

Visiologus: Mysterious and Mythical Creatures from the World of Visualization

By Alyxander Burns

Introduction

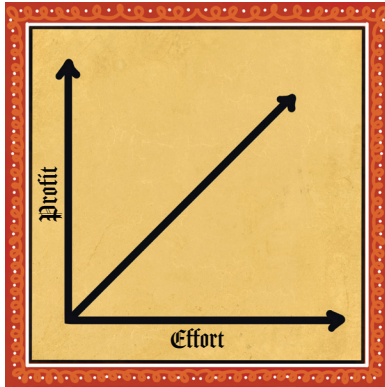
The World of Visualization is full of a dazzling array of diverse and resplendent species. From small and simple to vast and complex; from those who delight a single person to those that capture the imaginations of thousands each day; from those with commentary on enormous world-scale events to those which excel at centering small moments of personal reflection: there are endless niches, adaptations, and variations to celebrate and explore.

Among these creatures are two groups which cannot help but capture the imagination: The Mysterious and the Mythical. The **Mysterious Beasts** capture imagination with the unknown. Although they perhaps prance through our lives so frequently that they have not been granted a second look, there is so little known about these creatures that curious minds cannot help but daydream about the possibilities. On the other hand, the **Mythical Beasts** are those which come alive in the folktales we tell about them. Among this group are those so incredible, perfect, and beautiful that one cannot help but to pursue them in hopes of capturing a glimpse of the divine. There are others still whose qualities are so blood-chilling that they keep one up at night, a vision of destruction for those who deign to wander too far from the well-worn path.

This text is not intended to be an exhaustive enumeration of all of the creatures present in the world, but rather a curated collection intended to inspire wonder and delight. As in our wider world, it would naturally be impossible to collect and describe all of the creatures present in the World of Visualization. Instead, this text draws inspiration from bestiaries of the past to tell stories about life forms both real and imagined as a means to educate, entertain, and inspire interest in the world [17, 25]. As Jorge Luis Borges' writes of his book, *The Book of Imaginary Beings*, "A book of this nature is necessarily incomplete; each new edition is the core of future editions, which may be multiplied to infinity" [5]. Hence, the images of the beasts included in this text aim to capture the spirit of each beast, but may not be able to fully capture all aspects of their likeness (or in the case of the Mythical types, reflect their true form at all). Further, the scope of creatures covered in this tome somewhat narrowly focus on those found in the realm of Communication, the area with which the author is most familiar. I hope that through this work, readers will be inspired to explore and celebrate the diversity of visualizations further and reflect on our own relationship to these creatures, perhaps expanding upon the creatures in this booklet with volumes of their own.

Part 1:
Mysterious Beasts

The Visualization Mimic

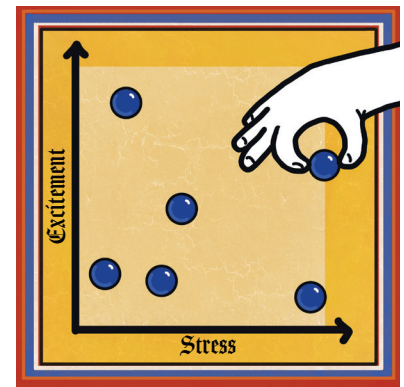


One type of poorly understood, yet pervasive creature borrows all of the style of a visualization without any of the substance: the Visualization Mimic. While this beast at first appears to be a typical data visualization, further examination reveals that there is no underlying data. Instead, these shape-shifters use ingenious camouflage: by wearing the clothing of existing visualization conventions, they leverage the rhetorical impact of visualizations to accomplish ambiguous aims. For instance, they may be able to harness visualization's ability to make conclusions seem like objective truths [15]. While these creatures can be found across the World, preying on the masses seems to be a particular hobby of this creature, as it is frequently observed in biomes such as popular titles in the Pop Science book genre (e.g., in Chapter 1 of [9]) and on social media (e.g., astrological memes which use a similar camouflaging tactic as a means to tell jokes [7]).

Despite not being “data” visualizations necessarily, understanding how Mimics succeed in their biomes may help to better understand the species they are mimicking. For instance, scholars could draw inspiration from Puerta et al.'s examination of the Octopus Map and other species which share some, but not all, of the same visual qualities [22]. In their study, the scholars observed how visualizations utilizing some aspects of an octopus's eldritch appearance can still evoke similar negative and conspiratorial feelings, even when an explicit octopus is not present [22]. Applying a similar approach to Mimics might help us understand things like: “what features cue to a reader that an specimen does (not) communicate some underlying data?” and “Do readers gather similar insights from these creatures regardless of whether the are Mimics or ‘true’ visualizations?”

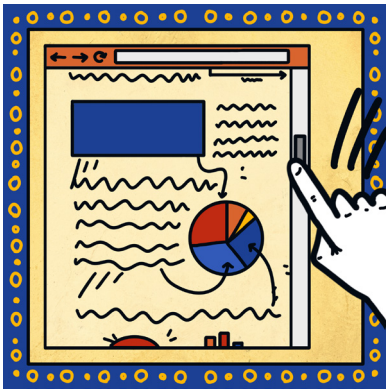
Rumor has it that the World of Visualization is home to an odd and interesting chimera notable for its banal appearance and yet highly unusual life cycle: the Input Visualization. While at first glance the Input Visualization resembles many more mundane and well-understood species of Visualization, when one sits to observe how it interacts with its environment, a novel truth emerges: instead of displaying existing sets of data (like any respectable visualization might), these creatures use visualizations *as a means to capture new data* [6]. Having collected their targets, Input Visualizations then re-integrate the captured data into their visualization displays, much like a humble sea slug captures and co-opts jellyfish stinging cells as a means for self-defense [11].

The Input Visualization



While Bressa et al.'s work on the species has revealed many secrets about the vast diversity within the family of Input Visualizations (e.g., [6]), there is much about the life and life cycle of this unique species which remains a mystery. For instance, it is not yet known to what extent existing wisdom about what a visualization needs to do to be successful in their environment readily applies to Input Visualizations, given their unusual life cycle. Additionally, the existence of this creature may pose a serious philosophical and taxonomic threat to our understanding of what data visualizations and data *are* and from where they come. For example, while many view data as an “objective [representation] of reality,” Input Visualizations' relationship to data seem to much more closely reflect Karen Barad and Akbaba et al.'s theories regarding the cosmic entanglement between the world, the methods used to produce data, and the data themselves [1, 3]. Perhaps further efforts to understand and place Input Visualizations in the taxonomy of life may shed light on the nature of the universe and Visualization's place in it.

The Scrollytelling Visualization



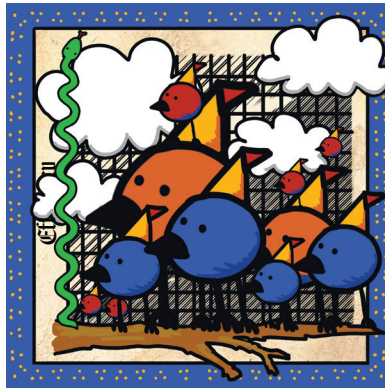
Among the creatures in the World of Visualization which peddle in stories and tales, one mysterious figure slides by above the rest: The Scrollytelling Visualization. Those who have encountered this curious creature in their every day travels describe its captivating dance (sometimes, more mundanely, called “Scrollytelling”) which combines carefully selected visual, written, and visualized elements, carefully choreographed to enrapture its audience and communicate its story’s message. Since word has spread of this unique narrative style in the mid-2010s, many designers have rushed to replicate it, hoping to keep readers engaged even as their attention grows short and eyelids grow heavy.

Yet, despite the popularity and abundance of Scrollytelling Visualizations, they have largely been ignored by the academic visualization research community. Pioneers such as Seyser and Zeiller who first described this creature’s behavior for a visualization audience in 2018 [23], Oesch et al. who defined a unified vocabulary for talking about this species in newsrooms [19], and Mörrth et al. who wrote about applications of this species to scientific contexts [18], have laid a solid groundwork for understanding these creatures, but there is still much to learn. One opportunity may be to compare how people make sense of and are impacted affectively by stories told in a Scrollytelling style in comparison to other similar species, such as Data-GIFs [24]. While both Scrollytelling and Data-GIFs guide the viewer through a progressive narrative flow, viewers have far more control over the pace of the narrative (and have the option of skipping sections) when interacting with a Scrollytelling Visualization as compared to a Data-GIF. Better understanding the impacts of these differences may thus be helpful to understand the genus of narrative visualizations as a whole and where each of their unique styles may be most effective.

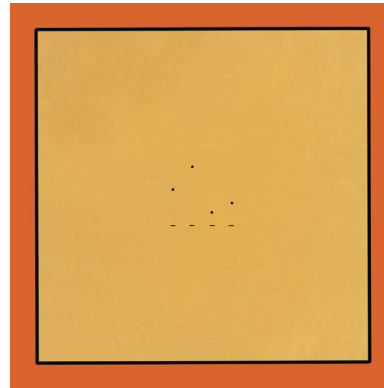
Part 2:
Mythical Beasts

The Twins:

The Mother of all ChartJunk



The Avatar of Pure Data-Ink



In the World of Visualization, there is a tale told of two legendary monsters locked in a cosmic battle of aesthetic proportions: on one side, a villain of unlimited excess; the other, a perfectly optimized creature of restraint and efficiency. These are, of course, The Twins: The Mother of All ChartJunk and The Avatar of Pure Data-Ink.

The Mother of all ChartJunk is a maximalist monster of excess and nightmare. So cluttered with junk, so colorful and extreme, this creature spares no expense adorning itself with toxic ephemera. Through this cursed act, this villain obscures all of its useful features, making it difficult to ascertain whether there are even data or a visualization under the “ChartJunk” at all. The legend of this creature chills the blood of designers who consider incorporating additional visual elements into their work, fearing that adding just one too many elements may cause this dreadful creature to spring to life on their very page.

Locked in eternal opposition to the Mother of all Chart Junk is the Avatar of Pure Data-Ink: a radiant, infinitely efficient visualization. The Avatar is a perfectly optimized visualization which wastes not one drop of ink in the pursuit of encoding its data. Legend has it that Edward Tufte defined the “data-ink ratio” to describe the ratio of ink used to represent data (“data-ink”) to the total ink used in the plot [13, 26] after receiving a vision of this creature. Further, he suggested that one ought to increase this ratio as much as possible [13, 26] (in the steadfast pursuit of visualizations created in the Avatar’s image). Legions of designers have taken up this call in the time since, though none have glimpsed this creature in all its glory. Nonetheless, brave scholars such as Frank Elavsky have extrapolated upon the laws of nature to consider what form it may take [10], which inspired the depiction included here.

Though The Twins are held up as paragons and boogeymen, neither are perhaps all what they seem. First, while many fight to create visualizations in the Avatar’s image with an optimized data-ink ratio, studies began to appear only a few years after the term was originally defined showing that the Avatar’s minimalist aesthetic does not have the kind of positive cognitive impacts that it was foretold to have (e.g., [13, 14]). In that same time, there has been empirical support for positive impacts of the Mother’s so called “ChartJunk”. For instance, Bateman et al. showed the positive impact of highly illustrated visualizations on long-term retention [4] and Burns et al. showed that visualizations with pictographs positively impacted readers’ impressions of charts, without any decrease in learning outcomes [8]. Additionally, others argue that relentless pursuit of visualizations in the Avatar’s vision make it more difficult to appreciate other aesthetic forms of expression. For example, Akbaba et al. and Kosara have written about the ways that the “ChartJunk” with which the Mother is said to festoon herself is not well defined, and thus labeling elements in this way instead largely functions as a means to support a specific minimalist aesthetic, while demonizing more decorated forms [2, 16].

The Paragon of Perfect Interpretation



Finally, we come to perhaps the most coveted, most pursued creature in all of the World of Visualization: The Paragon of Perfect Interpretation. Stories of this legendary creature say that everyone who gazes upon it comes away with *exactly* the same, factual interpretation of its message. It is said that the Paragon is universally and immediately understood by all who gaze upon it – never misunderstood, never misinterpreted, and never misused. Although highly sought after, it has never been seen before in all its glory. Nonetheless, legions of designers have tried many ordinary and arcane means in the hopes of summoning it forth.

While The Paragon of Perfect Interpretation may be the most illusive and striven for creature in all of the World of Visualization, it can be difficult to distinguish between its legend and possible reality. In its most ideal form, seeking the Paragon's is an honorable task: it is well understood that visualizations are not interpreted equally easily by all people, which makes access to their wisdom and the resources they unlock unequally distributed (e.g., [21]), so finding the Paragon would be an incredible boon. Yet, is it even possible for the Paragon to exist in this world? One idea which challenges the Paragon's reality is our understanding that knowledge and interpretation are always rooted in, and a product of, context [12]. Based on this idea, it is impossible for an entity which confers universal understanding to exist because all people have a different context (at minimum, because they are doing their thinking "in a particular situation, with a particular brain in a particular body" [20]). Therefore, pursuit of the Paragon may be a lesson in the journey itself: how can we pursue this ideal without going mad chasing a legend or throwing away helpful lessons we learn along the way?

Conflict of Interest

The author of this paper is also an organizer of the 2025 alt.VIS workshop.

References

- [1] Derya Akbaba, Lauren Klein, and Miriah Meyer. 2025. Entanglements for Visualization: Changing Research Outcomes through Feminist Theory. *IEEE Trans. Vis. Comput. Graph.* 31, 1 (2025), 1279–1289. doi:10.1109/TVCG.2024.3456171
- [2] Derya Akbaba, Jack Wilburn, Main T. Nance, and Miriah Meyer. 2021. Manifesto for Putting ‘Chartjunk’ in the Trash 2021! alt.VIS 2021. <https://altvis.github.io/papers/2021/akbaba.pdf>
- [3] Karen Barad. 2007. *Meeting the Universe Halfway*. Duke University Press.
- [4] Scott Bateman, Regan L. Mandryk, Carl Gutwin, Aaron Genest, David McDine, and Christopher Brooks. 2010. Useful Junk? The Effects of Visual Embellishment on Comprehension and Memorability of Charts. In *Proc. CHI Conf. Hum. Factors Comput. Sys. (CHI '10)*. ACM, NY, USA, 2573–2582. doi:10.1145/1753326.1753716
- [5] Jorge Luis Borges and Margarita Guerrero. 2005. *The Book of Imaginary Beings*. Viking, NY, USA. Trans. by Andrew Hurley.
- [6] Nathalie Bressa, Jordan Louis, Wesley Willett, and Samuel Huron. 2024. Input Visualization: Collecting and Modifying Data with Visual Representations. In *Proc. CHI Conf. Hum. Factors Comput. Sys.* ACM, NY, USA, Article 499, 18 pages. doi:10.1145/3613904.3642808
- [7] Alyxander Burns. 2025. Yes, Yes in Yellow: Memes and What They Tell Us About (Queer) Use of Data Visualization. *Journal of Visualization and Interaction* 1, 1 (2025), 9 pages. doi:10.54337/jovi.v1i1.8419
- [8] Alyxander Burns, Cindy Xiong, Steven Franconeri, Alberto Cairo, and Narges Mahyar. 2022. Designing with Pictographs: Envision Topics without Sacrificing Understanding. *IEEE Trans. Vis. Comput. Graph.* 28, 12 (2022), 4515–4530. doi:10.1109/TVCG.2021.3092680
- [9] James Clear. 2018. *Atomic habits: An easy & proven way to build good habits & break bad ones*. Avery Publishing, New York, NY, USA.
- [10] Frank Elavsky. 2025. Minimalism and the absurdity of the data-to-ink-ratio. <https://www.frank.computer/blog/2025/04/data-to-ink.html>
- [11] Paul G. Greenwood and Richard N. Mariscal. 1984. The utilization of cnidarian nematocysts by aeolid nudibranchs: Nematocyst maintenance and release in spurilla. *Tissue and Cell* 16, 5 (1984), 719–730. doi:10.1016/0040-8166(84)90005-3
- [12] Donna Haraway. 1988. Situated knowledges: The science question in feminism and the privilege of partial perspective. *Feminist studies* 14, 3 (1988), 575–599.
- [13] Ohad Inbar, Noam Tractinsky, and Joachim Meyer. 2007. Minimalism in information visualization: attitudes towards maximizing the data-ink ratio. In *Proc. of the 14th Eur. Conf. Cognitive Ergonomics: Invent! Explore! (ECCE '07)*. ACM, NY, USA, 185–188. doi:10.1145/1362550.1362587
- [14] James Kelly. 1988. The Data-Ink Ratio and Accuracy of Information Derived from Newspaper Graphs: An Experimental Test of the Theory. Presented at the Annual Meeting of the Association for Education in Journalism and Mass Communication. <https://eric.ed.gov/?id=ED295203>
- [15] Helen Kennedy, Rosemary Lucy Hill, Giorgia Aiello, and William Allen. 2016. The work that visualisation conventions do. *Information, Communication & Society* 19, 6 (2016), 715–735. doi:10.1080/1369118X.2016.1153126
- [16] Robert Kosara. 2012. The Three Types of Chart Junk. <https://eagereyes.org/blog/2012/three-types-chart-junk>
- [17] Getty Museum. n.d.. Book of Beasts: The Bestiary in the Medieval World. <https://www.getty.edu/art/exhibitions/bestiary/inner.html>
- [18] Eric Mörth, Stefan Bruckner, and Noeska N. Smit. 2023. ScrollyVis: Interactive Visual Authoring of Guided Dynamic Narratives for Scientific Scrollytelling. *IEEE Trans. Vis. Comput. Graph.* 29, 12 (2023), 5165–5177. doi:10.1109/TVCG.2022.3205769
- [19] Jonas Oesch, Adina Renner, and Manuel Roth. 2022. Scrolling into the Newsroom: A vocabulary for scrollytelling techniques in visual online articles. *Information Design Journal* 27, 1 (2022), 102–114. doi:10.1075/idj.22005.oes
- [20] Annie Murphy Paul. 2013. Eight Ways of Looking at Intelligence. <https://www.kqed.org/mindshift/29252/eight-ways-of-looking-at-intelligence>
- [21] Evan M Peck, Sofia E Ayuso, and Omar El-Etr. 2019. Data is Personal: Attitudes and Perceptions of Data Visualization in Rural Pennsylvania. In *Proc. CHI Conf. Hum. Factors Comput. Sys.* ACM, NY, USA, 1–12. doi:10.1145/3290605.3300474
- [22] Eduardo Puerta, Shani Claire Spivak, and Michael Correll. 2025. The Many Tendrils of the Octopus Map. In *Proc. CHI Conf. Hum. Factors Comput. Sys.* ACM, NY, USA, Article 970, 20 pages. doi:10.1145/3706598.3713583
- [23] Doris Seyser and Michael Zeiller. 2018. Scrollytelling – An Analysis of Visual Storytelling in Online Journalism. In *22nd Int. Conf. Info. Vis. (IV)*. IEEE, CA, USA, 401–406. doi:10.1109/IV.2018.00075
- [24] Xinhuan Shu, Aoyu Wu, Junxiu Tang, Benjamin Bach, Yingcai Wu, and Huamin Qu. 2021. What Makes a Data-GIF Understandable? *IEEE Trans. Vis. Comput. Graph.* 27, 2 (2021), 1492–1502. doi:10.1109/TVCG.2020.3030396
- [25] The Editors of Encyclopaedia Britannica. 2013. Bestiary. In *Encyclopaedia Britannica*. Encyclopaedia Britannica Inc., Chicago, IL, USA. <https://www.britannica.com/art/bestiary-medieval-literary-genre>
- [26] Edward R Tufte. 1983. *The visual display of quantitative information*. Vol. 1. Graphics Press, Cheshire, CT, USA.