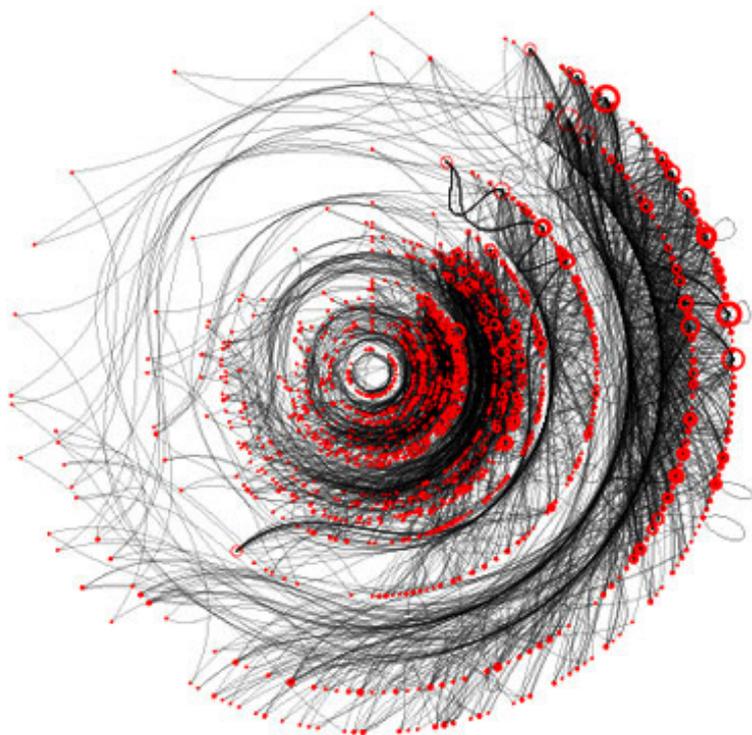


# Infosthetics: the beauty of data visualization

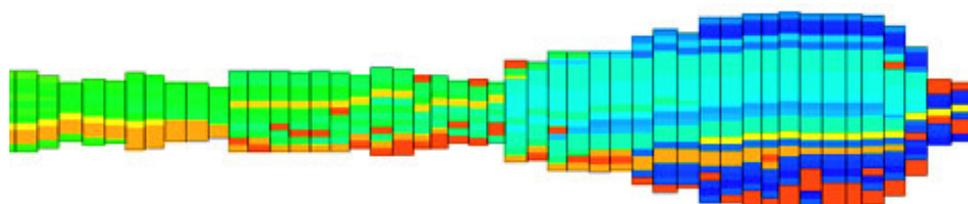
23 Mar 2007 Category: [Features](#), [Internet](#), [Recommended](#), [Technology](#), [Top Page 10](#)



The beauty of information aesthetics: [Visual Poetry 06](#) by Boris Müller. "Boris Müller's newest 'visual theme' for a annual international German literature festival. 2006 the theme consisted of beautiful visualizations of the poetry texts themselves. Each word corresponded to a numerical code by adding the alphabetical values of its letters together. This number was mapped onto the position on a circle, and marked by a red dot. Gray lines connect the dots in the sequence the words appear in the poem. The diameter of the circle on which the dots are placed is decided by the length of the poem," Andrew explains.

[Andrew Vande Moere](#) digs deep in his information channels to gather the most interesting forms of data visualization. Yes, those common diagrams and charts that haunted you during your school days (for example, displaying the annual per capita income of Togo's citizens in the most boring way). However, his blog [infosthetics.com](#) brings up the most *beautiful* outpourings of information aesthetics. For him this is a symbiosis between creative design and information visualization: form follows data and evolves in such unique graphs that you can call them art. Can you? PingMag talked to Andrew about *infosthetics*.

Written by Verena



[Stamen](#) are amongst Andrew's all time favorites. This is an excerpt of time-based mappings of

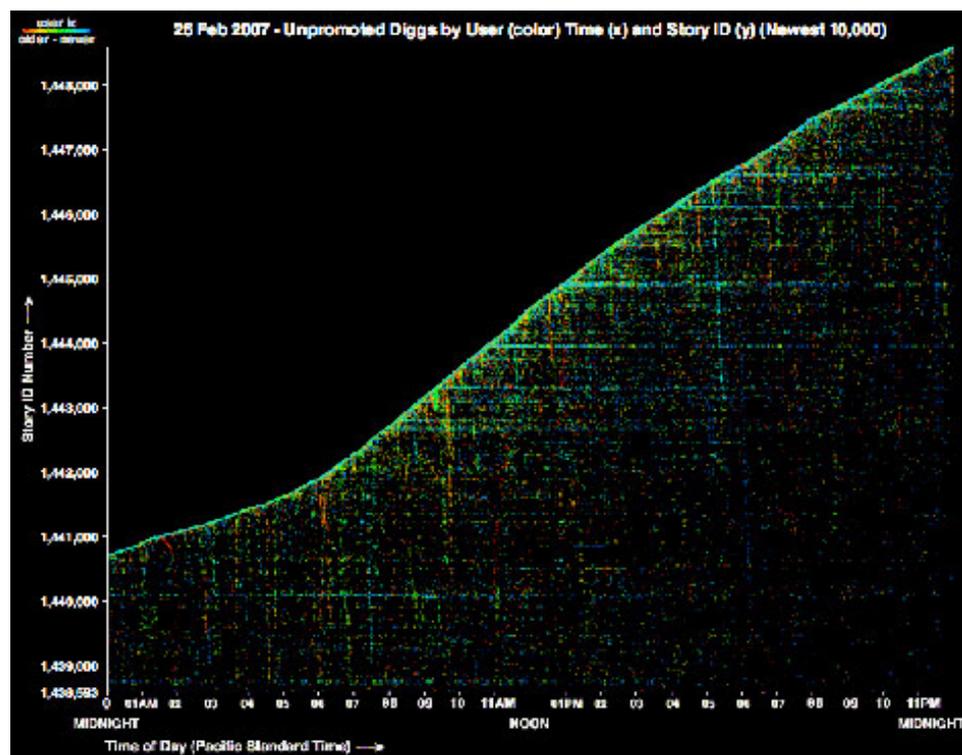
wireless networks in urban environments called [Trace](#): as a participant walks through the city, wireless networks are sensed by the PDA. Each time a new network is encountered, a new vertical bar is drawn. As each new network is encountered, its marker moves along the color spectrum. The first network is always red and on the left hand side, the last one is always purple and on the right side, and networks along the way get new colors as they come within range. The height of each bar represents the combined strength of the wireless networks currently in range.

**First, would you quickly sum up your background for us? I only figured out that you are from Belgium and worked as an assistant at the ETH Zurich...**

Way back, I studied Architectural Engineering at the K.U.Leuven University in Belgium. Even during my studies, I was always interested in how computers could create electronic forms of *architectural* spaces, non-physical places in which people still could meet, work and play.

In contrast to most currently existing shared 3D worlds, such *virtual* architecture is not necessarily based on traditional considerations as climate protection, privacy or constructive needs. Instead of bricks as the smallest delineator, such places have only one material in common: digital data. I discovered an academic group at [ETH Zurich](#) in Switzerland, who succeeded in merging architectural insights with the creation of such purely electronic spaces, including intriguing data-driven worlds and large-scale abstract visualizations that were both useful and beautiful.

I was lucky enough to become a post-graduate student there, then a research assistant, and finally a PhD student. During my PhD, I developed several novel visualization techniques that were specifically designed to be used in immersive virtual reality environments, such as [CAVEs](#). After my PhD, I moved to Australia and became an Assistant Professor in [Design Computing at the University of Sydney](#). I am now exploring more broadly the borders between IT and design, especially in the context of data visualization.



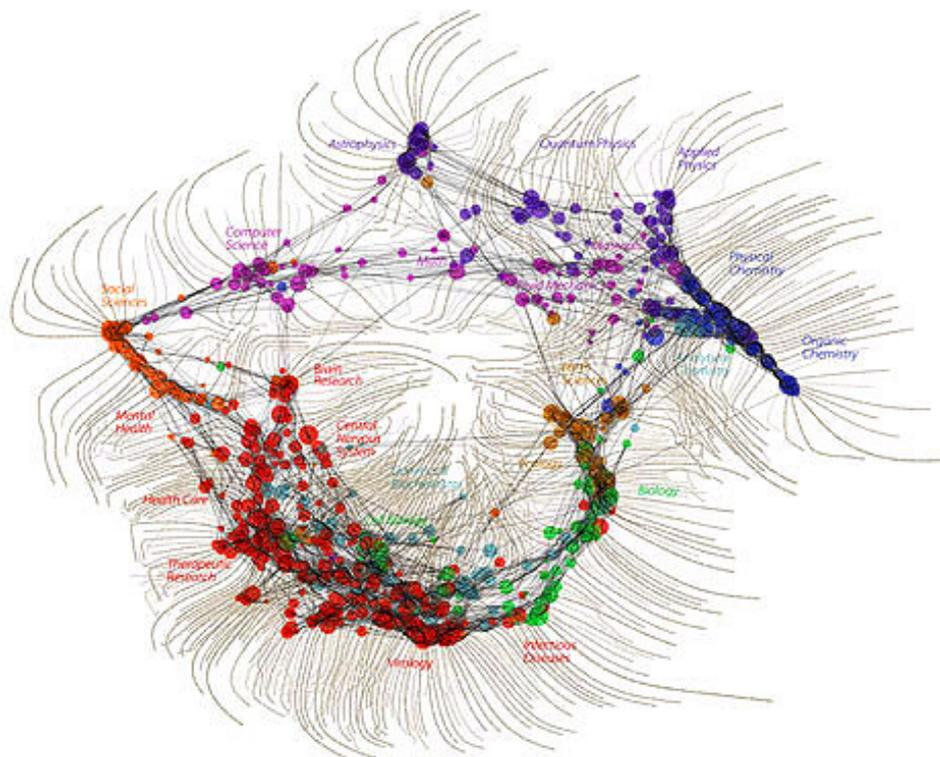
Beautiful diagram, again from [Stamen](#)! This shows the [user activities on Digg over an entire day](#). Made by Tom Carden, it displays the non-promoted stories only: only [diggs](#) upcoming stories are included. The scarring effect, where users digg one story after another in sequential order, seems to take place almost exclusively with very recently submitted stories, and seems to be about evenly

distributed between long-time and new members of Digg.

### For an introduction, would you explain shortly the difference between *information architecture* and *information design*?

*Information architecture* is an approach that focuses on organizing and categorizing data, conceptually as well visually, and is related to functionality, navigation, and interaction. It most often is referred to in the area of web design.

*Information design* is about the design of information graphics, and the design of visual displays of information. Think about the diagrams you can find in newspapers and magazines. However, different definitions exist.



The [Map of Science](#) by W. Bradford Paley: “The image was constructed by sorting roughly 800,000 scientific papers (shown as white dots) into 776 different scientific paradigms (red circular nodes) based on how often the papers were cited together by authors of other papers...” Research & Node Layout: [Kevin Boyack and Dick Klavans](#); Data: Thomson ISI; Graphics & Typography: [W. Bradford Paley](#); Commissioned by [Katy Börner](#)

In your [infosthetics](#) blog you were wondering about your own attraction to data visualization: “is it the attention to superficial decoration, a creative design approach to visualization, the desire to merge beauty & functionality, or a general lack of effective information communication?” What would you say about it right now?

To be honest, I really do not know the answer to this question. That is why I asked it to my readers. First of all, I especially appreciate the definition of *information aesthetics* (or *esthetics* according to him) from [Bradford Paley](#), who states that information aesthetics works are based on an understanding of how human information processing capabilities can enhance esthetic appreciation. Such applications use aesthetic engagement to increase the information flow, and thus make the visualization, as a tool, more useful.

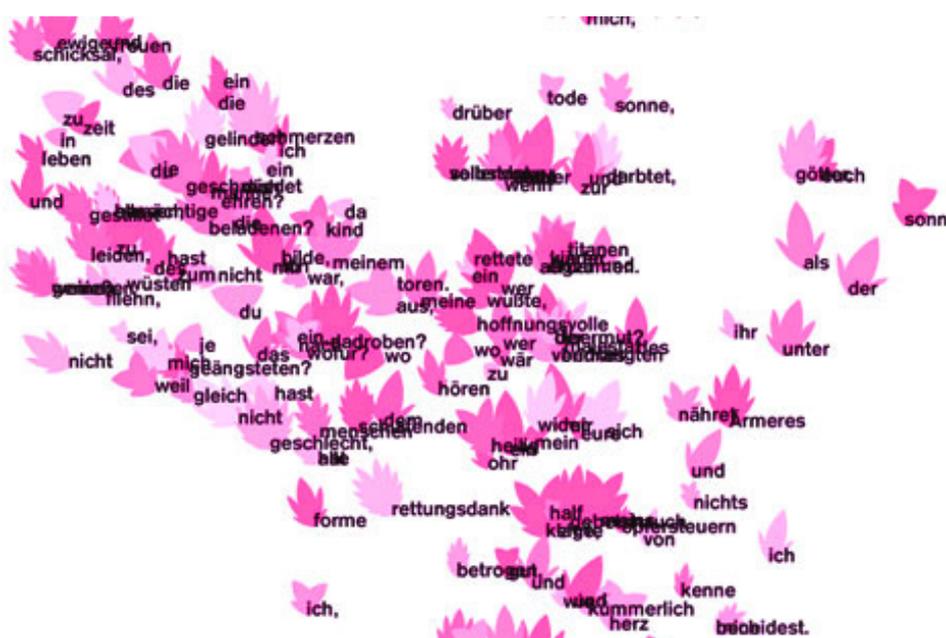


Close-up of the [Map of Science](#). “...Links (curved lines) were made between the paradigms that shared common members, then treated as rubber bands, holding similar paradigms nearer one another when a physical simulation had every paradigm repel every other: thus the layout derives directly from the data. Larger paradigms have more papers. Labels list common words unique to each paradigm.”

Although I agree to this definition, I do not know the conclusive answer to your question. However, some of my research students are currently investigating this matter. For instance, Nick Cawthon is determining whether subjectively judged aesthetic visualizations are considered more useful, and have inherent qualities that might have been overlooked by traditional visualization evaluation studies.

Andrea Lau, another research student, is currently investigating the characteristics of information aesthetics in visualization, such as aesthetic quality, data treatment and interactive features, and is analyzing several info-aesthetics works in terms of intent, purpose and employed technique. Our first findings show that aesthetics clearly *don't* consist of superficial decoration, and most info-aesthetic visualizations seem not very effective in augmenting the knowledge present inside the dataset.

Instead, information aesthetic visualizations rather seem to communicate messages that are based on the meaning represented by the data, and instead exploit visualization techniques as tools for slightly different goals than they originally were meant for.

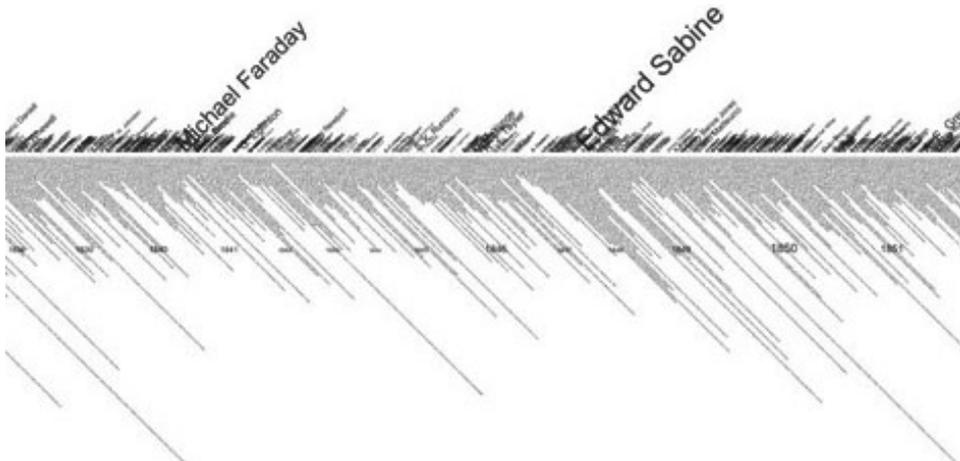


Another [Visual Poetry 05](#) literature visualization by Boris Müller. He [says](#): “I was visually inspired by L-System algorithms. However, it did not make sense to use any recursive algorithms. But I picked up the idea that certain symbols in a text would control the growth of the tree. Specific letter-combinations would create a new branch, others would make it grow stronger. So the final tree-structure would be a direct result of the letter sequence in the text. Therefore, every poem is

represented by its own, distinct tree.”

**Of course, these visualizations are not superficial decoration - but still their mere looks are a beauty of its own. Is it an art form to you or more a scientific output?**

If you mean “information aesthetic” infographics, then they should include both. **Information aesthetic visualizations should appeal both the mind and soul.** While they positively stimulate our senses, in terms of engagement, involvement, and imagination, they are also optimized for the specific task of conveying complex data-driven concepts in intuitive and easily comprehensible ways. **It is not a surprise then, that the most successful infographics use creative design insights.**

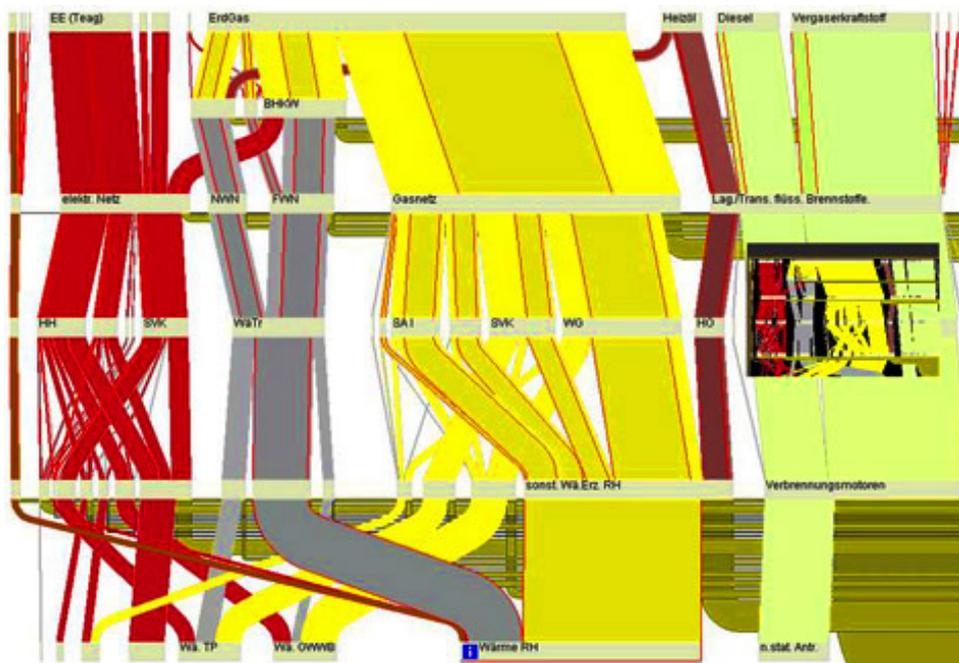


Chris Harrison’s [Royal Society Archive Visualization](#). Andrew [explains](#): “An extremely large timeline depicting the archive of papers published in the prestigious Royal Society’s scientific journal, from 1665 to 2005. The entire timeline has been segmented into 10 sections, each 20,000 x 2,000 pixels. this visualization displays papers chronologically, with paper titles radiating downward from the vertical midpoint at a 45 degree angle. The size varies linearly by the number of number of papers published during that year’s volume. The size of the author’s name reflects how prolific they were. Some patterns that can be observed: paper titles become shorter over time, and there is a notable decrease in the quantity of papers published per volume starting around 1761, which significantly rebounds in 1970.”

**So in terms of these design insights: what determines a superb made info diagram for you? And what would a real bad one look like?**

I find this a very difficult question. To determine whether a diagram is *good* or *bad*, one needs to determine for what context it was designed for. What is the goal of that diagram? Is it task-oriented, or does it aim to stimulate our emotions? Is it meant to communicate previously unknown insights hidden inside the data, or persuade a convincing message based on the same information?

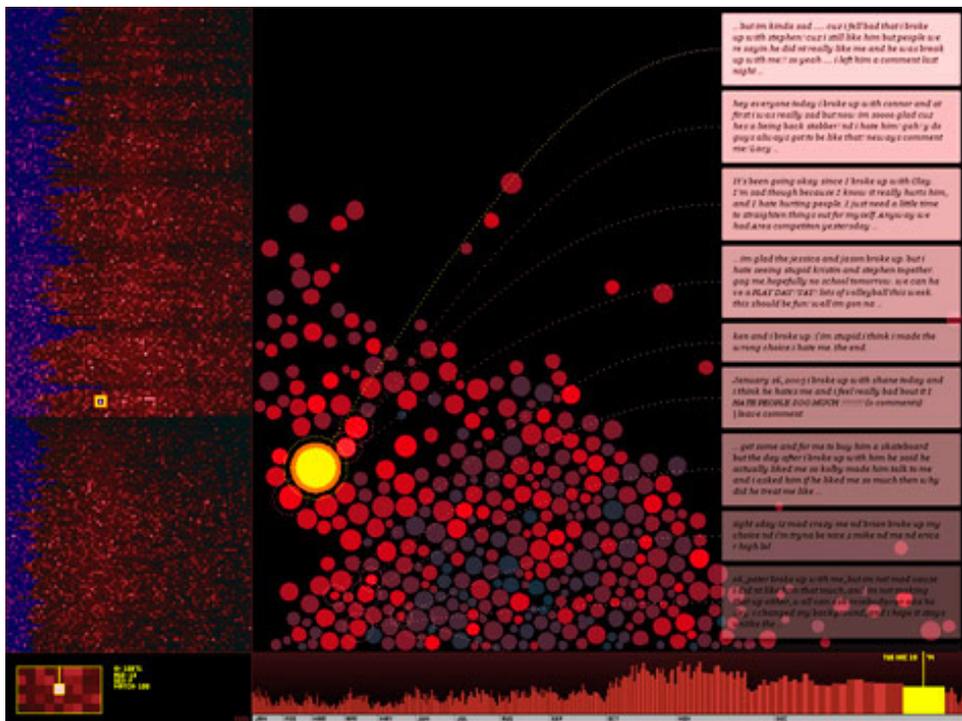
For instance, some information graphics are excellent in conveying the exact amount, place, and circumstances involved in recent Iraq casualties. While others are excellent in provoking thoughts and opinions about the Iraq war in general. Both these infographics could be based on an identical dataset, but both are designed with different intentions, and therefore probably use ‘aesthetics’ for different purposes. And they might be both ‘superb’ within their context. *[For example, one telling interactive infographic about Iraq casualties was published in the [New York Times](#), or this artistic one from Shane Carroll called [Panic in Detroit](#).]*



[Interactive Sankey Diagrams](#) by Patrick Riehmann, Manfred Hanfler, and Bernd Froehlich of [Bauhaus-University-Weimar](#), Germany. Andrew explains: “A novel data visualization system that allows users to interactively explore complex flow scenarios represented as [Sankey diagrams](#). The system provides an overview of the flow graph and allows users to zoom in and explore details on demand. The system is applied to the energy flow in a city. Different forms of energy are distributed within the city and they are transformed into heat, electricity, or other forms of energy. These processes are visualized and can be interactively explored.

### What are your all time infosthetics favourites?

With the danger of forgetting some very important projects, people interested in information aesthetics should definitely look at the works of Martin Wattenberg (e.g. [Baby Name Voyager](#)), Stamen.com (e.g. [Digg Labs](#)), Fernanda Viégas (e.g. [Themail](#)), Marcos Weskamp (e.g. [Newsmap](#)), Boris Müller (e.g. [Visual Poetry](#)), Golan Levin (e.g. [The Secret Lives of Numbers](#)), Bradford Paley (e.g. [textarc](#)), Jonathan Harris and Sep Kamvar (e.g. [We Feel Fine](#)), John Maeda, Edward Tufte, [Ben Fry](#) and plenty more. Having said that, I certainly also enjoy more *analogue* techniques (e.g. [Week in Review](#)). *[Please scroll up and down the visualizations going with the article.]*



[The Dumpster](#) by [Golan Levin](#) is an interactive online visualization that depicts the romantic breakups of teenagers, from their blogs. Using postings extracted from online blogs, people can surf through tens of thousands of specific romantic relationships in which one person has “dumped” another. Commissioned by [Tate Online](#).

**With all these fine visualization experts, I bet you have seen a lot of all kinds of graphic depictions. I wonder how far the degree of abstractness can actually go?**

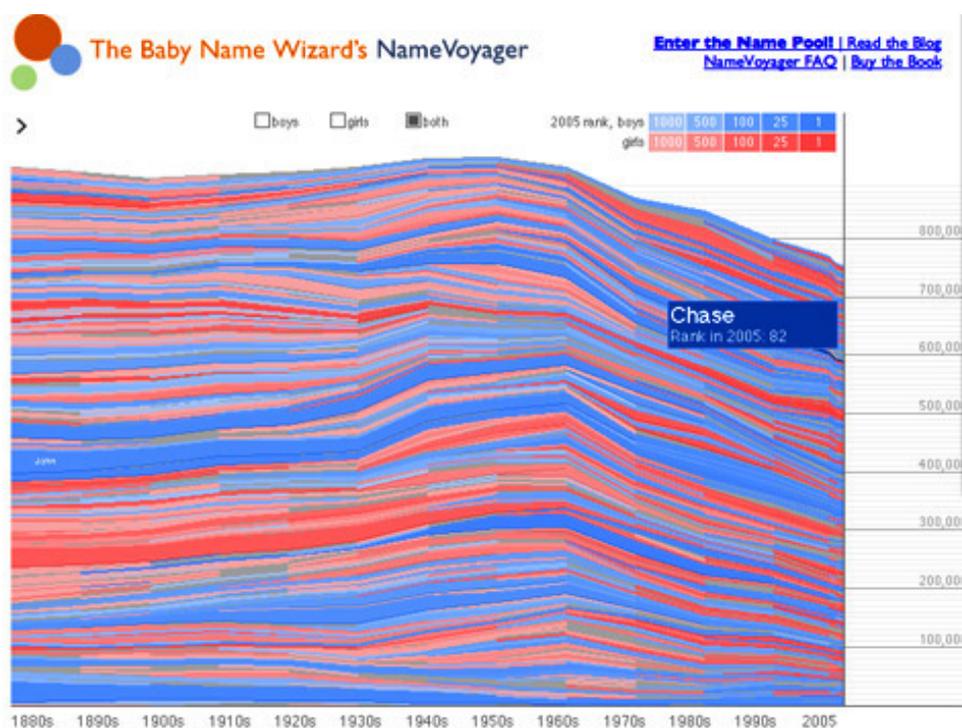
Abstractions can reach into alternative human senses, such as so-called *non-visual* visualizations. There are plenty of examples that use abstract data to stimulate sound, touch, smell, even taste. Just be amazed how Dan Maynes-Aminzade built a [working computer interface people can lick and taste](#).



Developed at MIT, Fernanda Viégas’ [PostHistory](#) explores the accumulation of e-mail activities over a period. Fernanda [explains](#): “Most of us deal with email on an everyday basis and some of us have been doing so for several years... In short, it is hard to get a sense of mere scale and patterns... The visualization aims at impressing on the user a sense of daily accumulation, of growth and scale dimensions not normally conveyed on current email applications... The goal is to create visualizations that allow us to look back at our actions in the digital world in order to grasp the scale, intensity and forms that our interactions take in this medium.”

On a data mapping abstraction level, anything that is created *out of* data, instead of some random algorithm, could be called *visualization*. This does not mean they are intuitive or even understandable at all. Some direct translations exist, such as the quite psychedelic depictions of statistical data tracking the [US domestic production of shoes and slippers from 1960 to 1998 in 31 categories](#), created by Jason Salavon.

While technically a visualization, I rather consider them a critique of visualization as a medium of which people inherently expect to *augment our understanding*. There is often that danger expectation and perceiving meaning where there is none. Other people use data as inspiration of their artistic work, such as [Christina Ray](#), for instance.



[Martin Wattenberg's](#) creation of the [NameVoyager](#), depicting the rankings of most popular baby names within the time frame between 1880 and 2005. By the way, he also worked on Golan Levin's visualization [The Secret Lives Of Numbers](#) and now joins Fernanda Viégas at [IBM Watson Research Center](#) in Cambridge.

**In one of your scientific papers you used the term [persuasive visualization](#) and you explained it with: “Information visualization that is able to increase awareness & motivate for human behavior modification.” Please explain that a bit!**

I propose that visualization has the potential to reach beyond the classical goals of *finding data patterns*, *making better informed decisions* or *communicating knowledge*. In short, I am convinced that designers are ideally suited to present information in engaging ways, which are able to personally involve people and therefore make strong emotional connections with them. A prime example for future visualization research could be part of *persuasive computing*, which uses

technology to make people aware of complex concepts, in the ultimate goal to encourage them to change their behavior.

In a basic form, the movie *An Inconvenient Truth* is an example of how information display is specifically designed for a non-expert audience, aiming to change people’s opinion and attitude, and hopefully everyone’s everyday behavior. More sophisticated applications could be developed in the healthcare domain, for instance to encourage people to change their eating patterns by informing them in an accurate, timely but always enjoyable way of the consequences of their food decisions.



[Marcos Weskamp's](#) depiction of the [newsmap](#). Andrew explains: “Newsmap is a live visualization of google news: a treemap algorithm fills the available screen space, as size denotes the importance of specific headlines, color distinguishes news categories, and brightness the story novelty.”

**What I also found really interesting was your issue of real-world buildings serving as information visualizations: the formality of inhabitable designs. Have you been working on any related projects lately?**

Unfortunately, I haven’t, but I guess it is only a matter of time before buildings truly *are* data-driven or data-based. I guess you refer to some conceptually intriguing buildings I consider *built data visualizations*, such as the [Holland Pavilion](#) by [MVRDV](#) at the World Expo 2000 in Hanover. From the outside as well as from the inside, it is truly a navigable information presentation of the stereotype interpretation of The Netherlands.



beat typography, maps, and charts all mixed together?

...really, you can't.

**Posted by:** [Græme](#) on March 24th, 2007 at 12:30 am

6. Amazing, amazing stuff...

More of it...

**Posted by:** [Tomi](#) on March 24th, 2007 at 4:20 am

7. [...] More here: Verena [...]

**Posted by:** [Data Visualization Daily » Blog Archive » Infosthetics: the beauty of data visualization](#) on March 24th, 2007 at 10:48 am

8. Brilliant. Information design at its finest.

**Posted by:** [aaron](#) on March 24th, 2007 at 8:59 pm

9. I am a CHINA student,I like science and design.Just lfound your web and I was excited ,but I'm only an English beginner and in Janpanese I'm pool.I'm sorry.

**Posted by:** [Tiancai lin](#) on March 24th, 2007 at 10:22 pm

10. wow, those images are great. Very informative / interesting article.

“Once buildings can dynamically alter their form, space and functionality based on data streams - how would that change architecture?”

\_< WOW!

Thanks PingMag.

**Posted by:** [Skull Lab](#) on March 25th, 2007 at 12:25 am

11. [...] Verena Dauerer (»pingmag«): »Infosthetics: the beauty of data visualization« [...]

**Posted by:** [Blog » Lesenswert Nr. 3 » Holzapfel & Bayer \(Webdesign Neuss, Düsseldorf und Mönchengladbach\)](#) on March 25th, 2007 at 12:51 am

12. [...] PingMag - Infosthetics: the beauty of data visualization [...]

**Posted by:** [Nerdcore - A Blog about very cool Stuff. Und so.](#) on March 25th, 2007 at 8:25 am

13. [...] PingMag'ında gördüm, “Infosthetics: the beauty of data visualization“. Dataların görselleştirildiğinde ortaya çıkan [...]

**Posted by:** [Infosthetics » Nahnu.Org : " Weblog Falan "](#) on March 25th, 2007 at 7:13 pm

14. nda...t

**Posted by:** [Alex](#) on March 25th, 2007 at 9:59 pm

15. Cool, I believe a lot of the visualizations / algorithms are coded through a program called