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Brendan Van Gorder  
*University of Pennsylvania*

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# An Image's Processor

## **Abstract**

This research experiments with a new method of visual data analysis. Through this method, which images receive greater processing attention depends on what is important and interesting to the viewer's mind, instead of how the data is presented. From the standpoint of this study, what visual input is important and interesting for the mind depends upon memory structure. Based on current cognition theory, memory structure is comprised of what specific concepts are wired together and fired together when a certain input is received. In analyzing visual input that should activate many different memory associations, this study seeks to investigate the importance of a viewer's specific memory in the process of understanding what they see.

## **Keywords**

visual data analysis

## **Disciplines**

Psychiatry and Psychology

## **Comments**

This paper was part of the 2014-2015 Penn Humanities Forum on Color. Find out more at <http://www.phf.upenn.edu/annual-topics/color>.

*An Image's Processor*

Brendan Van Gorder

2014–2015 Andrew W. Mellon Undergraduate Fellow

Penn Humanities Forum

The University of Pennsylvania

## **Research Focus**

This research experiments with a new method of visual data analysis. Through this method, which images receive greater processing attention depends on what is important and interesting to the viewer's mind, instead of how the data is presented. From the standpoint of this study, what visual input is important and interesting for the mind depends upon memory structure. Based on current cognition theory, memory structure is comprised of what specific concepts are wired together and fired together when a certain input is received. In analyzing visual input that should activate many different memory associations, this study seeks to investigate the importance of a viewer's specific memory in the process of understanding what they see.

## **Introduction**

Images are capable of forming meaningful memories for people who have no physical-world experience of the subject of the image. Researchers studying psychology, marketing, and public relations have found that strong opinions can be created due to emotional reaction to images, or just simple exposure, with conscious processing possible but not necessary.

## **Literature Review**

### **Importance of Visual Input**

Among our many senses, scientists studying the evolution of humans to our modern state have found that sight is disproportionately relied upon for information processing. Just how important sight is, is widely debated. Damasio (2008), long time contributor to the Journal of Behavioral Decision Making, argues that, "THOUGHT is made largely from images, broadly construed to include perceptual and symbolic representations. A lifetime of learning

leads to these images to become ‘marked’ by positive and negative feelings linked directly or indirectly to somatic or bodily states” (Slovic et. al. 2).

Damasio’s observation suggests that images are perhaps the very foundation of thought. Also, Damasio notes that, “a lifetime of learning” leads to “images being marked positively or negatively”. With this, Damasio suggests that images are stored, accumulated throughout our life and that these images are then referenced (most often subconsciously) when we think about things or see images. For example, we may consciously see a picture of a clown, but our mind thinks through the many different references of clowns we have seen. Although we may not see the images of the other clowns in our mind, we are left in an emotional state that our subconscious processing of these images has induced.

It is not the case however, that humans are at the whim of subconscious processing or associations. Importantly, Domke notes that, “the widely held notion that vivid images often drive public opinion is overly simplistic; in contrast, we posit that images most often *interact* with individuals’ existing understandings of the world to shape information processing and judgments” (Domke 131). In order to investigate the way images interact with a mind’s understanding of the world, one must seriously consider memory, and specifically, associative memory.

## **Memory**

Scientists are not yet sure exactly how image processing works, but Domke sums up one well-supported theory,

“...Images, like words, seem likely to be evaluated in relation to pre-existing beliefs and experiences – i.e. *schema*, defined as ‘general cognitive

*mental plans, that are abstract and serve as guides for action, as structures for interpreting information, as organized frameworks for solving problems*'. When people are confronted with an object, person, idea, or issue, evidence suggests that stimuli congruent with one's schema are given greater attention, are processed more quickly, and are more likely to be stored in memory or to be recalled at a later time. (Domke 134)"

This suggests that although thought gathers most of its material from sensory stimuli, because of the importance of schema in making sense of this input, the input matters less than the processor. But how is our schema - our mental "processors", our mapping of associations, and our lens of understanding - configured?

To attempt a hypothesis of the mental wiring of image processing we should consider what we know about memory. In considering memory, we cannot underemphasize the storage capacity of the human brain. Although our mind has vast amounts of information stored in it, it is important to consider the ways in which our brain optimizes the speed and accuracy of object recognition through prioritizing some memories over others. In other words, "...while a variety of mental categories might be 'available' to guide information processing, *which* particular ones become influential in evaluations and judgments may depend upon...how easily it might be retrieved from memory. It is widely accepted that schema *frequently* or *recently* activated become more readily accessible for application to attitude objects" (Domke 134). This "recency effect" becomes especially relevant when considering the news, as it is an information medium that people repeatedly and continuously expose themselves to. The frequency of news publications, combined with the American consumers' phenomenon of identifying with a particular news source (a FOX viewer vs. a CNN viewer vs. a MSNBC

viewer...etc.) means that the particular aesthetic of that news station is an oft recurring aesthetic in the visual memory of the viewer.

The working hypothesis that the images that we have seen in the past may heavily influence how we process imagery in the present (and how we understand what we are seeing and hearing) is not based on the idea that we see something that we remember seeing before, but rather that we see something that triggers associative recall- that we see something that reminds of us some other information encoded in our memory. Anderson, Bower, Collins, Loftus, and other scientists, "...have argued for a conception of memory as a network of connected cognitive structures... This perspective maintains that any one concept is associated with other constructs when encoded in memory, and that the linkages between constructs are strengthened each time they are activated in tandem." (Domke 135). This network of association makes sense when considering a baby learning a new word...the more times they see a cat and hear the word "cat" the stronger the association becomes... however, this linking is not limited to different sensory inputs such as language and sight. Seeing an image and having that image followed immediately with other images could also form links between those images. For instance, continually seeing protesters and looters shown in succession could link the image of a protester with an image of a looter.

Even more interesting, Berkowitz and Rogers argue that, "When a thought element is activated or brought into focal awareness, the activation radiates out from this particular node along the associative pathways to other nodes" (Berkowitz 58-9). Therefore, depending on how strongly the concepts have been linked together (through tandem activation), seeing a protester without the stimuli of a following image of looting may activate the same concepts one has associated with looting simply because of this activation effect. Because the neuron or

neurons which store “protester” in the brain are also linked to the neuron or neurons which store “looting” in the brain, the action potential (the electric activation of neurons) which was triggered by the sight of a protester will propagate to the associative pathways which protester is connected to. Depending on how strongly connected “protester” is to “looting”, this activation propagation may trigger the same emotions and related concepts attached to looting, even though looting was not actually observed.

## **Method**

### **Conceptualizing Effective Measurement**

In order to test whether or not news images are being stored in a person’s mind according to a certain networked schema it is important to be comparative (by drawing from different styles of imagery). Towards this purpose this study compiled images from the three most viewed US news networks in an attempt at getting a variety of imagery styles (all capable of being understood in many ways) while not changing the subject of the image. If the schema hypothesis holds, the viewer will combine the different “takes” on the news event in a single framework of understanding... Although their attention will be drawn to different specificities in each different imagery style, there will be few if any observations of one source that contradict or negate the observations from a different source. To reiterate, the input matters less than the processor.

### **Input Exposure Time**

In order to minimize as much as possible variables that did not relate to the memory structure (schema) of image processing this study attempted to solicit unconscious initial responses. The study did this by exposing the viewer to an image for only 142 milliseconds. This is based on current scholarship of how mental processing is affected by existing memory



structures (schema).

“Unconscious knowledge derived from recent experience influences neural activity in visual areas as early as 50–100 ms, close to the entry point of visual information in the cortical system. This unconscious bias is thus likely to influence later processing in other visual and decisional areas” (Bullier 10).

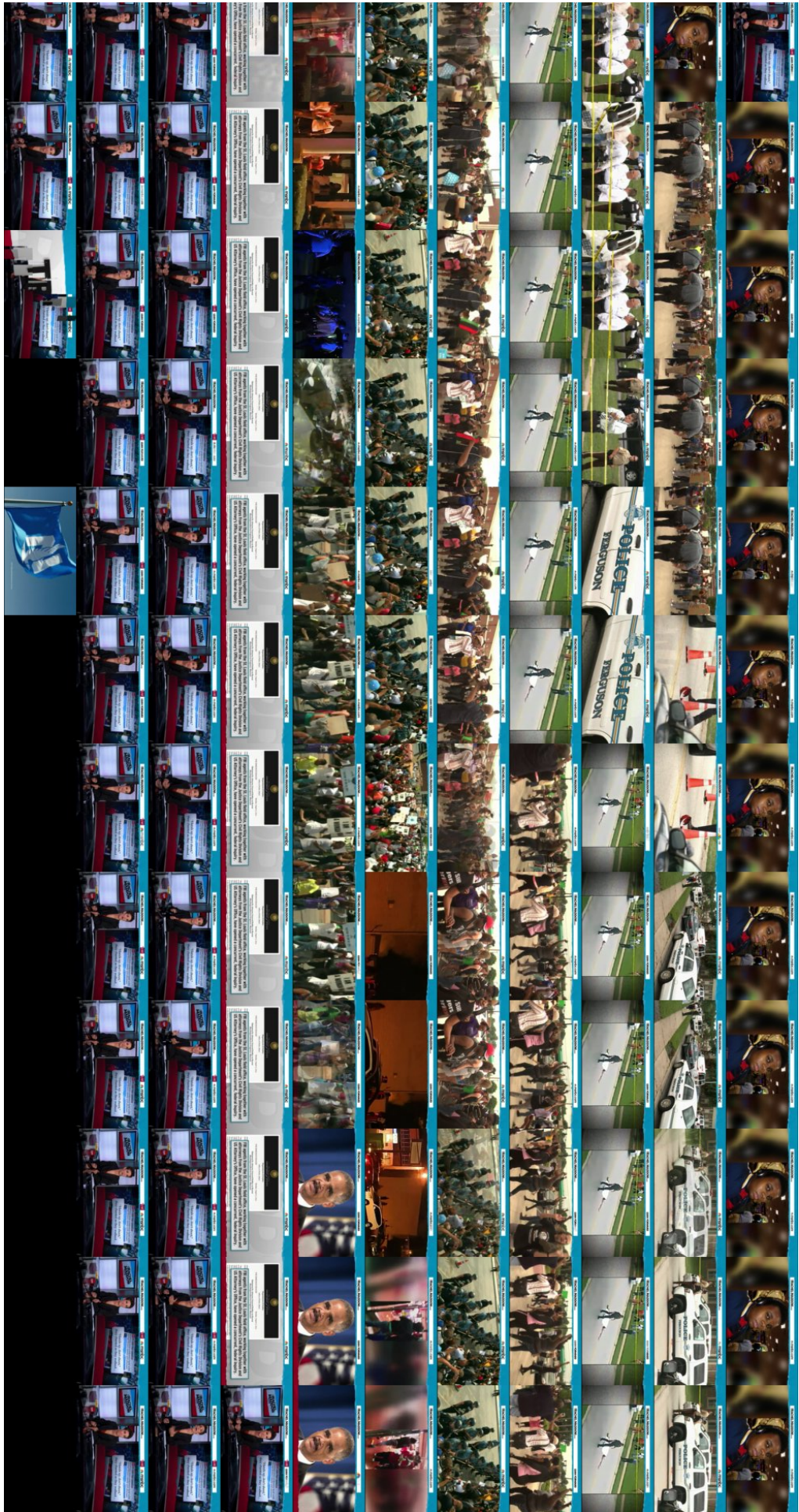
This supports the understanding that mental processing is influenced by a framework of memories already stored (and being reinforced). The importance of this framework is non-trivial. As one scholar puts it, “The effect of unconscious memory on early neural processing and on the following cascade of neural events may be the reason why it is so difficult to voluntarily override its influence” (Jacoby 1991). Because information from memory is already associated at the “entry point of visual information in the cortical system” this means that it has far-reaching effects along the “cascade of neural events”...precisely because it occurred at the beginning of the cascade.

## **Input and Response**

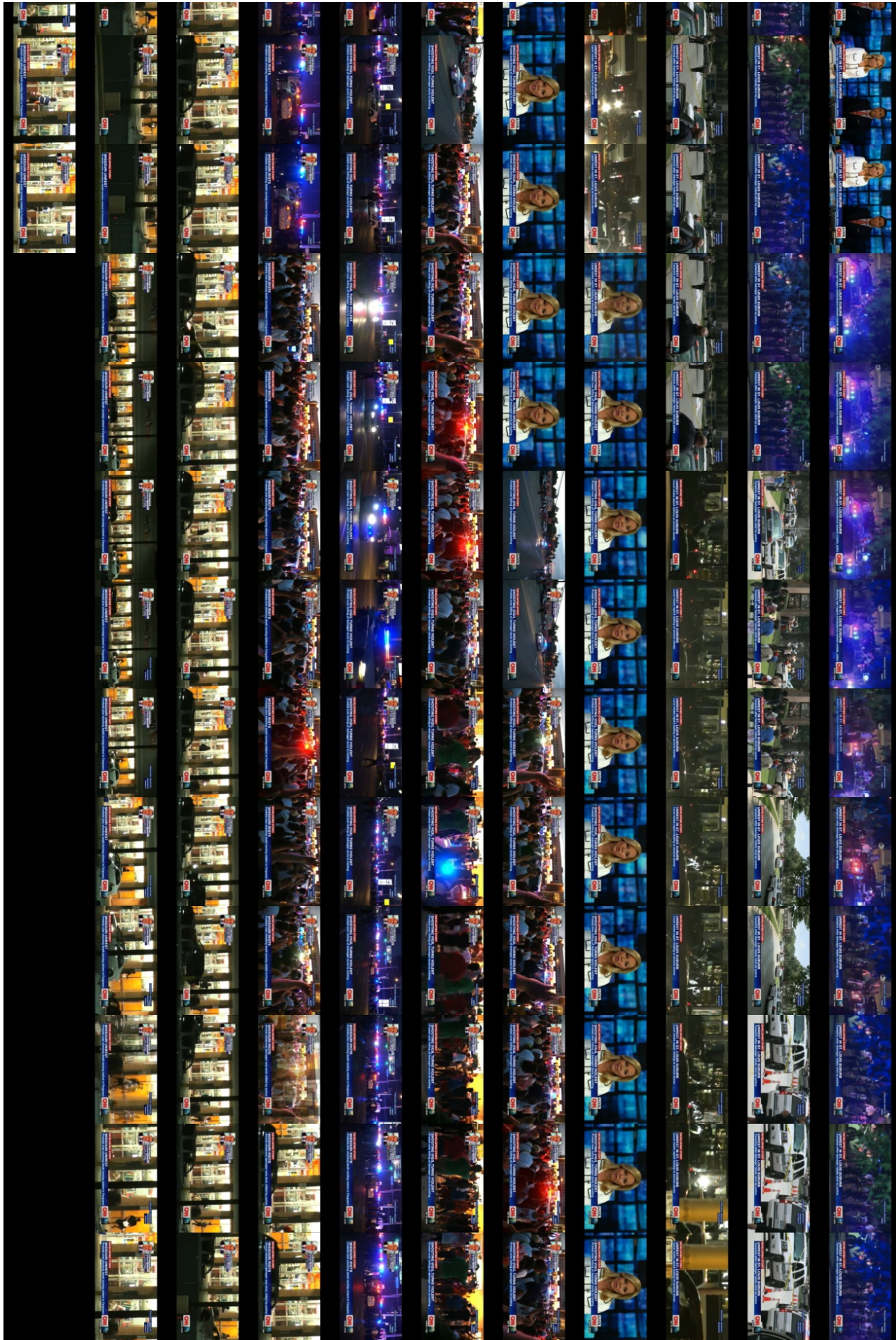
As visual input, this study chose the first two minutes that each of the three most viewed news networks in the United States mentioned “Ferguson” on the nightly news (which is the most watched news time-slot in the United States). This incident was chosen because it is a news event that people hold strong opinions or emotions of and so its images would be good data to use to study how images are processed as part of a broader schema (wired together with emotions, opinions, and other cognitive networks).

It is important to take into consideration that there is a serious research bias when media

content analysis is studied. "...content analysis...requires that a researcher decide before hand what information would be relevant to tag. In other words, as opposed to exploring a media collection without any preconceived expectations or hypotheses - just to "see what is there" - a researcher has to postulate, "what was there," i.e. what are the important types of information worth seeking out" (Manovich 3). Taking this into consideration this study chose against picking specific images from the newscasts that the researcher thought were important. Instead, we presented all images briefly (for 142 millisecond durations), and then altogether in order to allow the viewer to ascertain what is worth remembering from their own mental processing. The research tried to present as much visual information as possible for visual processing so that what was or was not important could be filtered out by the viewers brain. This technique is derived from another researcher's observation: "...when you observe a physical scene directly with your eyes, you can look anywhere in any order. This allows you to quickly notice a variety of patterns, structures and relations" (Manovich 4). Thus, all of the images from each station's two-minute broadcast were shown to the viewer, and the viewer was then asked non-leading questions such as, "what do you remember?" After presenting the images as a sequence of images viewed quickly and one at a time, the study then aggregated all the images of the two minutes and presented them at once. This method allowed the viewer's mental processing greater freedom to filter out what was or was not important to them based on their own mental schema. In order to view the entire visualization of the media visit: [analyzethemedia.webflow.io](http://analyzethemedia.webflow.io). Below, the aggregated image montages are shown.







## **Results**

The full study was put online at [analyzethemedia.webflow.io](http://analyzethemedia.webflow.io) to collect viewer input, but currently, there is not a sufficient body of responses to run analysis. As it stands, this study is a personal tool of analysis for the viewer to visually explore how they view and understand news media.

## **Conclusion**

Due to how the images are presented to the viewer (a quick stream of many images), the media analysis that this study provides makes it obvious that visual processing has a lot to do with subconscious processing, which is often coupled with memory associations. Although the viewer may feel that at such high speeds of image exposure they do not understand what they are seeing, when asked to recall what they saw, their memory exposes what associations they have stored in their mind associated to the topic of what they are seeing. With this revelation the viewer may agree, that the memory structure of their mental processor is more important in meaning creation than the actual visual input.

## Works Cited

- Berkowitz, L. and K. H. Rogers (1986) 'A Priming Effect Analysis of Media Influences', in J. Bryant and D. Zillman (eds) *Perspectives on Media Effects*, pp. 57–81. Hillsdale, NJ: Erlbaum.
- Chaumon, M., Drouet, V., & Tallon-Baudry, C. (2008). Unconscious associative memory affects visual processing before 100 ms. *Journal of vision*, 8(3), 10.
- Damasio, A. (2008). *Descartes' error: Emotion, reason and the human brain*. Random House.
- Domke, D., Perlmutter, D., & Spratt, M. (2002). The primes of our times? An examination of the 'power' of visual images. *Journalism*, 3(2), 131-159.
- Jacoby, L. L. (1991). A process dissociation framework: Separating automatic from intentional uses of memory. *Journal of memory and language*, 30(5), 513-541.
- Manovich, L. (2011). Media visualization: Visual techniques for exploring large media collections. *Media Studies Futures*.
- Slovic, P., Finucane, M. L., Peters, E., & MacGregor, D. G. (2007). The affect heuristic. *European journal of operational research*, 177(3), 1333-1352.