year only. At this stage of the research, we did not look at the backgrounds and demographics of each participant, although this could be a useful strategy for future work.

There were several instances of agreement and disagreement in the conversation on visualization minimalism including affirmation, refutation, and negotiation. Below we present examples from the threads to illustrate different type of conversations that are happening, and the ways in which design knowledge is constructed and interpreted socially.

Affirmation P53 shared their thought about stopping the obsession over fanciness in data visualization and advocated for ‘simple viz’ which could answer a team’s questions. On being asked about

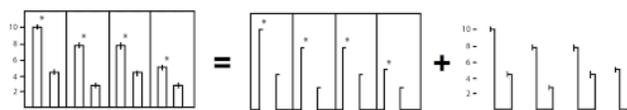


Figure 1: Image of error bar shared by P34 on Twitter

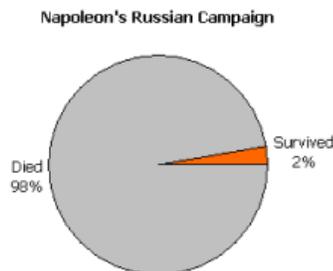


Figure 2: Pie chart version of Minard's map shared by P37

the reason for this change of perspective, P53 wrote that they kept fiddling with the visualization even after the question was answered. P54 supported their opinion of realizing ‘answering question’ as a primary purpose of visualization and said, “... (you) avoided the curse of aesthetic dysfunctionality...”. P55 also endorsed simplicity particularly “for work projects where the requirements change on the fly and I need someone to just understand fast”, and kept fancy visualizations for personal projects. P53 then shared their internal conflict between being able to blow away their user and enabling user to see actionable insights. P54 acknowledged having to face similar conflict and posted “I want to make it look good. But on the other hand, will the end user actually care? A general user vs an exec who is used to seeing corporate dashboards is totally different”. P56 also admitted facing this, however, they look for creating a balance, saying “I try to find the line by focusing on insights and making sure data is validated first ... then I’ll spruce up the design.”

A separate thread discussed how data-ink is being taken to the extreme. P33 opines that Tufte’s redesigned “marginal box plot into a broken line ... looks like a printing error” (see Fig. 1). P34 agrees and thinks that data-ink ratio is a silly concept, while P26 argues that it lacks empirical evidence. P35 concurs and says, “I never found these the least bit compelling” and feels that data-ink is a wrong framing as maximizing the data-ink may not positively impact comprehension. P35 further adds, “avoiding crowding is a better design guideline that probably accounts for any potential benefit of doing this sort of thing in other contexts”. To that, P34 argues that there is a “sin of visualization being considered a matter of engineering (with the resulting hard and fast objective universal rules) instead of a matter of communication and persuasion”.

Refutation In this thread, P4 shares their opinion about the use of term ‘chartjunk’ and says, “IMO what does need to be thrown into the oblivion of the trash bin is the very term ‘chartjunk’”. P6, however, is of different opinion and writes, “.. (it) is okayish if you are referring to outdated and superfluous elements of the chart that complicate reading the chart not icons and images.” P21 opines that there is not proper rationale for ‘hating’ chartjunk. P22 on the other hand used the word ‘chartjunk’ for elements that distort visualization. They pose a question, “What would be a proper/useful term for stylistic elements that introduce distortion? Thinking of e.g. stuff like superfluous 3D perspectives where relative lengths of chart elements become hard to assess.”

In another discussion, P21 thinks that Minard’s graph of Napoleon’s march is an elitist graph, because “many people need to have it explained to them”. There were a few respondents, including

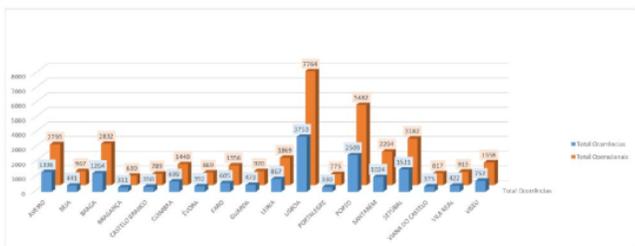


Figure 3: 'Glossy 3D chart' of PT parliament shared by P23

P37 who responds by sharing a blog by P23 that showed a simplified pie chart version of Minard's graph (see Fig. 2), or in P2's wording, a "dumbed-down executive summary version". However, this point of view was opposed by P38, 39, 40, 41 and 42, each of them had a different take on this. P38 quoted a historian who said that this chart "seems to defy the pen of the historian". P39 said that there was a simpler flow chart presented before Napoleon's march, which was "a nice introduction to concept of flow maps for uninitiated and makes march on Moscow map more accessible". P42 says that indeed there is nothing wrong in giving explanation for the graph as "... all graphs are explained to us. 19th century papers would explain line charts."

Negotiation P1 questions Tufte's data-ink ratio and asks if the community can stop quoting it as rule. To that P23 suggests "functional aesthetics" to be a good starting point, though acknowledging that it is defined narrowly compared to data-ink ratio. P1, however, thinks of functional aesthetics to be more related to design style. P23 clarifies his definition and says, "(it) is closer to an aesthetic function than functional aesthetics, and includes the emotional part". P1 emphasises his point again and says, "we should have it (data-ink) as an input, not a rule". However, P23 opines "data:ink ratio is a design choice, can't be used as a rule or even as an input, unless you share the same design principles.". They propose using U-shaped process - 'remove stuff, add better stuff' as opposed to J-shaped process of data-ink - 'remove everything, aesthetically'. P1 seems convinced and responds by saying, "Can I get a tattoo of this?? 'remove stuff, add better stuff'."

While discussing whether glossy 3D charts (see Fig 3) should be used for communicating important and serious topics, P28 writes "today here in the PT parliament a report on the state of emergency was discussed. It includes this chart (3D Bar chart). This is not a problem with the tool, it is the deep-seated notion that this is how you make charts, with silly effects no matter how serious the situation is." P57 opines that the 'fundamentals of datavis should get priority over these silly effects in this visualization and posts, "Situation serious, BUT, in terms of datavis, the silly effects would come 3rd IMHO." after #1 using vertical axis and #2 sorting the data by value. P28 doesn't deny the order of list and adds to it three more points, "#4 Adding a title would be nice too. #5 Less conspicuous labels. #6 This probably you can't interpret: orange is events (emergencies), blue is people (firemen). Should be two charts."

Inquiry When P19 asks for thoughts over the use of an icon in a chart published by the EU (see Fig. 4), people shared diverse opinions. This chart shows people at the risk of poverty and exclusion in the EU in 2020. One group thinks the icon could be helpful. P1 believes that illustrations grab attention and without it visualization would be boring. P13 and P15 feel that icon adds to the comprehension and memorability respectively. P11 posits that icons increase engagement and writes, "No objection to aesthetic elements which make people more likely to notice/engage". The other group, however, disagrees with the use. P2 thinks that it adds nothing to the chart, a view which P8 supports and writes, "I feel like maybe it doesn't really need an icon...". P5 feels that the way icon has

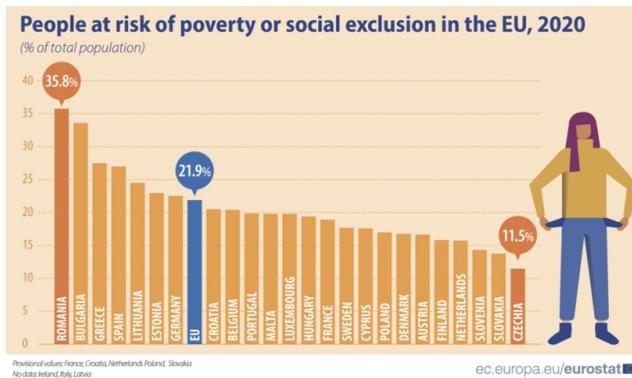


Figure 4: Chart showing people at risk of poverty and exclusion in the EU, 2020 shared by EU Eurostat

been used in the chart, it could be misleading. P7,8,9 and 12 think that the icon shows lack of empathy because it's "making light of a very serious issue." and "diminishes the seriousness" by showing "cutesy, uncle-scrooge cartoon iconography." P14 points out that this icon reinforces the stereotype by showing a female POC.

P72 asks to share best practices for making data story-telling effective. P61 shares that they like "KISS! Keep it simple (and consistent)." This is because they "see too many #datavis stories that are overly complex and hard to read." P62 feels that thinking about the audience is best approach. They say, "Information presented should 'always' be suited to the audience. A storyteller requires not only technical understanding but domain knowledge as well to be able to narrate a story". P62 also explains their interpretation of simple and writes "I call it 5 insights in 5 seconds. Insights answer up to 5 questions in 5 seconds. A combination of What (gist of situation), Why (key influencing factors), Where (location information), When (time information) and other Ws of business. But focus on only 5." Later, both P63 and P64 synthesize the discussion. P63 opines that best approach is "Knowing the target audience. Keeping it simple and designed for/with them." while P64 thinks that "Successful combination of KISS with 5 insights in 5 seconds" would enable datavis mastery.

4 DISCUSSION

Our analysis indicates that conversations about the meaning, value, and use of concepts related to visualization minimalism are happening regularly on Twitter. These concepts are popular and contentious, with considerable disagreement and debate taking place. We identified instances of people agreeing with one another about whether an embellishment was good or bad; people disagreeing or attempting to refute a position on a particular visualization; and people discussing and negotiating the meaning and application of concepts like chartjunk and data-ink with respect to particular visualizations. Overall, our analysis reveals a vibrant community of practice, with several different types of conversations taking place about concepts and methods relating to visualization minimalism. Our findings lead us to suggest several points that we believe are important for understanding how topics like minimalism are viewed within a community of practice. Although these points are made in relation to minimalism, they are broadly applicable to other concepts and methods.

Need for practice-led research. If we researchers wish to fully understand the ways in which design knowledge is used in practice, we must engage with practice on its own terms—including studying the spaces in which communities of practice meet to share, modify, and deliberate on their repertoire of tools and methods. There is a need for more practice-led approaches, including ethnographic

work, interviews, and social media analysis. Although experiments and lab studies are valuable in answering certain kinds of questions, they fall short for others. For instance, they can tell us whether users can remember visualizations with embellishments more than other kinds of visualizations, how quickly users can perform tasks with different variations of embellishments, and other types of performance metrics. However, this type of research does not tell us how and whether practitioners make use of experimental findings, nor does it reveal the kinds of deliberations and judgments that go into the application of design knowledge. In this preliminary work, we did not distinguish between tweets made by researchers vs practitioners, and simply viewed everyone participating as members of a community interested in visualization practice.

Epistemology and the value of ambiguity. It is important to recognize the epistemologies at play in the different activities of science and design practice (see [5, 21]). Science tends to seek knowledge that is precise, general, and codifiable, whereas design tends to seek the creation of artifacts that are useful and enjoyable. Scientists seek to avoid synonymy, ambiguity, and vagueness in language, whereas designers seek inspiration and utility in their artifacts. For a designer, if a concept is ambiguous yet has a recognizable core meaning, it may serve as a useful source of reflection and interpretation. Designers need to engage in creative mental activities, and metaphors, analogies, and forms of design precedent can serve as conceptual springboards for this kind of creative work. The designer does not need highly precise, controlled vocabulary like a scientist does. Terms like chartjunk and data-ink ratio may be popular and useful precisely because they have a recognizable core meaning while still being somewhat ambiguous and open for interpretation. If terms are too ambiguous and do not have a recognizable core, they are unlikely to be adopted. Our preliminary analysis suggests that these terms are discussed frequently in various ways on Twitter.

Social dimensions of design knowledge. In addition to the need for practice-led inquiry, and the value of inspiring yet ambiguous concepts, it is important to recognize the ways in which design knowledge is developed, maintained, negotiated, and critiqued within a community of practice. Although a group must have a shared repertoire to be considered as a community of practice, the tools and concepts within the repertoire do not need to be static or universally-agreed upon. In fact, the negotiation of the repertoire is an important part of a strong community of practice. Our analysis indicates that this type of negotiation is taking place, at least in regard to topics relating to visualization minimalism.

Implications for research-practice relationships. Without recognizing the need for practice-led inquiry, the value of ambiguous concepts, and the social dimensions design knowledge, it may be futile to suggest the removal of popular terms. If academics eschew the practitioner perspective on issues, more precise language may be developed; however, this may lead to increased distance between the research and practice communities. This distance has been noted in other disciplines, where practitioners often view the work of academics as not relevant for the needs of everyday design practice [8, 19, 20]. Within the visualization research community there have been increasing initiatives for engaging with practitioners—e.g., through workshops, podcasts, and on Twitter. These initiatives are undoubtedly valuable, and it is important that knowledge sharing and use are able to go both ways. In addition to such initiatives, scholarship on visualization practice is needed to inform researchers about the ways in which everyday practice is being carried out. Our work here is an attempt to provide this kind of insight.

5 SUMMARY AND FUTURE WORK

Our investigation shows a vibrant community of users on Twitter engaging in discussions about visualization minimalism. The threads we analyzed consisted of different types of conversations that are indicative of the negotiation of meaning taking place within a commu-

nity of practice. Although visualization researchers have suggested that concepts like chartjunk are problematic and should be removed or made more precise, we propose an alternative perspective that is in line with studies of design practice in other disciplines—namely, that concepts like chartjunk are popular and useful precisely because of their ambiguity and openness for reflection and interpretation. This point extends beyond minimalism specifically—even if arguments are valid that chartjunk and data-ink are poor terms, the fact remains that concepts equally as ambiguous and open will likely be popular among design practitioners (see [5, 6, 21, 22]). Thus, we believe it is important to study conversations about design knowledge as they occur naturally, on the terms of practitioners within a community.

In this work we have examined Twitter data, due to the ability to access tweets for research purposes, and due to the size of dataset we are able to accumulate. Future work could look at other social media platforms, such as Reddit and Slack. One limitation of Twitter is the lack of rich data that may otherwise be available in conversations taking place among practitioners. Future work could take an ethnographic approach, collecting much richer data on the negotiations taking place among visualization designers (e.g., in a visualization design studio [18]). Our analysis is preliminary and shows that conversations of different types are indeed taking place. The typology we used for coding was rudimentary and simply served to indicate whether different types of conversations were happening. Future work should look at the types of conversations more systematically, perhaps drawing on theoretical frameworks from communication studies and other disciplines. Despite the preliminary nature of our analysis, we hope it stimulates more discussion and scholarship on topics relating to practice-led research, design knowledge, and the emerging datavis community of practice.

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