



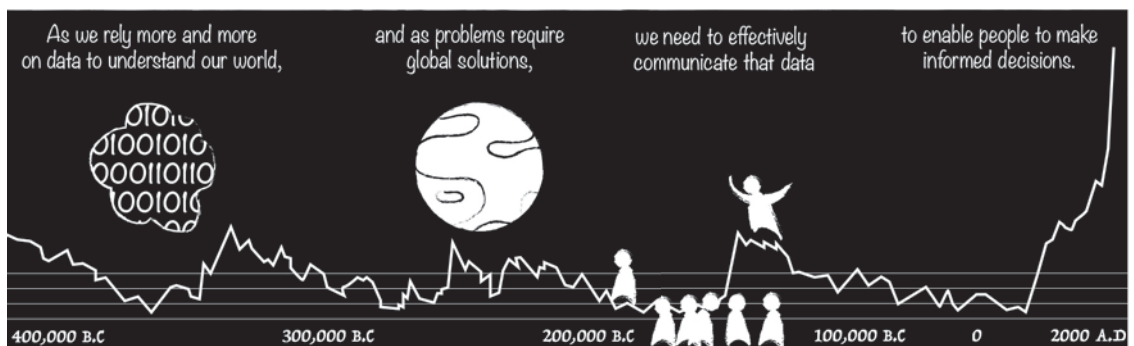
The Emerging Genre of Data Comics

Benjamin Bach
Harvard University

Nathalie Henry Riche
Microsoft Research

Sheelagh Carpendale
University of Calgary

Hanspeter Pfister
Harvard University



Visualizations can be effective in showing data,

[1] [2] [3] [4]

but a single picture alone may not be able to explain nor to engage an audience in decoding a message.

How do we engage an audience?

How do we break down complexity?

How do we guide the audience?

There are many ways of data-driven storytelling:

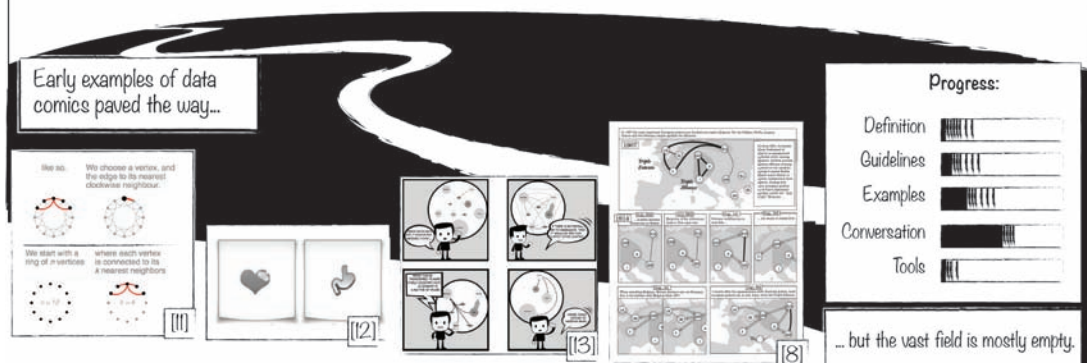
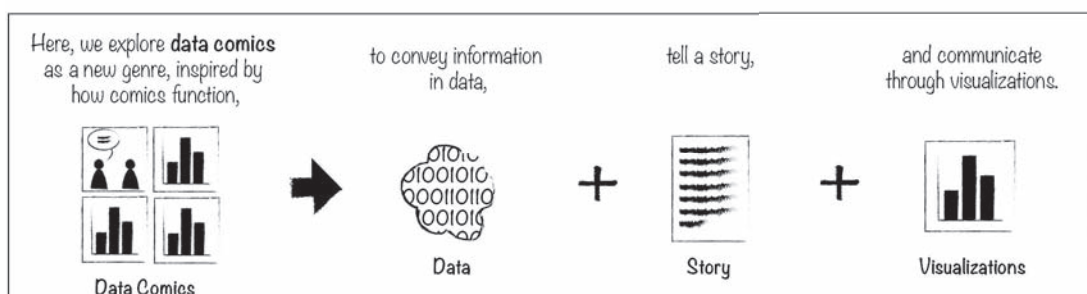
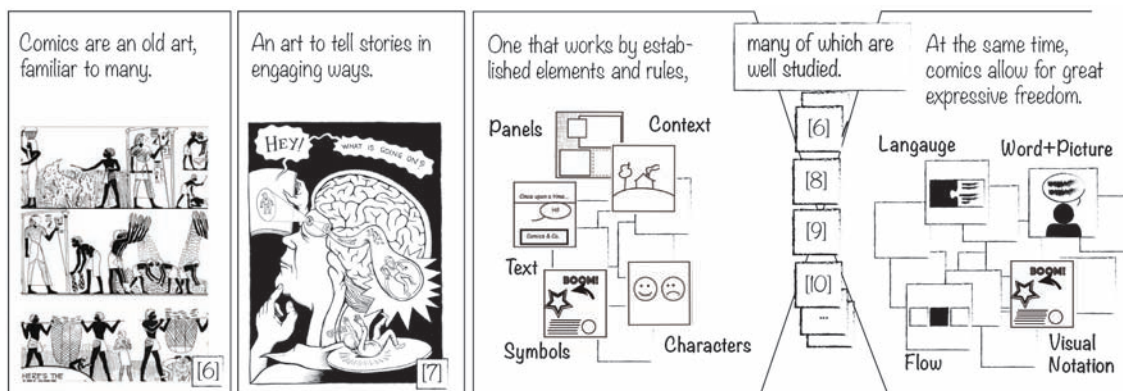
[5]

One of them being comics.

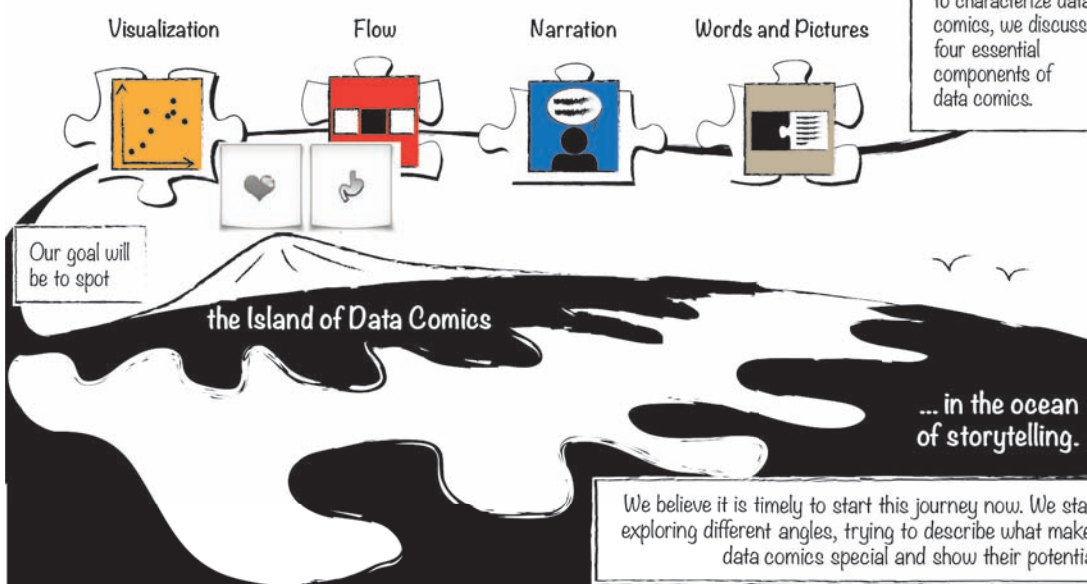
Comic Strip

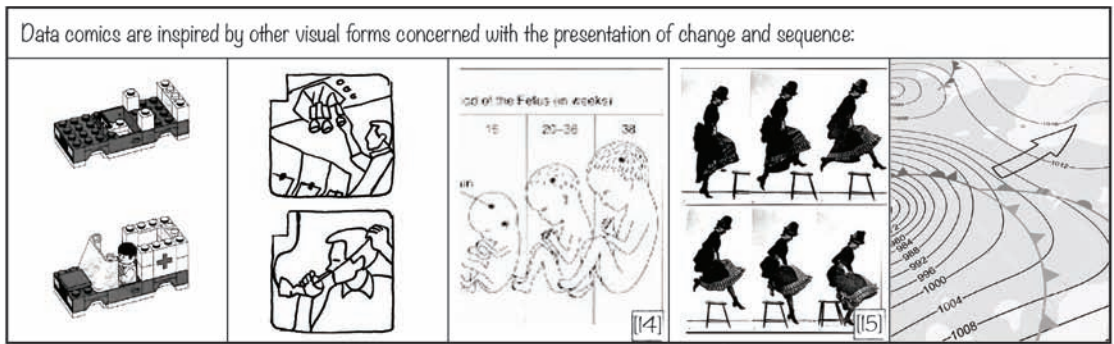
Although comics are familiar to everyone, they are vastly underexplored for data-driven storytelling.

This comic presents our viewpoint on **data comics** and how to leverage comics to tell stories with data.

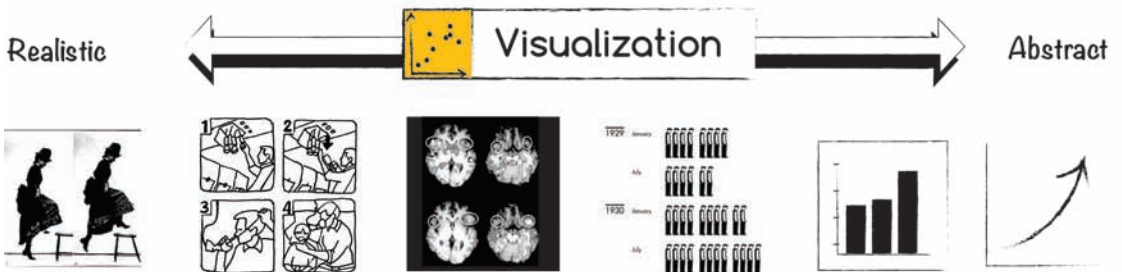


Four Essential Components of Data Comics





We call this component **visualization**, ranging from iconic **realistic** pictures to **abstract** and conceptual visualizations.



While all of these pictures are visualizations, not all of them show **data**.

Data visualizations provide a visual form to something otherwise **invisible**.

In fact, data does not actually have to exist,

nor can we be sure the representation is true.

Data comics can vary in style and detail to support a message

It's going up! This is unstable!

or use alternative representations to highlight a different point.

Node-Link Diagram

One central node.

Adjacency Matrix

Many missing connections.

A chosen visualization must fit the data, but

? !

most importantly, it must be understood by readers,

Bertin

even those who have never seen a visualization.

Data visualizations are designed to allow for a variety of discoveries and insights:

trends

relations

outliers

clusters


comparisons

change


distributions,

which eventually will be shown to the audience.


In storytelling, it is important that people understand the presented content easily,



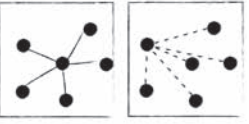
especially when data and visualizations are complex.



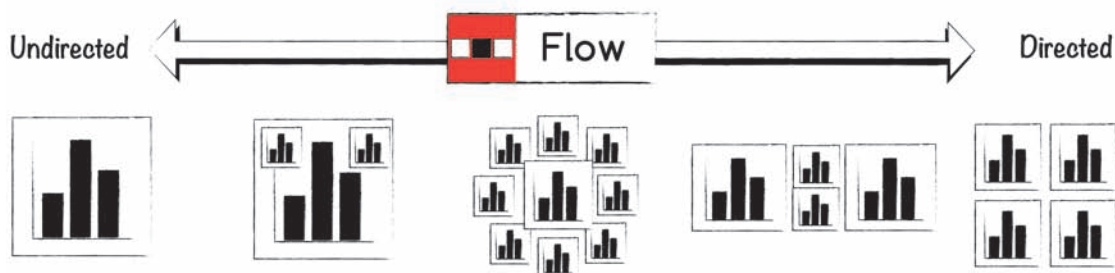
Yet, comics offer a fascinating and simple way:




one message per panel.




We call this component **flow**, ranging from an **undirected** nonexplicit flow to a **directed** flow indicated by the order of the panels.




No reading order requires readers to explore by themselves.




Comics can explain complex processes by splitting them into less complex units.




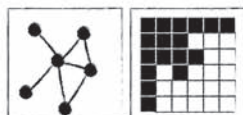
Linear order provides **guidance** and aids argumentation.



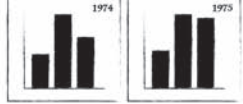
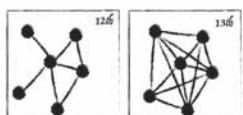
This requires **transition**.





For example: Visualization-to-Visualization

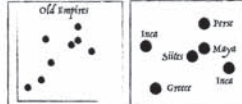
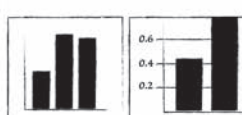
Moment-to-Moment

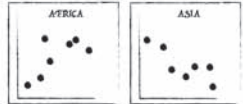
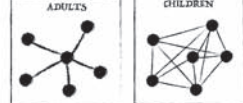
Detail-to-Detail



Level-of-Detail

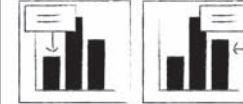
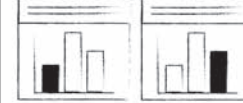
Data-to-Data

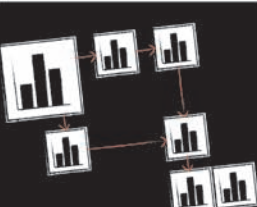
Visualization-to-Context

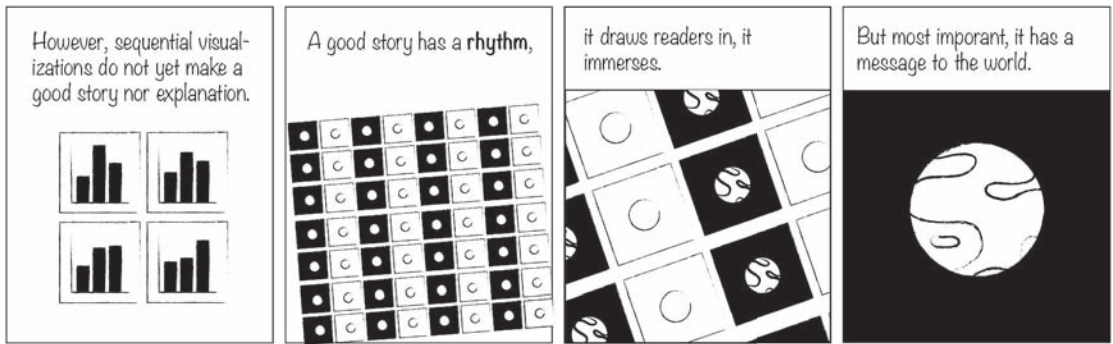



Message-to-Message

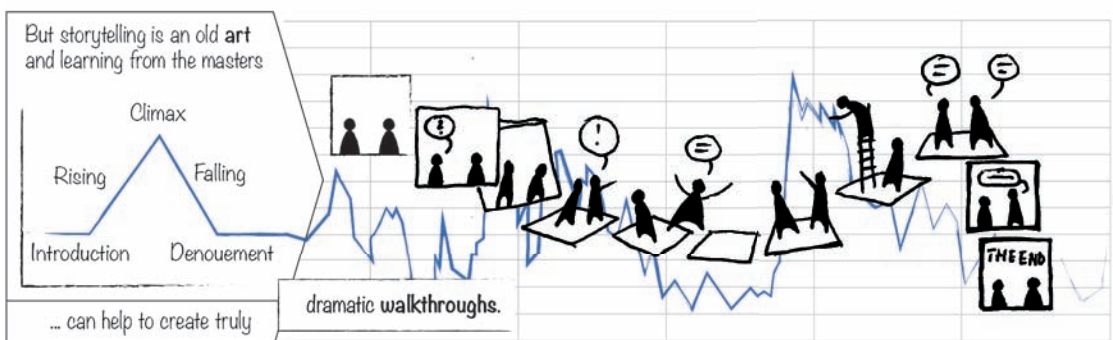
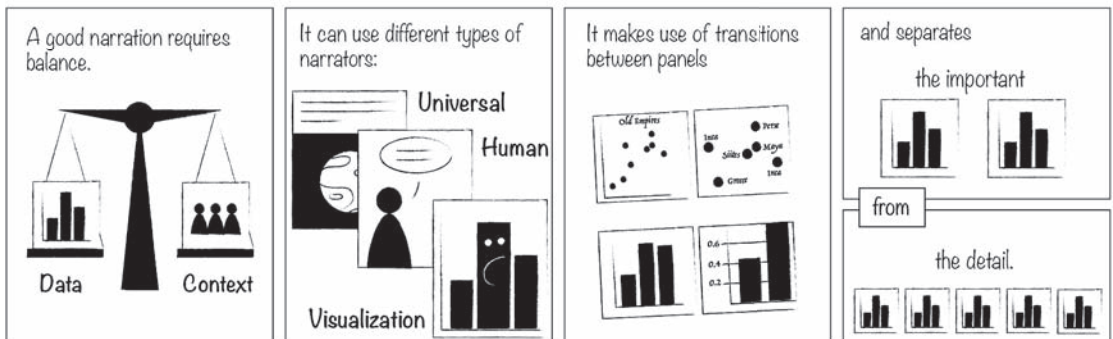
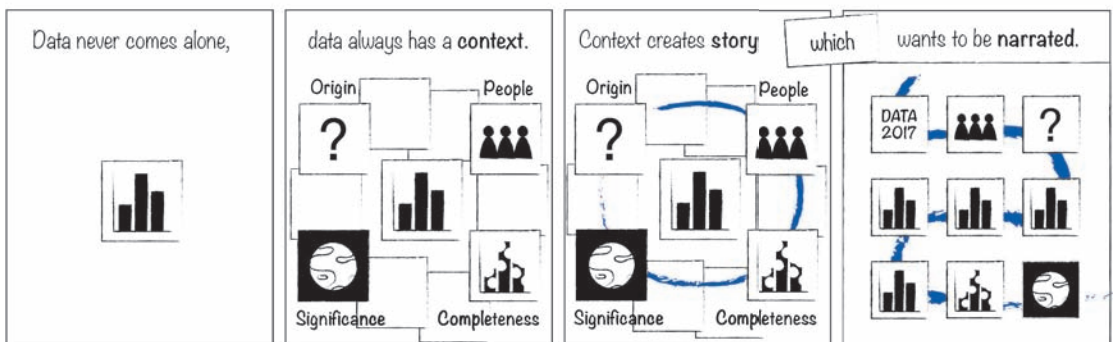



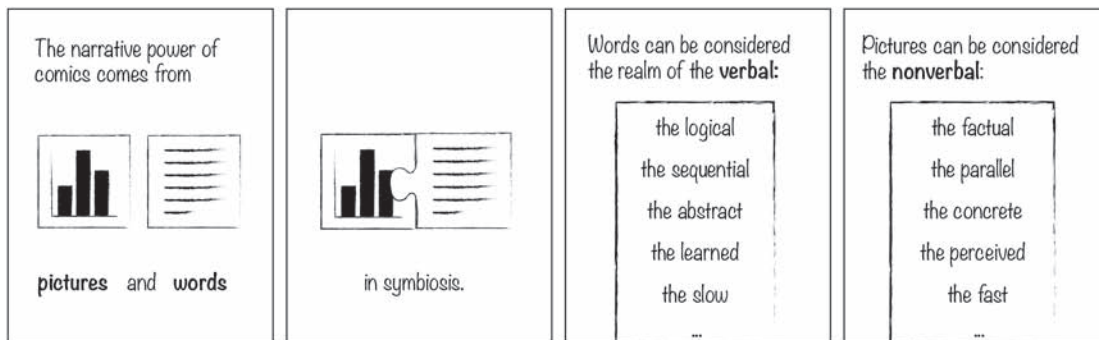
But sometimes, a linear order is not desired or just too simple.



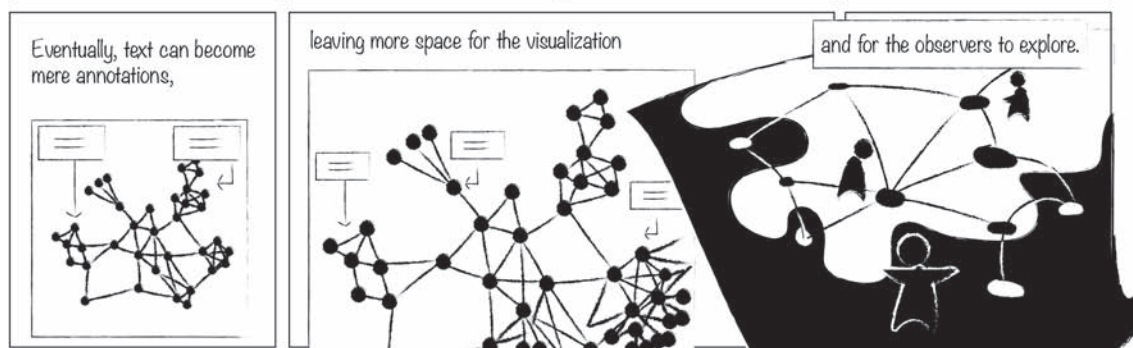
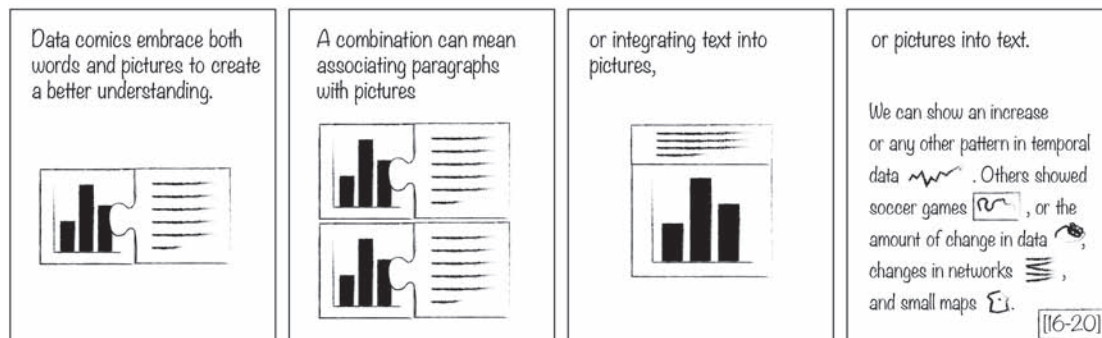
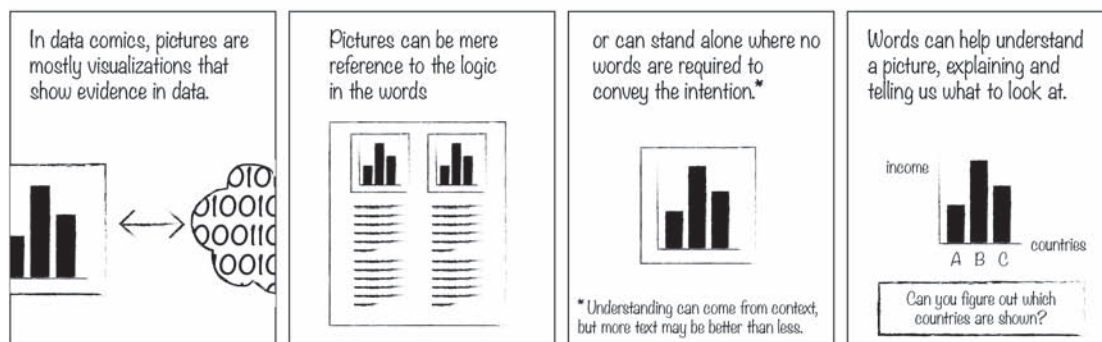
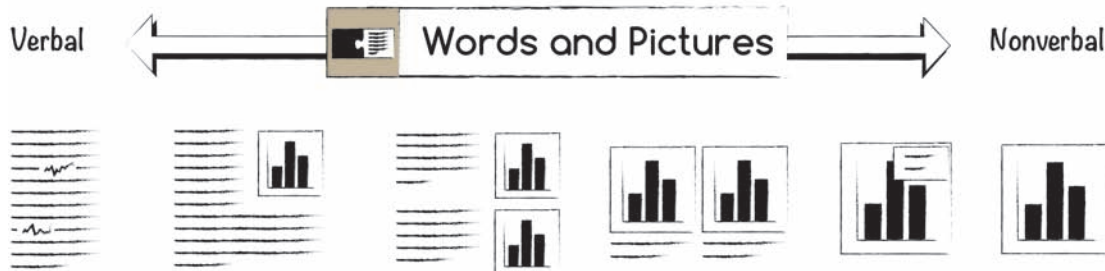


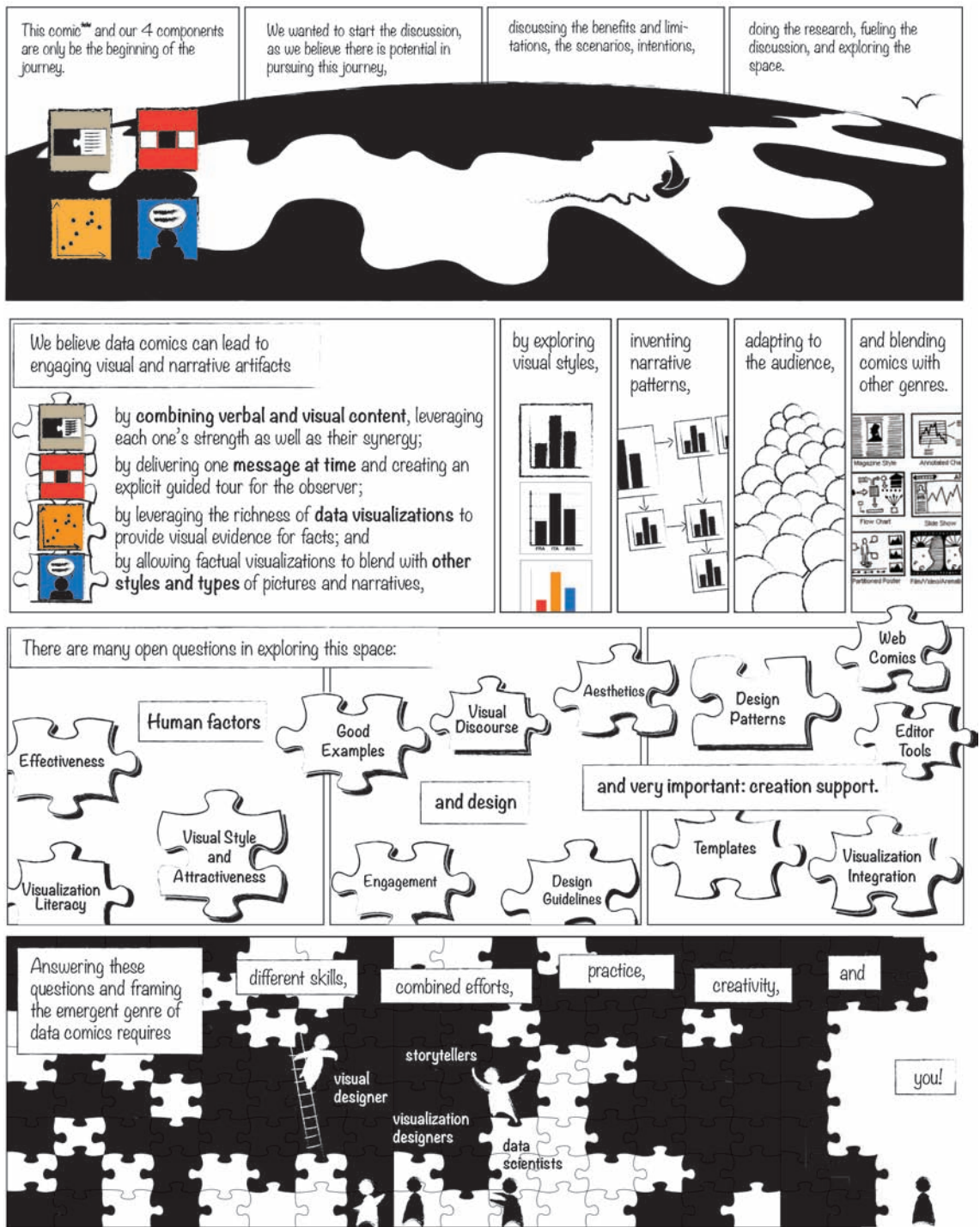
We call this component **narration**, ranging from **factual** arrays of visualizations to richly **narrated** graphic novels.





We call this component **Word and Picture**, ranging from almost entirely **verbal**, to **nonverbal** and visual.





™ This is **not** a data comic, as it does not tell a story about data. It is an homage to Scott McCloud [6].

www.datacomics.net

References

1. J. Katz, "'Duck Dynasty' vs. 'Modern Family': 50 Maps of the U.S. Cultural Divide," *New York Times*, 27 Dec. 2017; www.nytimes.com/interactive/2016/12/26/upshot/duck-dynasty-vs-modern-family-television-maps.html.
2. G. Lupi and S. Posavec, *Dear Data*, Princeton Architectural Press, 2016; www.dear-data.com.
3. Isotype Inst., www.humantific.com/tag/isotype-institute.
4. Gapminder, www.gapminder.org.
5. E. Segel and J. Heer, "Narrative Visualization: Telling

Editor's Note

The authors behind this special Art on Graphics department article—Benjamin Bach, Nathalie Henry Riche, Sheelagh Carpendale, and Hanspeter Pfister—also contributed this issue's cover image. See the About the Cover profile article, "Stories in the Data," for more details about their motivation, creative process, and attempts to leverage the massive untapped potential for data-driven comics to explain multiple threads of simultaneous data.

Sheelagh Carpendale is a professor at the University of Calgary. Contact her at sheelagh@ucalgary.ca.

Hanspeter Pfister is the An Wang Professor of Computer Science at the Harvard University School of Engineering and Applied Sciences. Contact him at pfister@seas.harvard.edu.

Contact department editors Bruce Campbell at bcampbel01@risd.edu and Francesca Samsel at figs@cat.utexas.edu.

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- Stories with Data," *IEEE Trans. Visualization and Computer Graphics*, vol. 16, no. 6, 2010, pp. 1139–1148.
6. S. McCloud, *Understanding Comics: The Invisible Art*, William Morrow Paperbacks, 1994.
 7. M. Farinella and H. Ros, *Neurocomic*, Nobrow Press, 2014.
 8. B. Bach et al., "Telling Stories about Dynamic Networks with Graph Comics," *Proc. CHI Conf. Human Factors in Computing Systems*, 2016, pp. 3670–3682.
 9. Visual Language Lab, www.visuallanguagelab.com.
 10. W. Eisner, *Comics and Sequential Art: Principles and Practices from the Legendary Cartoonist*, W.W. Norton & Company, 2008.
 11. B. Victor, "Scientific Communication as Sequential Art," 24 May 2011; worrydream.com/#!/ScientificCommunicationAsSequentialArt.
 12. J. Jin and P. Szekely, "QueryMarvel: A Visual Query Language for Temporal Patterns Using Comic Strips," *Proc. IEEE Symp. Visual Languages and Human-Centric Computing (VL/HCC)*, 2009, pp. 207–214.
 13. Z. Zhao, R. Marr, and N. Elmqvist, "Data Comics: Sequential Art for Data-Driven Storytelling," tech. report, Univ. of Maryland, 2015.
 14. K.L. Moore, T.V.N. Persaud, and M.G. Torchia, "Critical Periods in Human Development," *The Developing Human: Clinically Oriented Embryology*, 9th ed., Saunders, 2011.
 15. E. Muybridge, "Woman Jumping, Running Straight High Jump," *Animal Locomotion*, plate 156, 1887.
 16. E.R. Tufte, *The Visual Display of Quantitative Information*, Graphics Press, 2001.
 17. C. Perin, R. Vuilleminot, J.-D. Fekete, "SoccerStories: A Kick-Off for Visual Soccer Analysis," *IEEE Trans. Visualization and Computer Graphics*, vol. 19, no. 12, 2013, pp. 2506–2515.
 18. B. Bach et al., "Time Curves: Folding Time to Visualize Patterns of Temporal Evolution in Data," *IEEE Trans. Visualization and Computer Graphics*, vol. 22, no. 1, 2016, pp. 559–568.
 19. U. Brandes and B. Nick, "Asymmetric Relations in Longitudinal Social Networks," *IEEE Trans. Visualization and Computer Graphics*, vol. 17, no. 12, 2011, pp. 2283–2290.
 20. P. Goffin et al., "Exploring the Placement and Design of Word-Scale Visualizations," *IEEE Trans. Visualization and Computer Graphics*, vol. 20, no. 12, 2014, pp. 2291–2300.

Benjamin Bach is a research fellow at the Harvard University School of Engineering and Applied Sciences. Contact him at benj.bach@gmail.com.

Nathalie Henry Riche is a researcher at Microsoft Research. Contact her at nath@microsoft.com.

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