

OBFUSCATION BY DESIGN:

How Visual Complexity and Cognitive Bias
Shape Our Understanding of Political Information

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Abstract

There is a growing body of research on the ways in which people process and organize political information. However, these studies have focused almost exclusively on textual analysis at a time when people are turning to more visually oriented media in increasing numbers. While researchers have failed to account for this trend, political organizations have quickly adapted and begun to use visual media to their advantage for political messaging. This study examines people's ability to perceive bias in visual representations of political information. Through a series of surveys and one-on-one interviews, I found that participants exhibited significant confirmation bias in their assessments of visual information. This effect was particularly strong in participants' initial assessment of each example. The results reveal two potential paths to increasing awareness of bias in visual information. First, basic training in visual design could encourage more thorough examination of new information and result in increased awareness of bias. Second, illustrating the effects of confirmation bias could encourage viewers to pause and reassess their initial reaction to information, again resulting in increased awareness of bias. With these two hypotheses in mind, I have created an interactive guide that teaches basic elements of visual design, such as size and color, and then illustrates the effects of cognitive biases on assessment of information.

Acknowledgments

Thank you to everyone who has encouraged and guided me over the last year. In particular, I would like to thank my advisor, Stacie Rohrbach. Your insight took my research in new directions and challenged me to develop a deeper understanding of design. Without your support this project would have never come to fruition.

I am grateful to all those who participated in my research for sacrificing your valuable time to help me in this effort and for your astute observations.

I would also like to thank Robert Cavalier for his help in getting this project started, my fellow students in the Communication Planning and Information Design program for their advice and support, and all the School of Design faculty and staff.

Organizational Chart of the House Democrats' Health Plan

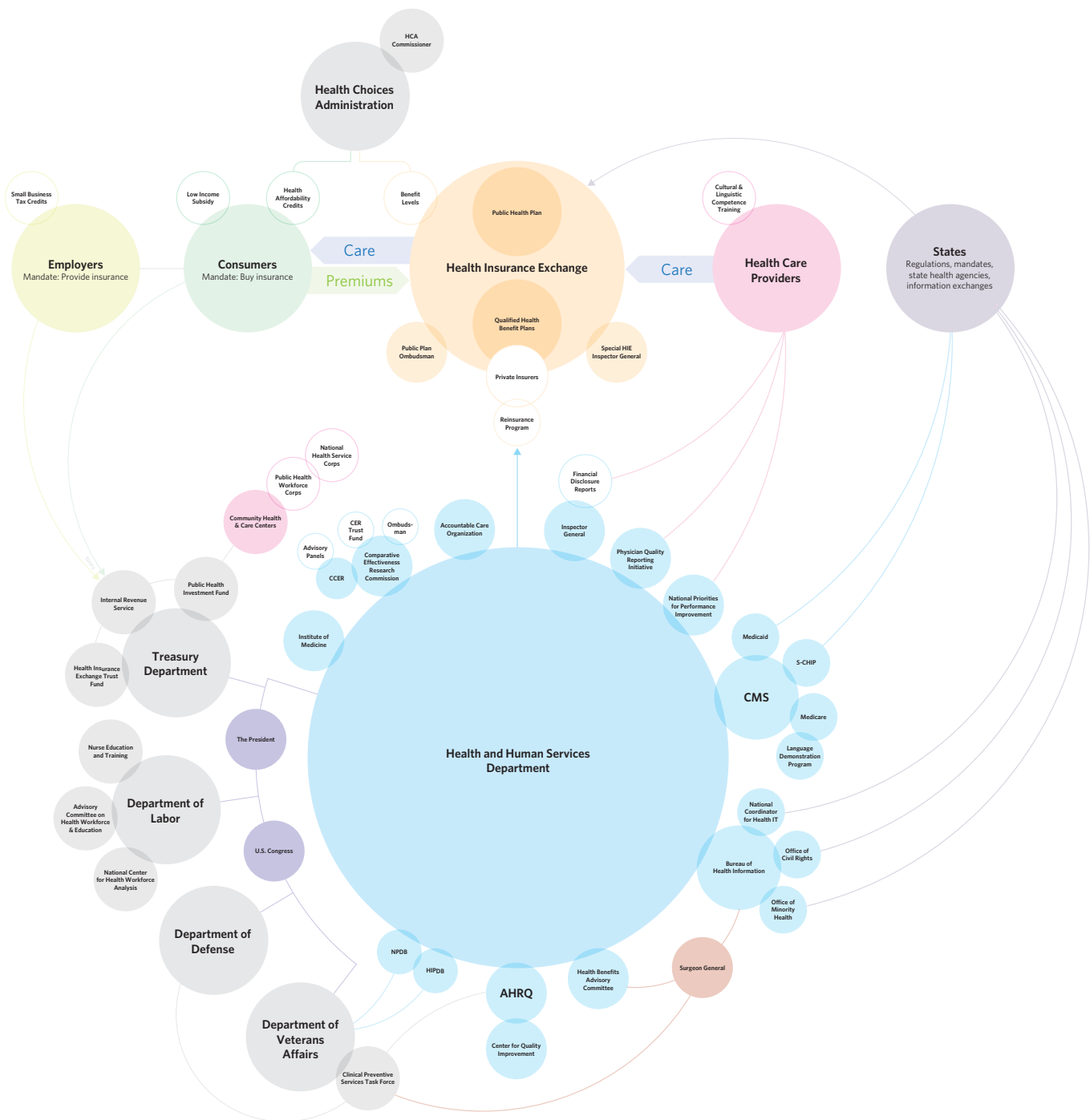


FIGURE 2:
Revised healthcare organizational chart,
designed by Robert Palmer. (2009)

The chart very quickly became a point of contention in and of itself. One designer took it upon himself to create a version (Figure 2) that was much clearer. The contrast between these two representations became a catalyst for my thesis work because it spoke to the larger issue of information and bias in politics. If the visual representation of information had the power to quickly shape public opinion on an issue, what implications did this have for political information as a whole? Could visual information be used as a uniting force, rather than a divisive one? If visual information had this kind of power, it led me to believe that even limited design education could benefit the public when it came to political information and information more generally.

» PROBLEM STATEMENT

Although many aspects of my thesis have evolved over time, my overall goal has always been to try to change the tone of political conversation through the proliferation and acceptance of unbiased, factual information. To this end, I asked “How can design be used to give facts an advantage over opinion and misinformation?” The answer would inform my decisions as I built an artifact that could give people the skills they need to avoid misleading information while increasing the public’s overall understanding of political information.

» PROJECT SCOPE

In order to encourage a wider acceptance of factual, unbiased political information, I found I would need to focus on one of two groups: either the producers or consumers of political information. The producers of political information seemed unlikely to endorse recommendations that promote unbiased information, so I decided to focus on the latter group. This audience was, at least potentially, more receptive to change.

The project focuses on visual representations of political information for three reasons. First, the general public often finds graphical information more approachable than text or data tables. Second, the public may not, in spite of the preference for graphical information, have the knowledge needed to properly interpret this information. Lastly, our current understanding of the impact of design on political information is largely anecdotal, and this gap in our knowledge creates an opportunity for new understanding.

Background Research

» CURRENT LITERATURE

My initial review of relevant literature focused on design elements that can mislead an audience and influence the way in which people understand and learn information. Mark Monmonier's *How to Lie with Maps* was particularly influential in this initial research. The book focuses on misinterpretation and manipulation of information in cartography, but the implications affect the interpretation of visual information more generally. Several points raised by Monmonier, including the analysis of visual variables (size, color, etc.) influenced my research and proved particularly important as I chose design topics to cover in my prototype guide.

While *How to Lie with Maps* provided a wealth of basic knowledge, it failed to discuss methods readers might use to proactively identify and reevaluate misleading visuals. Monmonier discusses potential pitfalls in great detail, but doesn't provide any indication of how readers could put this knowledge to use. As I continued my examination of current literature, I began to think an active learning process would be more beneficial than a simple recitation of potentially misleading elements. Exercises requiring active interpretation seemed more likely to give people the resources necessary to become better consumers of information in their everyday lives.

In *Things that Make Us Smart*, Don Norman examines how people interpret information, focussing on the psychological processes that shape these interpretations. Norman introduces two types of cognition: reflective and experiential. He describes experiential cognition as an almost reflexive response, in comparison to reflective cognition, which facilitates learning. Reflective cognition includes comparison, thought and decision making. This model of cognition led me to emphasize active learning as a way to encourage reflective thinking.

The contrast between reflective and experiential cognition clarified one of the problems I had noticed in political news: The sensationalist nature of news, particularly on television. While news has always depended on sensationalism to a certain extent, this has increased over the last several decades. Norman addresses this issue directly, using the news as an example of potentially detrimental experiential cognition. This helped to define what I wanted to accomplish—encouraging more reflective cognition, while still allowing for experiential cognition. Ultimately, I needed to facilitate learning so that users would be more likely to evaluate news reflectively.

Norman identifies three different types of learning: accretion, tuning and restructuring. Of the three, restructuring was most relevant. It is the process by which people “form the proper conceptual structures” through thought, exploration, reflection, comparison and integration. Like reflective cognition, appropriate tools can support restructuring. I would need to provide the tools necessary to support restructuring with regard to the news.

Norman points out that restructuring is the most difficult part of learning, because it is dependant on individual motivation. “Once people are curious about the questions, then they are stimulated and willing to do the work involved in pursuing the answers.” I hoped that people’s existing interest in politics could instill some of this curiosity as encouraging interest in politics was beyond the scope of the project. Partisanship could, in this case, serve a positive role—desire to expose the other side might provide the necessary incentive for people to be more engaged in the news.

In a later chapter Norman points out the human mind’s tendency to generate a whole from incomplete information. This idea played a central role in my later work relating to complexity. When we are unable or unwilling to

decipher a complex visual, we have only partial information and this process through which we fill in the gaps takes over. This idea is roughly equivalent to the concept of a schema, described later in this section.

In chapter four of *Understanding by Design*, Grant Wiggins and Jay McTighe present six facets they believe comprise “mature understanding.” These include explanation, interpretation, application, perspective, empathy and self-knowledge. Even at this early state in my research I knew my prototype would need to encourage users to develop a mature understanding in order to successfully improve their ability to interpret visual information. Four of the six—explanation, application, perspective and self-knowledge—seemed particularly relevant to this task, for the reasons described below.

Explanation, as it is described in *Understanding by Design*, is “not mere knowledge of the facts but knowledge of why and how.” It was essential for people using my prototype to be able to explain at least the general principle behind the design elements I presented. The description of each term was written with this in mind. Because the design elements I chose were so basic, it seemed likely that participants would intuitively grasp their implications, but I wanted to ensure that they could also explain the reasoning that led to their conclusions.

Even if only a small number of people interact with my prototype directly, I would hope their understanding was complete enough to spread from person to person. Providing enough information for people to justify their opinions would make this sort of person-to-person learning more likely simply because arguing ‘I believe X’ is much less convincing than arguing ‘I believe X, and here’s why I do.’

Application was critical to the success of my prototype guide in that users must gain the ability to generalize the knowledge. Application is the ability to use knowledge in context. The real-world nature of application made it essential. People must have the ability to apply the knowledge they've gained from my prototype. To this end, Wiggins and McTighe say that example problems "should be as close as possible to the situation" in which knowledge would be applied in the real world. The use of graphics pulled from actual political materials had its roots in this idea. I needed the material to reflect reality as much as possible.

Perspective was also essential to what I tried to do. "To understand in this sense is to see things from a dispassionate and disinterested perspective." Without perspective people would not be able to see bias effectively either in others or themselves. I needed to convey that "any answer to a complex question typically involves a point of view." This idea is referenced in the final section of my prototype. "Instruction should include explicit opportunities for students to confront alternative theories and diverse points of view." This was the insight behind the comparisons that I included in the final section of the prototype guide.

Wiggins and McTighe discuss self-knowledge in terms of "intellectual blind spots" that "predispose us toward intellectual rationalization." This evokes the idea of both schemas and cognitive bias. "We must do a better job of teaching and assessing self-reflection." The final example in my prototype was geared toward self-knowledge. Without this kind of understanding it would be difficult for people to re-evaluate their initial assessments of information. Illustrating the fallibility of these assessments could help convince users to dedicate additional time and effort into understanding information more accurately.

Schemas came to play a central role in my understanding of the way people interpret information. In *Social Cognition* Martha Augoustinos and Iain Walker describe a schema as “a mental structure which contains general expectations and knowledge about the world.” Social schemas present a more detailed theory behind the concept alluded to by Norman. Schemas provide a blueprint for our thoughts and actions by providing a standard model for a given situation against which we can compare new events or experiences and then act accordingly. I returned to the schema concept under a different name—cognitive bias—in my later research. While my initial research was focused on schema theory, cognitive bias encompasses a wider array of phenomena. Thus my later research refers to cognitive bias, rather than schema theory as is described here.

Using schemas can, however, lead to problems when a situation is atypical or we have only partial information available. Since schemas depend on prior expectations, preconceptions and knowledge, a schema may be less effective, or even counterproductive, if we have limited experience with a subject. If we initially match information to a certain schema, we may assume the remaining information also fits the schema, without attempting to verify this conclusion.

In this sense our existing political beliefs could play a critical role in our understanding of new information, particularly if we do not take the time to investigate thoroughly. This process was responsible for some of the more interesting results in my later think-aloud interview sessions. Schemas initially held sway over the interpretation of most information and were particularly powerful in relation to complex information.

However, people do not blindly follow existing schemas. They may be more ‘data-driven’ when a situation is far outside their previous experience or when a situation calls for a very high level of accuracy. In these relatively unique situations there is additional processing required that may lead to better recall later. This principle became part of the basis for my prototype, but it was also at the heart of some of the more puzzling results of my initial surveys.

My first user survey did have some clearer results, including the relevance of framing effects. *Toward a Psychology of Framing Effects*, by Thomas Nelson, Zoe Oxley and Rosalee Clawson, describes the process of framing, by which information is put into context. “To frame is to select some aspects of a perceived reality and make them more salient...in such a way as to promote a particular problem definition, causal interpretation, moral evaluation, and/or treatment recommendation for the item described” (Entman, 1993). Frames are used “to make sense of a broad array of information...while suggesting a suitable course of action.” Because much of the public’s knowledge of politics is mediated by news media, frames can have a dramatic influence. Framing can “profoundly influence public opinion even without any overt attempt at persuasion or manipulation” (emphasis in original).

Framing seemed to be involved in the results of my first survey. These results, along with text references above and elsewhere, clearly showed that I would need to address this effect in my prototype. However, explaining this issue seemed relatively intuitive—we all realize, on some level, that a person’s opinions and beliefs affect the way they explain an event. This idea is at the heart of the perception of ‘liberal media bias.’

From a theoretical standpoint frames appear to be a reflection of schemas. Schemas form an internal model of the world, whereas frames may be the external manifestation of the schema model. Thinking about this connection

between schemas and framing led me to associate the two in my prototype. Framing became a means of introducing the more abstract (or at least less familiar) concept of schemas.

Because there is necessarily some consistency in schemas across individuals (as a society we have many common experiences), it seemed that framing could be easily obscured by a viewer's own beliefs. In effect, people would be less likely to notice framing if the frame aligned with their schema for the topic. This became a secondary reason for educating the public about this effect. While people may understand how framing can be a source of bias in others, they might not be so aware of the effects on their own understanding of information.

Each of the papers I read regarding framing, including *Toward a Psychology of Framing Effects*, noted the difference between framing and belief change. Framing does not add to a person's understanding of an issue, it operates "by activating information already at the recipients' disposal, stored in long term memory." This distinction didn't appear relevant at first, however, this implied that framing effects could be relatively easy to overcome, something I was able to confirm in my subsequent research.

User Research

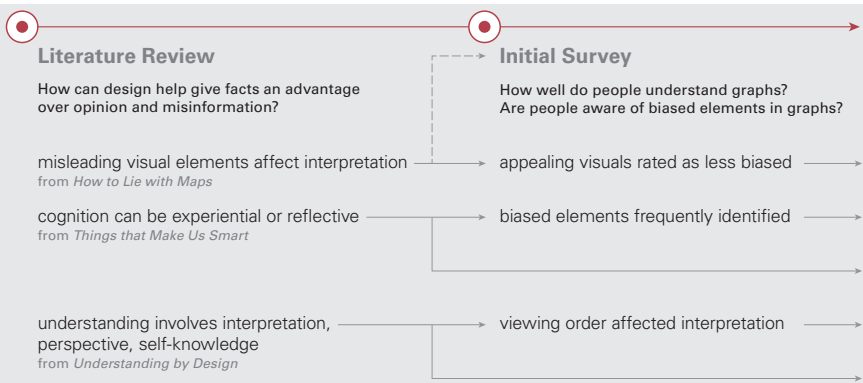
» INITIAL SURVEY

I constructed the first survey with three questions in mind:

- 1. How well do people read graphs?
- 2. Are people aware of misleading/biased visuals?
- 3. Can people differentiate between biased and unbiased information?

This survey presented participants with two graphs sequentially, followed by a direct comparison of the two on the same page. These graphs ostensibly illustrated the same information. However, one of the two (taken from a television newscast) had been widely derided for its blatant bias. The second graph showed the same information, but removed or adapted the biased elements of the original. Participants were initially shown one graph at a time and asked to interpret each and rate its understandability. Once they had evaluated both individually, both graphs were presented side by side and participants were asked if they thought either graph was biased.

The results showed that a significant majority of participants were aware of misleading information. My expectation had been that some participants would notice misleading elements, but that the majority would not, so this result was surprising. However, nearly all were able to spot the misleading graph. Many participants even pointed out biased elements in their initial evaluation of the graph, before being asked about their perceptions of bias. Interestingly, some participants identified the misleading graph even though they could not articulate what they found misleading. This didn't seem particularly significant at the time, but this gap in knowledge would play a part in my later decision to explain visual elements in my interactive guide prototype.



RESEARCH PROGRESS: INITIAL SURVEY

My later research indicated that the accuracy displayed by participants in this survey was likely an artifact of the survey context. In effect, the survey encouraged participants to be more attentive to detail and spend more time on their analysis than they would normally. This effect lent support to my later hypothesis that a relatively small increase in attentiveness could result in a dramatic improvement in the accuracy of analysis.

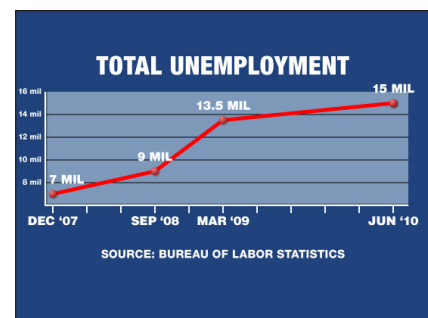
The results also showed an interesting theme among the answers of participants who thought the misleading graph was less biased or thought the two were similarly biased. Many of these participants seemed to base their decision, at least in part, on the visual appeal of the misleading graph. Answers often praised the relative simplicity of the misleading graph. This suggested that the visual appeal and complexity of a graphic do play a role in at least some people's evaluation of visual information. This finding played a large role in shaping my second survey.

There were several key insights revealed in the data:

- People are generally accurate in their interpretation of graphs if given the motivation and time necessary to make a detailed analysis
- People notice misleading information if they are motivated and given adequate time
- People are less likely to notice misleading information when they see accurate information first, indicating the initial graph may serve as a frame for the second
- A large minority of participants indicated visually appealing graphs were less biased
- A similarly large minority of participants indicated that the complexity of the graph had an impact on their assessment

SURVEY EXAMPLES

The graph on the left was taken from the news and is widely considered very misleading. The graph on the right presents the same data in a more accurate format.



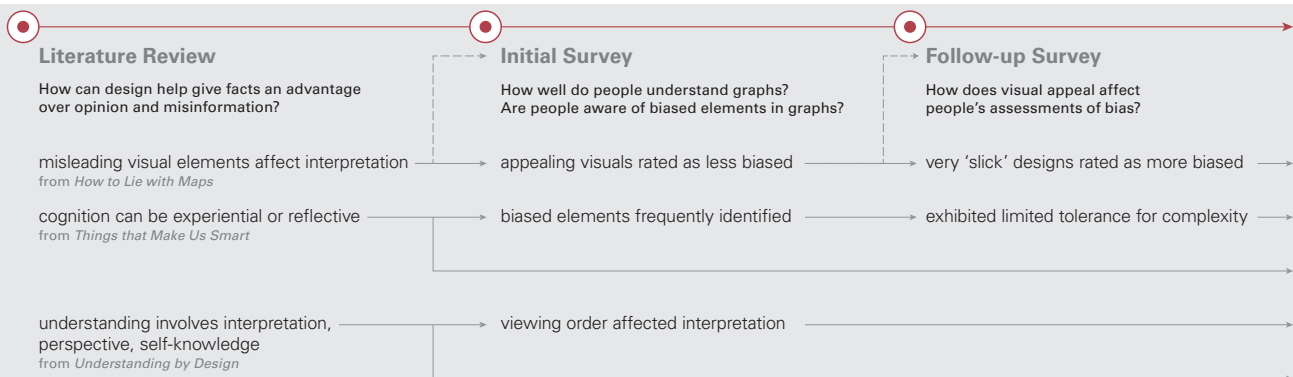
» FOLLOW-UP SURVEY

My second survey focused more on the impact design elements could have on participants' interpretations of visual information. I sought to investigate two issues raised by the results of my first survey: the effect of visual appeal on participants' perceptions of bias and the role of complexity in shaping opinions related to both visual appeal and bias. My intent was to answer three questions:

1. What role does complexity play in understanding, perceptions of bias and visual appeal?
2. How do visual appeal and complexity affect persuasiveness?
3. What design elements are most important in determining perceptions of bias and visual appeal?

This survey had several sections, each focused on a different question. First, participants were asked to sort a series of graphics of varying complexity according to understandability. They were then asked to rate how persuasive they found this same set of images. Last, participants were asked to evaluate the visual appeal of a new set of graphics that utilized different types of imagery, such as illustrations, photographs and more abstract elements.

There were two particularly notable trends revealed in the survey results. There appeared to be a consistent level of complexity deemed acceptable across all participants. Additionally, visual appeal did appear to increase the likelihood that participants would find a particular example unbiased. However, this result came with one important caveat. Participants reported that they trusted visually appealing examples only to a point, after which they became less trusting of 'slick' graphics.



RESEARCH PROGRESS: FOLLOW-UP SURVEY

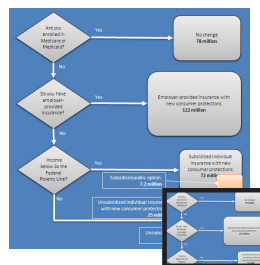
A significant number of participants in my initial survey reported that less complex designs were either more visually appealing, more understandable or less indicative of bias. In order to tease apart this finding in more detail I presented participants in this follow-up survey with several examples of political and non-political visuals that I had previously rated in terms of complexity. Participants were asked to rank the examples from most to least understandable and their rankings aligned with my own assessment of these graphics. Participants' explanation of the rankings were revealing. They cited complexity far more frequently than visual appeal, and the responses seemed to indicate there was a level of complexity beyond which participants were either unwilling or unable to decode the information. This result was confirmed in my later think-aloud interviews and played a large part in my later research into the role of complexity.

The second key finding was that visual appeal did not necessarily decrease participants' perception of bias. The most polished examples were actually rated more biased. Participants' explanations shed light on their reasoning. They frequently cited the level of effort put into designing the graphic as a warning sign for bias—i.e. anyone willing to put in that much effort must have an agenda they were trying to hide using dazzling visuals. Anecdotally, this may be because lobbying organizations have historically put more money into visual design than governmental agencies have.

My later work moved away from dealing directly with visual appeal, so this finding did not directly influence my prototype. However, this it could be significant to designers who work with political visuals. It indicates that a very polished design may actually be counterproductive; giving people the

COMPLEXITY, VISUAL APPEAL AND BIAS

I evaluated examples used in the follow-up survey in order to have a baseline to evaluate participant responses. With the exception of the contrast rating (derived from a web-based analysis tool) these reflect my own judgement.



topic: healthcare
type: flowchart
dimensions: 560 x 560px

1-10 scale (1 is lowest/worst)

- complexity of form: 2
- complexity of content: 3
- visual appeal: 3
- contrast: 6
- abstraction: 10
- bias: 3
- amount of text: 2

Nicholas Beaudrot — <http://www.donkeylicious.com/2009/08/flowchart.html>

impression that the designer is trying to dazzle, rather than inform and may be trying to use design elements to distract the viewer. Simple, clean design seems to be the obvious solution in this case.

Key findings included:

- Participants rated appealing visuals as less biased, but this effect was limited. Visual appeal increased viewer's ratings, but these ratings declined for the most 'slick' visuals. These ended up being considered more biased.
- Participants were unwilling or unable to understand information that exceeded a level of complexity that was consistent across the participant pool.

SORTING BY UNDERSTANDABILITY

Participants sorted graphics based on how understandable they felt the graphics were.

Please order the following graphics from most (1) to least (5) understandable. Move the graphics by clicking the black dot and dragging to the position you choose.
(click the image to see the entire graphic at a larger size)

1

2

» THINK-ALOUD INTERVIEWS

While the surveys I conducted produced a number of interesting results, these seemed to lack context in terms of people's practical, step-by-step analysis of information. Conducting think-aloud interviews would allow me to get more detailed, real-time explanations of the thought process that went into people's understanding of visual information, as well as the factors that influenced their perception of bias. These interviews ended up being a pivotal point in my research process.

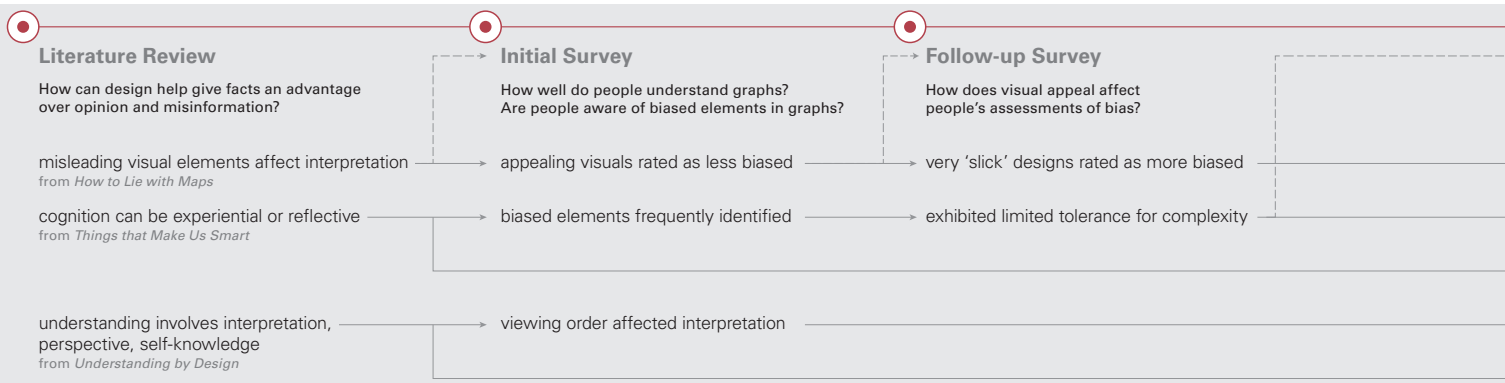
I assembled five examples of visual information along with a text excerpt taken from a newspaper article. Participants were shown each example and asked the following questions:

- What is your interpretation of this example?
- How did you come to this conclusion (regarding their interpretation)?
- Do you think this is biased? If so, how and why?
- What do you believe the author wants you to think when you look at this example? Why?

Once the participants had answered these questions for all six examples, I conducted a brief sorting exercise. Participants were asked to sort or group the six examples in three different ways:

- Based on the criteria of their choice
- Based on their preference
- In order from most biased to least biased

As expected based on my earlier studies, participants preferred the less complex examples. Participants gave relatively accurate assessments of the information in each example, but only after looking at each example in



RESEARCH PROGRESS:
THINK-ALOUD INTERVIEWS

detail. I explore this in more detail below. While participants had more difficulty drawing conclusions about the more abstract examples (a photo and newspaper excerpt), they were still able to give accurate assessments.

The interviews highlighted three factors I had not anticipated and which were not originally part of the study. First, participants' initial assessments of each example reliably reflected their existing political beliefs. Second, these assessments were often walked back or even reversed when the participant examined the example in greater detail. Third, many of the participants acknowledged their own bias, but they were unable to fully overcome this bias in their evaluations, particularly in the card sorting exercise.

The first point made sense in the context of schema theory, as defined by Augustinos and Walker. The participants' schema for political information may have prompted their initial response. However, as they began to examine the example in more detail, they adjusted their analysis as they noticed new information. This hinted that schemas for political information are at least somewhat flexible and open to revision based on new information. However, it seemed that there needed to be a force motivating participants to do so. In this study the motivation was the interviewer patiently waiting for them to give additional details. This was definitely a positive development in terms of my ability to affect change in the way people interpret information, but it carried negative connotations as well. Given that the participants had to be prompted to examine the examples in more detail, it seems reasonable to conclude that outside of a research environment they would be unlikely to take a closer look at the information and the initial response, based purely on schema, would be their only interpretation.



Think-Aloud Interviews

How does interpretation of visual information function in real time?

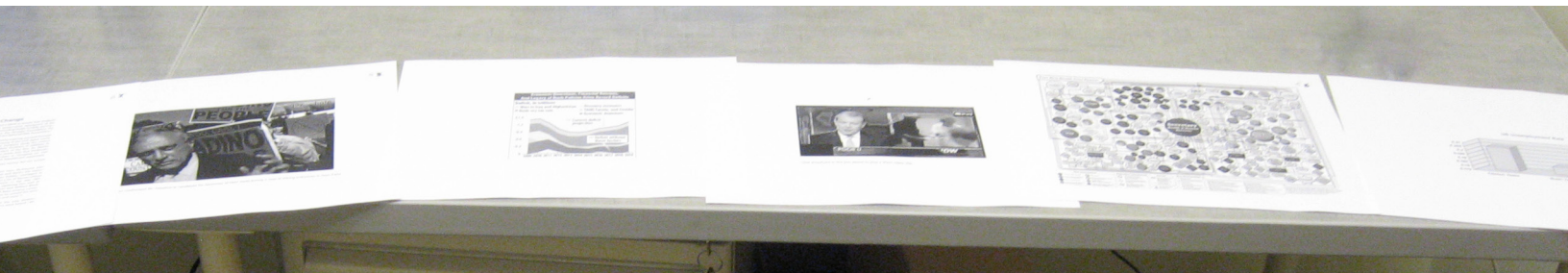
- complexity prevented interpretation →
- additional time led to more accurate interpretation →
- initial interpretations reflected existing beliefs →
- unprompted acknowledgement of own biases →

Schemas seem to be at play in the second point as well. The participants were at least somewhat aware of the fact that their existing views could skew their interpretations, but they were unable to completely compensate for this. This appeared to be another avenue I could pursue to improve the likelihood that people would be able to overcome this bias.

I knew that these results were at least somewhat related to my research on schemas, but enough was still unclear that I realized I would need a more detailed understanding of schemas.

Key findings:

1. Participants' initial assessment of each example was a reflection of their own political beliefs.
2. Given additional time and prompted to examine the examples in more detail, they were able to identify misleading elements and reassess their initial conclusion.
3. Participants were aware of their own biases, but were unable to fully account for them and even with this awareness gave biased responses in the sorting exercise.



SORTING EXERCISE

One participant's take on ordering the study examples from least to most biased.

Research Implications

My research led me to conclude that three factors have the greatest influence over people's ability to perceive bias in visual information:

- Framing (of information or narrative)
- Cognitive bias
- Time/Attention

Framing can “profoundly influence public opinion even without any overt attempt at persuasion or manipulation.” The effects of framing can be seen in the results of the surveys and interviews I conducted. My initial survey showed that participants' evaluation of an initial graph influenced their evaluation of the subsequent graph. Essentially, the first graph framed the one that followed. Participants in my later think-aloud sessions brought up framing somewhat literally in their evaluation of the example photograph, mentioning the possibility that the photographer cropped the image to create a specific narrative. Both results highlight the potential influence of framing effects on understanding information.

On the surface, the influence framing has on a person's understanding of information appears to rule out any chance of changing the way people interpret information. However, the literature presents a significant caveat to the influence of framing—its effects diminish rapidly with time. This is evident in the results of my think-aloud interviews. Participants tended to answer in two parts: an initial reflexive reaction followed by a more detailed, thoughtful explanation. The initial reaction appears to reflect the effects of both framing and cognitive bias, but these effects are fleeting. This suggests that it would be relatively easy to overcome the influence of framing effects if people can be convinced to put a little more time into their evaluations.

While framing effects were apparent in my early research, the evidence of cognitive biases did not appear until I conducted think-aloud interviews. However, these interviews showed a very strong influence from cognitive bias, particularly in participants' initial evaluations. I suspect that the lack of evidence of cognitive bias in my earlier surveys is attributable to the time participants spent examining the visuals.

At first I wasn't sure what the initial reaction/detailed response dichotomy might imply. However, the fact that the more detailed responses were also more accurate led me to believe that this effect would play a central role in any effort encouraging the public to seek out more accurate, unbiased information. The reasons for this result quickly became clear as I delved into literature about cognitive bias. Based on this research, it appeared that confirmation bias was largely responsible for participants' initial responses. In the context of my study, confirmation bias was evident in initial reactions that confirmed the participants' existing views. However, participants were able to overcome confirmation bias. Given time they were able to make more accurate, less biased assessments.

The third factor, time and attention, is likely the most important of the three. The effects of both framing and confirmation bias are reduced when the viewer takes more time to evaluate information and is more attentive to detail. This seems to reflect, in Donald Norman's terms, a switch from experiential to reflective cognition. Understanding this switch played a central role in the design of my final artifact.

Proposed Solution

» INTRODUCTION & AUDIENCE

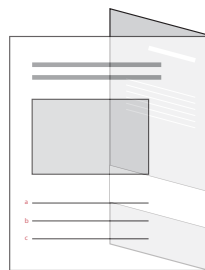
“How can design be used to give facts an advantage over opinion and misinformation?” I had this question in mind throughout the various stages of my research, but the question was still unresolved. My research had, however, given me enough information to form a simple hypothesis: If I could encourage people to look at visual information in even slightly more detail, they would have the time and attentiveness required to overcome the errors produced by framing effects and cognitive bias. The idea to develop an interactive guide had roots in both my research and my personal experience as a student of design.

To influence the tone of politics in any meaningful way, I would need to reach as wide an audience as possible. However, for practical purposes I narrowed the audience in several ways. There was little reason to address people with no interest in politics, as they were not involved in political discussion to begin with. The literature on schemas and confirmation bias showed that people with a strong interest in politics were highly unlikely to change their beliefs based on new information, even if the new information was more accurate. However, the same literature indicated that people with a moderate interest in politics were likely to change their opinions given new, accurate information. This made the group an ideal audience and I developed the guide with this in mind.

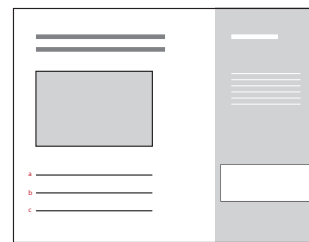
» **PRACTICAL CONSIDERATIONS** I designed the guide as an interactive PDF that could also function as a printed document for users more comfortable with paper. I achieved this by dividing the page into two sections, one for the questions and examples, another for the answers and explanations. Users who preferred to use a paper copy would be able to fold the answer column under the page to ‘hide’ it as they read and answered the questions. I have included a diagram below to illustrate how this would work. For the sake of concision the rest of this section refers to the interactive guide, however, the information applies to the paper guide as well.

PRINTABLE PROTOTYPE LAYOUT

The layout of the printable prototype is nearly identical to that of the interactive one. Rather than clicking the answers, users of the print version simply fold back the ‘answer’ section of each question, hopefully without peeking at the answer first.



Answer hidden.



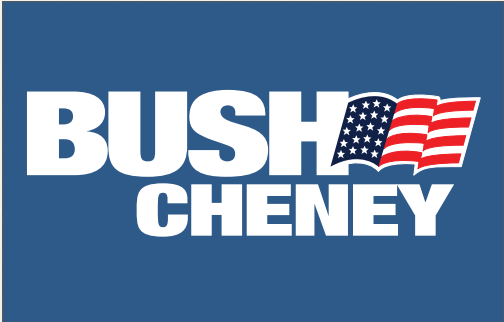
Answer revealed.

» DEVELOPMENT PROCESS

In order to be successful, the guide would have to encourage users to spend more time looking at and analyzing visual information. I addressed this objective in four ways. The first was simple awareness—the guide would show users how framing and confirmation bias could shape their opinions and the opinions of others. Second, the guide would need to make users aware of visual elements that may lead to misinterpretations. Third, the guide would need to encourage users to look at information in a reflective, rather than experiential mode. Fourth, the guide had to encourage users to spend more time looking at visual information to negate the effects of framing and confirmation bias. While the first two are relatively straightforward, the second two are more complex.

The way I addressed the final points was based on my experience studying design. As I learned the basics I found myself spending more time looking at visuals, trying to understand them in the context of my new knowledge. Giving users a very basic introduction to elements of visual design had the potential to do the same thing for users of the guide. While this reasoning may be a bit of a stretch on its own, the idea is supported by information in *Things that Make Us Smart* and *Understanding by Design*. Hopefully, users would end up spending more time looking at visual information reflectively of their own volition, rather than being told to do so explicitly in the guide.

What does this campaign logo imply about the candidates?



CAMPAIGN LOGO
2004 Bush/Cheney logo

a. The logo implies that Bush and Cheney have won the election.

b. The logo implies that Bush is significantly more important than Cheney.

c. The logo implies both a and b.

Understanding Visual Information | 2

Answer: B

Size can be used for emphasis or to draw attention to specific information. Size may also assert the importance of one thing in comparison to another—larger objects are often considered more important. When used in graphs, a larger size may indicate a larger quantity.

- Size can draw attention
- Size can imply importance
- Size can imply quantity

The questions in the guide are designed to provoke thought about the way each design element or concept affects the way we read and understand information.

The description of each design element and concept was written to be as simple and concise as possible.

Even if a user chooses not to read the entire description, they will see a set of bullets that outline the key effects of each element.

» CONTENT

The prototype guide is divided into three sections: an introduction to basic elements of visual design, more specific information on graphs and a brief final section that touches on the effects of framing and confirmation bias. The final section addresses the first point I list above, while the other three points are covered in the first two sections.

Each page contains a single example of political information and a simple question about that example. The questions are meant to encourage users to explore the concept as much as the specific example on the page. Upon clicking an answer, the answer and explanatory information are revealed. The information includes a brief explanation of the topic addressed on that page as well as bullet points that present the potential effects on people's interpretations. I have included a sample page from the guide with each element highlighted.

The first section covers basic elements of visual design, including size, color and placement. Users are asked about the implications of each variable, rather than the use of that variable in the example. This is meant to encourage users to apply the knowledge to information more generally. The second section addresses graphs specifically because they appear so frequently in political information and are often the most misleading component of political visuals. While this section is still meant to encourage a more thoughtful approach to information, it does play a purely informational role as well. The final section addresses framing and cognitive bias, and is meant to leave users thinking about how these affect their judgment and the judgment of others. The hope is that users will not only become more self-aware, but more aware of how others can reach opposite conclusions from the same information. Spread widely enough, this knowledge may provide hope for a less acrimonious future for political discourse.

Conclusion

» AREAS FOR FUTURE RESEARCH

Although there has not been time to formally test my prototype, I was able to have three people work through the guide. All three gave me informal feedback about the guide and about their approach to political information during the a week after receiving the guide. Each reported that they paid more attention to the design of political graphics during the week. The three also reported, to a lesser extent, that they considered their own level of bias in relation to politics. While this evidence is anecdotal, it does indicate the potential for validation of concept behind the guide.

There are several open questions left by this research. Foremost is whether or not the effect of the guide is lasting. While it was anecdotally successful, the testing took place over a relatively short period of time. For the guide to have significant impact it would need to have a lasting effect on people's interpretation of information. Intuitively, I would assume that the effects would decrease somewhat over time. Even so, the guide is so straightforward and deals with such basic concepts that it seems likely that there could be a permanent improvement in attentiveness to visual information.

Even if the guide does successfully encourage people to investigate visual information more thoroughly, it is still uncertain whether or not they will act on information that contradicts their existing beliefs. Research has shown that belief change is a difficult problem; one that is not necessarily solved by more accurate information.

» CONCLUSION

For this guide to successfully change the tone of politics in America it would need to be widely distributed and accepted. This is a significant challenge, as there is no obvious venue for wide distribution. It is possible that a news outlet or non-profit organization would be interested in making the guide available to readers.

One of the faculty participating in the final critique for this project had an interesting suggestion in this regard. The guide could be adapted for use in middle and high school classrooms as a lesson on media literacy. This context carries the added benefit of an audience without well-defined political beliefs. However, any lesson relating to political thinking is likely to cause some controversy among parents.

Even though this project dealt specifically with political information, the knowledge is likely generalizable to a variety of subjects. The polarizing nature of politics suggests that these principles could be applied to other areas, such as advertising. Put in this less antagonistic context, the public might be more inclined to use this guide as an educational tool than they would in its current state, centered on politics.

While this project addresses just one of many problems related to politics, my research and results do provide some hope that positive change is possible.

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Appendices

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» **APPENDIX A:**
RESEARCH DEMOGRAPHICS

INITIAL SURVEY

Total Participants: 85

- Female: 52
- Male: 33

Age:

- 18-25: 4
- 26-35: 32
- 36-45: 9
- 46-55: 12
- 56-65: 10
- Over 65: 18

Political Inclination:

- Liberal: 45%
- Conservative: 20%
- Neutral: 35%

FOLLOW-UP SURVEY

Total Participants: 86

- Female: 52
- Male: 25
- No response: 9

Age:

- 18-24: 23
- 25-34: 42
- 35-44: 9
- 45-54: 4
- Over 55: 8

Political Inclination:

- Liberal: 83%
- Conservative: 9%
- Neutral: 8%

THINK-ALOUD INTERVIEWS

Total Participants: 9

- Female: 5
- Male: 4

Age:

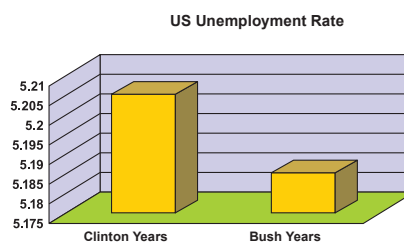
- 18-24: 2
- 25-34: 4
- 35-46: 1
- Over 65: 2

Political Inclination:

- Liberal: 5
- Conservative: 3
- Neutral: 1

» APPENDIX B:
THINK-ALoud INTERVIEW
EXAMPLES
(IRB HS11-571)

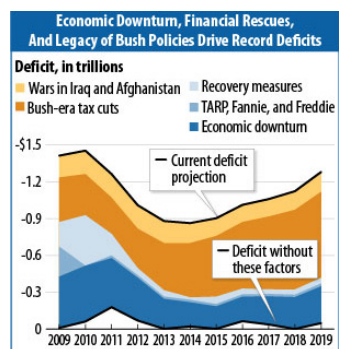
1



2



Click anywhere in the box above to play a short video clip.



Protesters confronted Mr. Paladino (a candidate for Governor of New York) during a stop at Viking Industries in New Paltz.

"I reject the notion by the left of a constitutional separation of church and state," said David Bradley, a conservative from Beaumont who works in real estate. "I have \$1,000 for the charity of your choice if you can find it in the Constitution."

Cynthia Dunbar, a lawyer from Richmond who is a strict constitutionalist and thinks the nation was founded on Christian beliefs, managed to cut Thomas Jefferson from a list of figures whose writings inspired revolutions in the late 18th century and 19th century, replacing him with St. Thomas Aquinas, John Calvin and William Blackstone. (Jefferson is not well liked among conservatives on the board because he coined the term "separation between church and state.")

"The Enlightenment was not the only philosophy on which these revolutions were based," Ms. Dunbar said.

