Point of View as Mediacy of Information Visualization

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Abstract
In recent decades, the importance of information visualization has greatly increased in our daily lives, as it has provided a medium through which to analyze, explore, and express the meanings of datasets. Although much current research has been devoted to addressing the process and various types of visualization, information visualization still lacks the theoretical foundation as a discipline to delineate clearly the complex relationship among information, audiences, and context. The purpose of this paper is to investigate how to analyze the complex relationship among information, audience, purpose, and context. This paper presents a point of view framework that helps to describe the design strategies used for to create information artifacts in response to specific design problems. Through examination of the four thematic variations—person, perspective, mode, and principle—we demonstrate the use of this framework to conduct analyses of several examples of information visualizations. This paper contributes to the literature by providing a theoretical framework that models the relationship among information visualization, audiences, and designers in specific contexts and that provides a meta-language that can be used and applied by educators to foster students’ thinking processes and to facilitate in-class critique.

Keywords
Information visualization; mediacy; point of view; narrative

In Wired (2012), Steven Levy wrote the article, “Can an algorithm write a better news story than a human reporter?” His focus was on how a company can train a computer to write new articles. The computer algorithm developed by Narrative Science can generate an update of sports game, a preview of a corporate earnings statement, or a summary of the election results for Forbes.com or other Internet media powers. This has become possible thanks to advances in data-mining technology and the availability of open public data or user-created content. Algorithmic content creation has also begun to transform publishing, such as Nimble books, in which all of the content of a book is automatically generated by inputting a set of keywords or topics. In this case, the concept of the author is replaced by that of an editor or curator.

There is no doubt that automatically created content enables people to easily access an enormous amount of data in an efficient manner. However, does it help to better understand its meaning, to serve other purposes, or even to evoke emotional experiences? Card, MacKinlay, and Shneiderman (1999) argued that the purpose of visualization is insight, not pictures. As an external aid, visualization helps to expand one’s cognitive capacity, but its more important goal is to use this insight to discover relationships, make decisions, and explain ideas (Card et al., 1999). To this end, computer-written products may offer a shortcut to large sets of data, yet it is not clear whether they can automatically provide valuable insight into the ever-changing complex data sets in a way that is similar to the shrewd and distinctive point of view of a human-written story.
This paper is motivated by the limitation of conceptualizing information visualization as a mere aggregation of data. In recent years, information visualization has begun to be applied to numerous disciplines, from computer science and statistics to journalism or media art, but as a discipline, it still lacks a substantive theoretical framework that would allow design researchers and educators to model the relationship among information artifacts, audiences, and designers in specific contexts. By shifting the focus from the relationship among data points to the relationship among information, purpose, and context, this paper presents a point of view framework that helps to describe design strategies used for creating information artifacts in response to specific design problems. Through examination of the four thematic variations of point of view—person, perspective, mode, and principle—this paper demonstrates the use of this framework to analyze of several examples of information visualizations that have been created for a similar communicative situation. The next section examines the point of view framework in greater detail and explains why it is relevant to information design.

Related works: point of view

In literary criticism and linguistics, point of view has been conceived as a framework for the speaking voice in the analysis of narrative texts. The readers’ experience of the story may vary greatly depending on which viewpoint the story is told from or whether the point of view is singular or multiple (Ehrlich, 1990, p.2, p.4-6; Auerbach, 1973, p.536). Perhaps one of the most common uses of point of view can be found in its focus on the narrative person. For example, the story is told from the person who speaks of himself or herself in the story (the first-person narrator) or the one who “never speaks of himself/herself but rather of characters designated by third-person pronouns” (the third-person narrator). In addition, there is another type called the omniscient narrator who knows everything that happens in the story but the story is told without a viewpoint of character (Ehrlich, 1990, p.6).

Although the emphasis on narrative person is still prevalent in the study of point of view, there have been some shifts from the focus on narrative person to other notions, such as distance or mediacy as there are some problems or limitations that come from treating point of view as narrative person (Stanzel, 1986, p.9-10). According to Wayne Booth, professor of rhetoric and literary criticism, regarding point of view simply as narrative person is not adequate for discussing any subtle distinctions in point of view or any actual literary effect to the readers (Booth, 1961, p.60-79). For Booth, the discussion of point of view can be further enriched by including “differing degrees of presence and of proximity to the fictional world of the characters.” He offers a critical analysis of point of view conceived as the degree of distance between the narrator and the implied author, distance between the narrator and the reader, or the kind of distance, such as moral, psychological or intellectual (Booth, 1961, p.60-79).

Literary theorist Franz Stanzel also points out the inconsistent use of point of view in narrative criticism, specifically when its general meaning (‘viewpoint,’ ‘attitude toward a question’) is not distinguished from its special meaning (‘standpoint from which a story is narrated or from which an event is perceived by a character in the narrative’) (Stanzel, 1986, p.9). For Stanzel, the distinction between these two meanings is significant for examining different functions of point of view (deep structure) beyond the narrative form in the story (a surface feature). In this regard, he argues that “mediacy as the generic characteristic of narration” consists of three constitutive elements: person, perspective, mode (Stanzel, 1986, p.47). Fig 1 is Stanzel’s Typological Circle in which each constitutive element, person, perspective, and mode, is presented by the oppositions in order to articulate different kinds of mediacy (Stanzel, 1986, p.56).
Fig 1. *The Typological Circle* by Stanzel (Stanzel, 1986, p.56).

For example, *mode* with two oppositions refers to the way in which the narrator either "directly conveys information to the reader (teller-character)" or "filters it through the consciousness of one or several of the characters (reflector-character)" (Stanzel, 1986, p.141). Depending on the characteristic of *person*, as identity or non-identity, in terms of the narrator's relation to the world, whether he or she belongs to the world of the story" or "abides in another postulated realm of existence"; *perspective* is based on the way in which the narrator perceives the narrated events in the story from an *internal* or an *external* perspective (Stanzel, 1986, p.111).
While Stanzel’s *Typological Circle* (Fig 1) is a triadic system in which three kinds of narrative situations are characterized by the dominance of one constitutive element over the others, my reconstruction of his framework in Fig 2 attempts to emphasize the following two aspects. First, Fig 2 centers on the relations between the narrator and three elements: the fictional characters (person), the fictional reality (perspective), and the reader (mode). In Fig 1, each element is also based on the various relations, yet its binary opposition and its relationship to different kinds narrative situations are prominent. Shifting the focus from narrative situations to relations, I attempt to deconstruct the binary opposition of perspective, mode, and person in order to explore additional possibilities under each element. Second, Fig 2 offers three elements as places for discovery in order to examine the mediacy of information design. Stanzel’s Typological circle also comes from the examination of differences in mediacy of a proposed narrative, and his model highlights the relationship of three elements that center on three kinds of narrative situations. In contrast, the purpose of my modification in Fig 2 is to provide a framework that would allow us to describe and analyze the diverse use of point of view in the context of information design in which the narration can take the form of verbal, written or visual narrative.

There are, however, some missing aspects in Fig 2 in terms of perspective, in the way the narrator or the reader perceives fictional reality. For Stanzel, a distinction between internal perspective and external perspective lies in whether “the point of view from which the narrated world is perceived or represented is located in the main character or in the centre of events” or whether it is located “outside the main character or at the periphery of events.” (Stanzel, 1986, p.111-112) While his opposition perspective as it relates to demonstrating an internal or external view is one way to explore perspective, there is a limitation to conceptualizing perspective merely as a physical position or as the narrator’s perception of fictional reality, particularly when the narrator’s ideological view is discordant with that represented in reality. At this level, it is no longer a difference in perception that dictates whether the narrator’s belief is in accord or in discord with that of the implied author or the fictional character in the story; instead it is related to a difference in one’s ideology or belief.

Take Unilever’s Dove campaign of Real Beauty as an example (Fig 3, Fig 4). In this worldwide marketing campaign launched in 2004, Dove challenges the stereotypical imagery of other beauty products, often symbolized by slim and attractive women, by showing “how our perception of beauty is distorted” by extensive media exposure. Taking an oppositional stance to the objectification of women in other beauty products campaigns, the Dove campaign attempts to argue that real beauty comes from the inside resulting from self-esteem or confidence in oneself. This ideological attitude needs to be distinguished from perspective, which should instead be named the principle.

![Fig 3. Dove campaign of Real Beauty: Onslaught (TV advertisement)](image)
Fig 4. Dove campaign of Real Beauty (billboard advertisement)

Point of view framework

Fig 5 illustrates the theoretical framework for this study, which presents four thematic variations of point of view as mediacy of information design: perspective, person, mode, principle. This framework will help to broaden one’s understanding of point of view in relation to its functional aspects that move beyond its focus on narrative person; it also will contribute to providing a framework that can develop design strategies through an inquiry into the following questions: 1) What are the nature and the scope of reality presented in information design? (perspective) 2) From whose point of view is the information presented? (person) 3) How is the information presented to the reader? (mode) 4) On what ground is the belief based? (principle). These questions do not represent mutually exclusive categories for the purpose of analysis. Instead, they should be regarded as “places” or topics that provide “tools of inquiry” in analysis, exploration, and generation of various forms of mediacy for information design (Buchanan, 2001, p.75). For example, some people can consider point of view as the perspective from which individual elements are structured and visualized while others can focus on the aspect of the person from whom information is perceived and interpreted. Others might regard perspective as the mode by which information is reconstructed and experienced through the process of action in contrast to the principle in which one’s belief or idea is grounded.
The purpose of this framework is twofold. First, it offers terminology and a theoretical framework which are relevant in examining diverse uses of point of view as the mediacy of information design. In fact, point of view is not a new concept, in that its application and related terminology have appeared in visual studies and social semiotics in the analysis of levels of meaning in images (e.g., Kress & Van Leeuwen 1996; Unsworth 2001; Rose 2007). For example, in their 1996 book *Reading Images*, Kress and Van Leeuwen use the terms, *direction of gaze, distance, and angle*, in the context of understanding “a particular social relation between the producer, the viewer and the object represented,” specifically by discussing the level of attention and involvement between the viewer and the participants in the image (Kress & Van Leeuwen, 1996, p.41-43, p.94-98). While these terms are still useful for analyzing the physical, social and emotional relationships between the viewer and the represented participants in the image (interpersonal), the use of point of view could be improved by the discussions of other kinds of relationships between an image and reality (ideational) or the relationships among the information components (textual).

Second, this framework is useful to explore a set of design strategies that will be effective in particular communicative situations through analysis of information design projects. Fig 6 presents a few exemplary sets, which designers can further apply to create various kinds of emotional effects in the audience experience of a design. For instance, Stanzel's constituent *person* presents the opposition of *identity* and *non-identity* to whether the realms of existence of the narrator are *identified* with those of the fictional characters, yet a given list of sets in this category can still be further expanded depending on its focus within the character. While *identity* and *non-identity* illustrate emotional distance between the narrator and the fictional character, the terms *single* and *multiple* focus on the diversity of voices within a story, particularly on whether information is presented from the viewpoint of a single person or multiple persons. Therefore, the notions of *identity–non-identity or single–multiple* are able to provide different kinds of strategies for examining the nature of a character.

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![Diagram](image-url)

**Fig 6. Exemplary set of design strategies**
In what follows, I will examine ways in which the Point of View framework can be used to describe design strategies using examples of information design, from charts to interactive information visualization.

Example Analysis

_Perspective: representing with a focus_

Information visualization as an academic research discipline began with its focus on “displaying structural relationships and context that would be more difficult to detect by individual retrieval requests.” (Robertson, Card, & Mackinlay, 1993, p.65) Traditional information visualization systems are designed to perform analytical tasks for expert use; yet their use has now been extended to visualize data in everyday lives, for functions ranging from social connections to artistic purposes (Card, Mackinlay, & Shneiderman, 1999).

Perhaps one of the most common applications of point of view in information visualization can be found in the use of perspective. Simply put, perspective refers to the viewer’s physical location in relation to the reality that is represented. When presenting some data sets that are selected from reality, the use of perspective can be associated with looking at the same data in different ways, specifically through different types of representation or through different structural representations. The choice of particular structures and forms of representation is based on the choice of the various properties from reality that are reflected in the corresponding information visualization, as well as the purpose and the emphasis of different types of representation. For example, a person’s monthly expense data can be represented by a pie chart, a bar graph, or a line graph. Choosing a pie chart rather than a bar graph should not be regarded as a selection of a different type of representation; rather, each selection provides a different perspective of the same data, emphasizing in one case the comparison among different expense categories (pie chart) and in the other case the changes in expenses over time (line graph).

The use of perspective to illuminate differing aspects of data can be also found in interactive visualization methods, such as focus + context techniques or dynamic queries. While static charts provide a single perspective on data, interactive visualization methods, such as focus + context techniques or dynamic queries, allow users to shift the perspectives of the data, employing real-time manipulation or interactive graphics over time, depending on their focus in maintaining the context of the whole. For example, the hyperbolic browser visualization, one of the focus + context techniques, demonstrates one way of presenting a detailed view, by maintaining the overall structure in the context of visualizing large hierarchies, such as organizational charts (Lamping & Rao, 1996, p.33-55).

There is another use of perspective in interactive visualization methods, specifically organizing data according to different variables. For instance, the Film Finder enables users to reduce the number of movies in the display by adjusting each slider or button used for movies. This is the dynamic query method, in that it provides continuous real-time feedback to users during their query process in their exploration of large databases (Ahlberg & Schneiderman, 1994, p.313-317). By providing multiple points of views to the same data sets, the viewers are able to customize their access to data based on their needs and on the tasks performed.
**Person: relating data to user**

The two ways of exploring the relationships among the data points, as shown above, demonstrate the use of point of view as perspective. In addition to this, there is another way of exploring a different kind of relationship between information and users, by adjusting the distance or the relevance of information to users. While the previous two means of representation illustrate use of perspective, this example demonstrates the use of person as point of view.

The next four figures showing visualizations of the H1N1 swine flu (Fig 7, Fig 8, Fig 9, Fig 10) further illustrate this idea of difference between perspective and person. In the first figure, the Flu Tracker (Fig 7) presents data about H1N1 incidents by showing the geographical distribution of the flu on a map along with its temporal progress on a bar chart. On the map level, the aggregate data for each country are represented as circles in various sizes and colors according to the number and types of cases, such as probable, confirmed, or fatal. Users can also examine individual cases when they zoom in to specific parts of the map and read individual incident reports (Fig 8). Providing both macro and micro views of H1N1 incidents, Flu Tracker allows users to access an overview as well as detailed accounts of individual cases.

![Flu Tracker in a macro-view](image)

Fig 7. Flu Tracker in a macro-view. Copyright © 2009 Rhiza Labs, Copyright © 2009 Rhiza Labs, LLC LLC
Similar to Flu Tracker (Fig 7, Fig 8), the H1N1 flu map at flu.gov (Fig 9) visually presents H1N1 and influenza activity across the states; yet it focuses on comparing the activity among the states rather than its overall temporal progress. This focus reflects the difference in purpose of the visualization at flu.gov versus that of Flu Tracker (Fig 7), in that it offers the user a detailed view about the flu and the current status of a particular location. Through visualization of the monthly progression of flu per location by categorizing influenza activity from "no activity" to "widespread" per state, this flu visualization (Fig 9) can provide users with data that are more relevant to their needs, particularly by illustrating H1N1’s activity in their place of residence.

In contrast to the data that are presented as numbers in tables or charts, the two examples of information visualization above point to different usages of perspective in order to monitor the activity of H1N1 at a macro level, as well as to examine individual cases on a micro level which is relevant to particular needs. However, it is not clear that considering perspective as different types of representation or at a macro/micro level is sufficient. At this point, the question arises: what is the difference between data presented on a table versus data on a map? Is it a matter of choosing a formal presentation that is either abstract or representational? Are there any differences in the way each type of representation connects information to its viewer, particularly in the sense of changing the way one looks at the situation that is represented through data?

Take a look at the following examples in Fig 9, where the state level H1N1 virus Lab test data are represented, on the week of June 9th, 2009 (top) and the week of September 19th, 2009 (bottom). This example shows that data can be customized to respond to users’ queries at different scales; instead of seeing the overall spread of the flu across several states, users can view information about specific H1N1 incidents that occurred in their region or during a particular week. Furthermore, it is possible for users to find various patterns or relationships while they are exploring data in various ways. For instance, from the week of June 9th to that of September 19th, there is an exponential increase by more than 40% of individuals testing positive for H1N1 flu in Western states, such as Oregon, Washington, and California, whereas the rate decreased from 40% to 10-20% in most Southern and Eastern states. What happened during these three months? What does this
indicate to the residents in these regions about prevention from catching the flu? Exploring various relations among data with the use of visualization – comparing data on the scale of time and region – may lead to a discovery of patterns that may not have been noticed before.

Fig 9. H1N1 map from flu.gov website, state level comparison between the week of June 9th, 2009 (top) and the week of September 19th, 2009 (bottom) Copyright © Flu.gov
Another example (Fig 10) points to a different use of point of view, which brings the relationship of information closer to users by offering more detailed information that is relevant to users’ needs. This table in a Korean newspaper article presents data about the nine fatalities from the H1N1 flu in South Korea from the beginning of May until the end of September in 2009. At first sight, presenting information with a small size of data samples in a table does not seem to have any advantage over large sets of data on a map (Fig 7, Fig 8, Fig 9) in terms of the amount of data and type of visualization in context. However, this manner of presenting information reveals another important feature that has not yet been discussed: how to connect users and information not only through visual representation but also in the selection and the frame of data that are more relevant to the users’ needs in a particular context.

In Korea, H1N1 flu incidents began to occur in the spring of 2009; yet the number of confirmed cases exponentially increased from mid-July 2009, with nine deaths reported between August and September. Although this number was minimal in comparison to the number of confirmed cases and deaths in North and South America, the prompt increase in deaths over a month-long period put most Korean in a state of fear. The purpose of the table in Fig 10 is to present patterns among these nine deaths by offering diverse variables, such as the ages, health conditions, symptoms, and the number of days of hospitalizations for these victims. Fig 10 shows some commonalities, namely that 7 out of 9 were above their fifties and had other health problems, except for the ninth victim. In summary, it is significant to note that presenting the H1N1 death cases in this way may express a message about the risks associated with the disease among particular groups within the population. This example suggests another way of selecting, organizing and presenting data in ways that are appropriate to the various information users want to extract from various H1N1 flu visualizations, in particular depending on the type of audience or the context in which the information is presented. While seeking the disease’s causes and possible solutions by understanding its progression, etc. is one of the primary concerns of researchers and doctors, providing more a detailed profile of a small number of cases is a more effective means of communication for the general audience who is more interested in flu prevention.

Mode: making connections for purpose
Point of view in information visualization should not be limited to different kinds of representation or different methods of organization. Instead, conceptualizing point of view may have a greater impact as a way of exploring different kinds of connections not only among the individual data within the visualization but also between data and users, so as to discover relationships that are not apparent. Other examples of such applications can be found in the Gapminder Project or Human Disease Map Project (Fig 11). These information visualization projects suggest a different way of inquiring into a situation, specifically by changing the way we look at the world, which also leads viewers to identify
a problem and a potential solution in different ways. For instance, Hans Rosling at one of his Gapminder project presentations at TED demonstrates a different way of looking at the current status of HIV by presenting its temporal progress and geographical distribution for 100 years, using animated and interactive statistical visualization. Rosling’s presentation helps the audience not only recognize that the distribution of the HIV is not Africa’s problem alone, as the rate in other continents is rapidly increasing, but also helps them discover that its geographical distribution among several countries within Africa vary greatly. Identification of the existing problem from a new point of view may suggest a new direction from which to seek a solution.

Mapping the Human Diseasome (Fig 11) also demonstrates a different way of exploring the connections between human diseases and the genes associated with them. Like the Gapminder project, it is useful not only to redefine the classification of diseases by improving the “understanding of the causes of disease and of the functions of particular genes,” but also to search for alternative treatment to the disease. In other words, these two projects point to the power of visualization as a means of not only discovering a problem but also seeking a potential solution to a problem, identified by exploring various kinds of connections.

Fig 11. Mapping the Human Diseasome, Copyright © 2008 The New York Times

Conclusion

This paper presents the Point of View framework that allows us to describe design strategies used for development of information visualization artifacts. The four themes, person, perspective, mode, and principle, are means for questioning and illustrating the use of point of view in the context of information visualization and other fields of design. What distinguishes point of view from other descriptive or generative frameworks is its breadth as well as the expandability of each theme. It should be regarded as a topic or place for discovery, which can be further explored with more variations within each theme.

This work includes three contributions that are worth mentioning in conclusion. First, this study provides a theoretical framework that can model the relationships among information artifacts, audiences, and designers in specific contexts. Conceptualizing information as a medium for human action and conceiving emotion as a relationship
among various actions, this research leads us to explore a new direction of information visualization beyond compositional, semantic, and pragmatic levels.

Second, it provides a metalanguage that would allow design researchers and educators to articulate the complex relationship between information and emotion. For example, the vocabulary suggested in this work can be used by design educators to foster a students’ thinking process in design and to facilitate critique of the effects of information artifacts in class.

Third, this research offers a unique approach for uncovering design strategies that are often implicitly used by designers to create information visualization projects that are aimed at producing a particular emotional effect on an audience. The Point of View framework functions as a tool of analysis that would allow us to examine plausible design strategies used in a particular context of information design. In addition, this framework can be used as a tool for production when creating plausible design strategies for information artifacts.

References


http://www.wired.com/gadgetlab/2012/04/can-an-algorithm-write-a-better-news-story-than-a-human-reporter/


