Top-down Effects on Attentional Selection in Dynamic Scenes and Subsequent Memory: Attitude Congruence and Social Vigilantism in Political Videos

by

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B.S., Knox College, 2010
M.S., Kansas State University, 2016

AN ABSTRACT OF A DISSERTATION

submitted in partial fulfillment of the requirements for the degree

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Abstract

Political videos are created as persuasive media, and at a basic level that persuasion would require that the videos guide viewer attention to the relevant persuasive content. Recent work has shown that filmmakers have techniques that allow them to guide where viewers look, and this guidance occurs even when viewers have very different understandings of the film. The current research tested if these attentional effects carry over to political videos, or if the top-down factors of attitude congruence and social vigilantism, belief superiority and the tendency to impress one's "superior" beliefs on others (O'Dea, Bueno, & Saucier, 2018; Saucier & Webster, 2010; Saucier, Webster, Hoffman, & Strain, 2014), will break the ability of videos to guide viewers' attention. Attentional selection was measured through participants' eye movements, and memory encoding was measured through recall and recognition for both verbal and visual information. Three overarching competing hypotheses predicted different relationships between attitude congruence, social vigilantism, and visual attention and memory. The Tyranny of Film Hypothesis predicted that the videos would guide viewer attention, regardless of attitude congruence. This would result in similar eye-movements and memory for all participants. The Selective Exposure Hypothesis predicted that participants would avoid processing attitude-incongruent information. As a result, viewers' visual attention would be directed away from attitude-incongruent information, and subsequent memory would be worse. Lastly, the Social Vigilantism Hypothesis predicted that people high in Social Vigilantism would engage more with attitude-incongruent information. Two experiments tested these hypotheses. The first was the Memory experiment (conducted online), and the second was the Eye movement experiment. In each experiment, participants watched a series of political advertisement and debate videos, and attitudes were measured to identify which information in the videos was attitude-congruent

and incongruent. The Memory experiment showed some support for the Social Vigilantism Hypothesis, with People high in Social Vigilantism having better memory for attitude-incongruent information on certain memory measures. Conversely, the Eye movement experiment consistently showed strong stimulus driven effects in support of the Tyranny of Film, but also weaker attitude and social vigilantism effects that were independent of attitude congruence. Altogether, these results show dynamic video stimuli features are the best predictors of viewer attention and memory, but viewer attitude and social vigilantism have subtle top-down effects. The support for different hypotheses between the two experiments indicates the strength of top-down effects may depend on the format of the viewing experience, and specifically how much control the viewer has over the experience.

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Chapter 1 - Top-down Effects on Attentional Selection in Dynamic Scenes and Subsequent Memory: Attitude Congruence and Social Vigilantism in Political Videos

Do we each, literally, see the world in a different way, or in much the same way? Given the diverse perspectives people take on the issues in their lives, especially political ones, people very clearly, figuratively, see the world in a different way. Could these figurative differences be driven by or drive the fundamental cognitive processes of attention and memory?

Political media (political ads, debates, speeches, etc.) are created to guide our attention to information relevant to the creators' beliefs and influence our subsequent memory for the information. The creators of this content have many bottom-up techniques to guide attention and subsequent memory, but the viewer has the ultimate top-down control of whether they will attend to the content. The current research uses the conflict between bottom-up features and top-down processes in political videos to test the role of high-level cognitive processes in guiding attention and subsequent memory in dynamic scenes by testing how attitude congruence with political information presented in persuasive videos (advertisements and debates) influences attentional selection and memory. Theoretically, the question is if our social and political attitudes influence the basic processes we use to understand our environment. For example, to avoid information we think we will disagree with, we may move our eyes away from the information. Interestingly, many of these processes may occur outside of our conscious awareness. Throughout our daily lives, much of what we remember we have not consciously told ourselves to remember, and it is even less frequent that we consciously decide exactly where we want look.

The Role of High Level Cognitive Processes in Scene Perception

The current work was designed to test a fundamental concept in psychology—top-down processing. Further, the effect of top-down processes on attention and subsequent memory was tested in scenes, which are a ubiquitous and ever-present stimulus for humans. That is to say, if our eyes are open, we are seeing a scene, and even when we dream we see scenes. Tests of top-down effects on eye-movements in scenes started fairly early in the 20th century with Buswell (1935), and have continued with notable work from many major figures in the study of attention (Henderson, 2007; Itti & Koch, 2001; Rayner, 1998; Wolfe, 1994; Yarbus, 1967). Until recently, much of the work on top-down guidance of attention in scenes relied on task-based instructions to manipulate top-down processing. Recently, however, there has been a trend to explore the role of naturally occurring top-down effects on scene processing. This more recent research has drawn heavily on the overarching finding from reading research that a person's comprehension for a text influences how they move their eyes through the text (for review Rayner, 1998). The most direct extension of this work is likely work in picture stories and comics, which allow readers to progress through the narrative at their own pace (Foulsham, Wybrow, & Cohn, 2016; Hutson, Magliano, & Loschky, Submitted; Loschky, Hutson, Smith, & Magliano, In press). Tests of the effect of comprehension on eye-movements in film have also been carried out (Hutson, Smith, Magliano, & Loschky, 2017; Loschky, Larson, Magliano, & Smith, 2015). Finally, in the most directly relevant research to date, Huff et al. (2017) tested the role of fandom (i.e., the sports team a person supports) on eye-movements and event perception during a soccer match and subsequent memory for it (more details on this study presented below). Together, these seemingly disparate lines of research converge to explore top-down effects on attentional selection in scenes. The current work is a unique extension of the research on top-down effects on attention in film/video that has far more experimental control than previous work, testing hypotheses that draw on scene perception and the extensive attitude/persuasion research, and the converging measures of eye-movements and memory. Specifically, the study used what was intended to be a very strong manipulation of top-down processing, attitude congruence with political information in videos, to create a very strong test of the role of top-down processing on eye movements and memory in video.

In sum, the current work is designed to uniquely test one of the major theoretical constructs in psychology (top-down processing), in a common stimulus type (film/video), using naturally occurring top-down differences (attitude congruence and belief superiority). These top-down differences are well understood and can be accurately measured through methods from social psychology. Taken together, the methods and design used in this study uniquely tested for top-down effects on attentional selection (eye-movements) and subsequent memory in film/video.

Attentional Selection While Watching Videos

There has not been much research on how attitude congruence affects attentional selection in political videos. However, much is known about eye-movements and memory in scenes generally. Together with the research on how people engage with political media (presented below), this research on attentional selection in and memory for scenes is used to develop a series of competing alternative hypotheses.

Lower- and higher-level scene processing

When people view scenes, there are two broad categories of processes that may influence attentional selection (Henderson, 2007; Itti & Koch, 2001; Wolfe, 1994). Bottom-up features are stimulus features of the scene (e.g., motion, color, and edges), many of which have been shown to guide attentional selection in the scene. This is where people will look, and similarly what is available to consolidate in long term memory. Top-down processes are the inverse of this, in that they are the memory, biases, comprehension, and other cognitive processes that the perceiver incorporates into processing a scene. A person's top-down processes can influence both where that person attends (e.g., DeAngelus & Pelz, 2009; Yarbus, 1967) and their subsequent memory (Anderson, 1978; Pezdek, Whetstone, Reynolds, Askari, & Dougherty, 1989).

Bottom-up processes. As the current study is testing the role of attitude congruence and social vigilantism on attentional selection and subsequent memory, it is a test of top-down processing. That being said, understanding how bottom-up processes influence attentional selection and controlling for them is very important for testing top-down effects. Bottom-up scene features are relatively well understood (Henderson, 2007; Itti & Koch, 2001; Wolfe, 1994). For the current study, it is important to consider bottom-up processing of dynamic scenes (i.e., videos). Within the last 10 years this has become an important area of research, and a number of interesting discoveries have been made. Most notably, when people watch videos there is a surprisingly large amount of clustering of gaze when compared to static scenes (Dorr, Martinetz, Gegenfurtner, & Barth, 2010; Smith & Henderson, 2008; Smith & Mital, 2013), meaning that people tend to look in the same places at the same times. This phenomenon of gaze clustering has been termed attentional synchrony (Smith & Henderson, 2008; Smith & Mital, 2013). Research has shown that it is the dynamic nature of the scenes (i.e., the motion) that is most important for creating attentional synchrony (Mital, Smith, Hill, & Henderson, 2010; Smith & Mital, 2013), and it is exacerbated in highly produced dynamic videos that also use techniques of cinematography and video editing (Dorr et al., 2010; Smith & Henderson, 2008; Smith & Mital, 2013; Wang, Freeman, Merriam, Hasson, & Heeger, 2012). In addition to gaze clustering, videos also create synchrony in brain activity as measured by EEG (Dmochowski, Sajda, Dias, & Parra, 2012) and fMRI (Donohew et al., 2017; Hasson et al., 2008) , with most of the synchrony occurring in brain areas that process visual information. Based solely on the effects on bottom-up features on attention and memory, in the current study it would be predicted that participants will show attention synchrony regardless of attitude. This is consistent with previous work in which participants showed attentional synchrony in narrative film, even when they had very different levels of comprehension (Hutson et al., 2017; Loschky et al., 2015). This was termed the Tyranny of Film. However, videos can be constructed to have different amounts of attentional synchrony. As such, the ability for attitude to have an effect on attentional selection might vary based on the type of political video a person is watching. While a political advertisement may guide participant eye-movements regardless of attitude, the weaker bottom-up features of a political debate may allow a viewer more opportunity to guide their attention based on attitude congruence. From another perspective, even if there is a high level of attentional synchrony regardless of attitude congruence, we know people can watch the same video and have a very different understanding of it (e.g., a presidential debate). This indicates the importance of top-down processes in guiding subsequent processing of the information, for example how it is remembered.

Top-down processes. Much like bottom-up features, top-down processes also influence viewers' attentional selection in a scene. The classic example of this is Yarbus' work (1967) showing the task given to a participant while they viewed a painting (e.g., estimate the material circumstances of the family) influenced where they looked. This work was later replicated and extended by DeAngelus and Pelz (2009). To test the connection between what a person is thinking and their eye-movements, more recent work has tested whether a person's eye-movements can be used to determine what their task was while viewing an image (Borji & Itti, 2014; Greene, Liu, & Wolfe, 2012; Henderson, Shinkareva, Wang, Luke, & Olejarczyk, 2013). Results in these studies are mixed, but the prevailing claim is that with the right tools a person's eye-movements can be used to reliably identify their task. In other words, a person's eye-movements do show the cognitive processes they were engaged in. As such, this strong connection between eye-movements and higher order cognition could be expected to be present due to attitude congruence and social vigilantism effects as well.

As mentioned previously, the current work is testing the role of higher-level cognitive effects on viewers' attention in videos. In experiments with no task manipulation, viewers show attentional synchrony when watching videos (Dorr et al., 2010; Mital et al., 2010). When there is a task manipulation there is some evidence people will look at different places in videos (Hutson et al., 2017; Lahnakoski et al., 2014; Smith & Mital, 2013). The key element of these task manipulations that have a top-down effect in video is that they require viewers to look away from the main point(s) of interest in the video. Conversely, a handful of published studies, and likely more unpublished, have shown no or very targeted effects of top-down manipulations on eye-movements in videos (Huff et al., 2017; Hutson et al., 2017; Loschky et al., 2015; Taya, Windridge, & Osman, 2012; Wang et al., 2012). When taken together, research on bottom-up and top-down effects on eye-movements in video shows that bottom-up features in videos have a much stronger influence on where people look than static images (Mannan, Ruddock, &

Wooding, 1997; Smith & Henderson, 2008; Smith & Mital, 2013). This ability of videos to create attentional synchrony despite large differences in top-down processing has been termed *The Tyranny of Film* (Loschky et al., 2015). While in film people may readily follow the filmmakers goals, when watching political videos viewers often try to avoid being persuaded by content they disagree with (Jacks & Cameron, 2003). In this instance, the use of film making techniques that have a very strong influence on what people look at could be considered to be tyrannical, in that they could be an unrestrained, arbitrary use of the power of filmmakers. That being said, since we know people do resist persuasion, the question is, does a person's resistance to persuasion affect their attentional selection while watching political videos, and is this affected by the degree to which film making techniques are used in making those videos? When compared to the narrative comprehension manipulations of previous work that showed support for the Tyranny of Film (Hutson et al., 2017; Loschky et al., 2015), attitude congruence may be a stronger top-down manipulation that would be more likely to influence attentional selection—especially if the attitude is on a highly controversial topic.

Identifying a Highly Controversial Topic--Abortion

Research with attitude congruence as a main independent variable requires the use of a social/political issue with specific characteristics. First, the issue needed to be familiar to the participant pool that was collected from. Second, people in the sample needed to have attitudes towards the issue. Finally, there needed to be a distribution of attitudes within the sample that had people on the extremes of the issue. For research conducted in the United States, an issue that has frequently met these criteria is abortion. Importantly, at Kansas State University, previous studies have shown that the sample of students who participate in psychology department research are fairly evenly split on their abortion attitudes, with most participants either identifying as highly Pro-life or highly Pro-choice. For these reasons, abortion was chosen as the social/political issue to use in the current study. Neither I, nor any of my collaborators, have any interest in promoting a specific side of the abortion issue, or to persuade any participant to change their attitude. Instead, the goal in using the topic of abortion in research was to create distinct experimental groups to test the role of attitude congruence on attentional selection in and subsequent memory for political videos.

Attentional Selection in Political Videos

How closely does a person's reported use of a resistance strategy line up with their actual use of that strategy, and at what level of processing does the strategy take effect? This study is designed to comprehensively test how political videos are processed by combining eye-tracking and memory. Specifically, how does attitude congruence and belief superiority influence attention selection, and does attentional selection predict memory performance? This is not an entirely new area of research, with some of the most directly relevant findings presented below. However, previous work typically tested a very narrow band of behavior or attentional processes (i.e., only self-reported behavior, memory, or eye-movements).

Resisting Attitude-incongruent Information

As outlined above, what appears to be a very strong test of high-level cognitive effects on attentional selection and memory in visual media is the use attitude congruence with political content. As we all personally experience when being confronted with attitude-incongruent information, there are many ways we can go about relieving ourselves of the negative emotions that information may engender. Similarly, how people interact with attitude-congruent and incongruent information is well study in areas such as Social Psychology, Political Science, and Communications, which means many theories have been developed that can be used to make predictions about how attitude congruence and social vigilantism will influence attentional selection and memory encoding. For example, the strategies people use when confronted with attitude inconsistent information have been termed resistance strategies (for review Jacks & Cameron, 2003). Importantly, with resistance strategies, the idea is that counter-attitudinal information is presented to persuade people towards a given attitude, thus the resistance is towards that persuasion. Resistance strategies can take on many forms, but generally involve either avoiding counter-attitudinal information or bringing in one's own attitudes to avoid truly considering the counter-attitudinal message. To understand eye-movement and memory characteristics during political information viewing, we can use how people report engaging with political information. The way a person reports engaging with political information allows for direct predictions of how they will attend to the information. That being said, with the highly automated processes of eye-movements and memory it is difficult to predict how much direct control political video viewers will have.

Resistance strategies and behavior

Selective exposure. Most of us would likely agree that we do not actively seek out counter-attitudinal information. For example, we do not regularly watch the news channel that has a political leaning we disagree with, and we do not watch campaign rallies by political candidates we do not plan on voting for. These are examples of selective exposure (Brock & Balloun, 1967; Hart et al., 2009; Jacks & Cameron, 2003; Knobloch-Westerwick & Meng, 2009) on a very macro scale (i.e., total counter-attitudinal information *avoidance*). A related example of selective exposure is when a person tunes out counter-attitudinal information when they are confronted with it (e.g., tuning out at Thanksgiving dinner when a family member starts talking about why they voted for [insert candidate name here]).

For the current work, what is important is how resistance strategies people use influence attentional selection and subsequent memory when people are confronted with attitude-incongruent information versus attitude-congruent information. Theories of selective exposure say people will find some way of avoiding or tuning out the information. Evidence for this comes from memory experiments, where people tend to have worse memory for attitude-incongruent information (for review Eagly, Chen, Chaiken, & Shaw-Barnes, 1999). However, there are a number of important considerations concerning these selective exposure memory effects. First, without other measures of visual attention, it is unclear why the memory effects are occurring. It could be that people are tuning out counter-attitudinal information, but there could also be effects due to fluency with the arguments (e.g., a person that is Pro-life may not know as many Pro-choice arguments, thus even if they attend to Pro-choice arguments they would be more difficult to remember) (Eagly, Kulesa, Brannon, Shaw, & Hutson-Comeaux, 2000). Second, the selective exposure effects on memory are fairly weak. However, they become more clear when a person's attitude strength is included as a moderating variable, with selective exposure effects on memory more common for people that have weakly held, but highly partisan attitudes (Eagly et al., 2000). Conversely, people with strongly held beliefs tend not to show selective exposure effects, but rather use resistance strategies that increase their engagement with counter-attitudinal information. The key point here is that although people clearly engage in selective exposure, it may not be entirely dependent on attitude congruence. Rather, moderating variables such as their attitude strength, whether they tend to counter-argue, and believe their attitudes are superior, are also important to understanding how people engage with counter-attitudinal information (Albarracín & Mitchell, 2004; Brannon, Tagler, & Eagly, 2007).

In addition to selective exposure memory effects, there is some evidence of effects on attentional selection as measured by eye-movements. Recent work showed that people are more likely to fixate political posters they agree with (Marquart, Matthes, & Rapp, 2016). Unlike the memory effects, the majority of this work comes from marketing and advertising research on popular goods (e.g., shampoo), and uses print advertisements. Nevertheless, a person's experience with a brand and their attitude towards it does influence where and how long they look (Ju & Johnson, 2010; Rosbergen, Pieters, & Wedel, 1997; Teixeira, Wedel, & Pieters, 2012). Interestingly, viewers with high brand-involvement view ads longer (Ju & Johnson, 2010), and tend to spend more time on the pictorial content of the ad (e.g., the model promoting the product) than the brand-specific information (typically the text). Together, this work shows how people have increased engagement with attitude-congruent information.

In this study, the construct of selective exposure was treated as presented above. The selective exposure construct of *avoidance* would result in selectively attending only to attitude-congruent information, and as a result have better memory for attitude-congruent information. Conversely, the construct of *tuning-out* (Brock & Balloun, 1967; Jacks & Cameron, 2003) would predict no effect of attitude congruence on attentional selection, but better memory for attitude-congruent information. That being said, selective exposure is a much larger construct, and has been used to describe many more behaviors. This includes things like selective exposure on a more macro scale, where people prefer browsing web articles that they agree with (Knobloch-Westerwick & Meng, 2009). Importantly, research has shown that people will first search for attitude-congruent information but will also search for attitude-incongruent information once they have formed their opinion on the issue. Due to this, more specific constructs have been developed, and one of the most relevant is *selective avoidance* (Jang, 2014; Marquart et al., 2016), which is entirely avoiding attitude-incongruent information. Again, however, the construct of selective avoidance is often times related to macro behaviors of, for example, selecting news stories online or selecting TV channels (e.g., Fox vs. MSNBC). When presented with a video, it is likely difficult to engage in selective avoidance, because the viewer does not have control of the flow of the information presented. However, the viewer could look away from the screen.

Message oriented resistance strategies. There are many resistance strategies that result in people engaging with counter-attitudinal information, which are termed *message-oriented strategies* (Jacks & Cameron, 2003). Some of the more common examples are counter arguing (Abelson, 1959) and attitude bolstering (Abelson, 1959; Sherman & Gorkin, 1980). Counter arguing involves developing counter arguments to the counter-attitudinal information presented, while attitude bolstering involves generating thoughts consistent with one's original attitude. The use of these strategies varies based on the amount of knowledge people have and how personally important they identify with a topic (Jacks & Cameron, 2003). When people have more knowledge on a topic, they are more likely to counter-argue, and when they find it more personally important they are more likely to use attitude bolstering. The extent to which these message oriented resistance strategies influence memory are not clear, but generally it is hypothesized that the more a person engages with counter-attitudinal information to in turn resist persuasion, the better their memory for that counter-attitudinal information will be (Eagly et al., 2000).

One potential reason message oriented resistance strategies result in better overall memory for counter-attitudinal information is that they result in a deeper level of processing (Craik, 2002; Craik & Lockhart, 1972), where *depth of processing* is the amount of cognitive or semantic processing of a stimulus. For example, if a person goes through a list of words they will subsequently have better memory for the words if they complete a task that requires they identify whether each word belongs to a basic level category (i.e., Is the word a type of flower?) versus a shallow level task of indicating whether the word rhymes with another (i.e., Does the word rhyme with crane?) (Craik & Tulving, 1975). Similar effects have been shown using static scenes (Baddeley & Hitch, 2017). Message oriented resistance strategies for political videos necessarily require that a person process the messages presented at a deeper level than a person that does not attend to attitude-incongruent information. As a result, engaging in a message oriented resistance strategy should result in comparatively better memory for that information. Further, a message oriented resistance strategy may require a deeper level of processing for attitude-incongruent information than attitude-congruent information, which would predict better overall memory attitude-incongruent information.

Positive and negative affect. When we are confronted with information we agree or disagree with, it likely results in emotions. Another resistance strategy is to respond to counter-attitudinal information by getting angry or irritated (Jacks & Cameron, 2003). This is not a commonly reported strategy (Jacks & Cameron, 2003), but is nevertheless likely something people experience. Importantly, for the current work, the emotions people feel have been shown to have effects on how people process the information in film (Subramanian, Shankar, Sebe, & Melcher, 2014) and advertisements (Heath, Brandt, & Nairn, 2006; Teixeira et al., 2012), but the positive and negative affect may be inconsistent predictors of memory for politically attitude-incongruent information (Eagly et al., 2000).

Effects on behavior and subsequent memory. An implicit thread that has been running through the description of resistance strategies is that although research on them is often based on self-report measures, their critical importance is that they predict specific real world behaviors. Basic levels at which this behavior can be measured are eye-movements and subsequent memory. The current study is designed specifically to do this. Although self-report resistance strategies were not gathered, the behavioral consequences of resistance strategies on eye-movements and subsequent memory are used to theoretically support the competing hypotheses below.

Social vigilantism

We have all likely at one point or another used the resistance strategies mentioned above. However, we do not all use them at the same rate, and there are personality traits that influence the strategies we use most often (Brannon et al., 2007; Eagly et al., 2000; Hart et al., 2009). One such trait is social vigilantism (O'Dea et al., 2018; Saucier & Webster, 2010; Saucier et al., 2014), which is the tendency to believe that one's beliefs are superior. Additionally, due to one's "superior" beliefs, people high in social vigilantism feel the obligation to impress their views on others to "enlighten" them. Importantly, the SV construct is reliably and validly measured with the Social Vigilantism Scale (Saucier & Webster, 2010). Additionally, the individual differences based on SV generalize across political issues (e.g., sex education in schools, abortion, the war in Iraq, etc.) (Saucier & Webster, 2010; Saucier et al., 2014). Social vigilantism is also a unique measure, that predicts behavior above and beyond other related individual differences including dogmatism, narcissism, need for cognition, reactance, attitude strength (for the issue presented), and argumentativeness (Saucier & Webster, 2010; Saucier et al., 2014).

Given the personality characteristics associated with SV, it makes sense that a person's level of social vigilantism also predicts the resistance strategies they report using (Saucier et al., 2014). Saucier et al. (2014) found that above and beyond a person's attitude strength and argumentativeness, those high in social vigilantism were more likely to counter-argue, have more negative affect, and, to a slightly lesser extent, were more likely to engage in selective exposure. Importantly, the use of these strategies was influenced by the personal importance of the issue. However, the issue for which people report resistance strategy use may have some effect on the strategies used. For example, the above effects mostly held for the specific topic of abortion, except selective exposure was no longer significantly related to level of social vigilantism (Saucier et al., 2014).

Factors Influencing Visual Selective Attention and Subsequent Memory

Directly considering attitude congruence, social vigilantism, and bottom-up effects on eye-movements, how might people engage with and disengage from political media they agree with or disagree with? We know that there are attitude congruence effects on memory, but the effect is often moderated by other factors such as attitude strength (Brannon et al., 2007; Eagly et al., 2000; Hart et al., 2009). Based on these memory effects, an important next question is if early information acquisition through overt attention selection (i.e., eye-movements) accounts for any of the variability in memory. Many of the memory experiments above did not measure behavior at all, and those that did were often reliant of participant self-reports. Conversely, selective exposure experiments that have measured behavior through reading times, eye-movements, and website visits have measures of behavior, but they typically do not have measures of memory. Lastly, the bottom-up features of ads and videos used in previous experiments were not manipulated. As presented in detail below, the current study controls and/or measures these bottom-up features and top-down processes to directly test the interactions between the bottom-up and top-down components of watching political videos.

By controlling and measuring both bottom-up and top-down components, the design allowed for a critical test of the eye-mind assumption, which states that what a person is thinking about will influence where they look (Just & Carpenter, 1980; Reichle, Pollatsek, Fisher, & Rayner, 1998; Reilly & Radach, 2006). The current study tested the bidirectional causal relationship of the eye-mind hypothesis with political videos in two ways. First, the test of participant attitude and social vigilantism on eye-movements tested how the "mind" influences the "eye." Second, testing the relationship between eye-movements and memory tested how the "eye" influences the "mind".

Testing both of these causal relationships is important for the eye-mind hypothesis. If a person uses any resistance strategies we would predict that their attitude and level of social vigilantism will guide where they look. Similarly, the connection between what a person fixates and what they remember is well established (Hollingworth & Henderson, 2002; Loftus, 1972; Pertzov, Avidan, & Zohary, 2009; Richardson & Spivey, 2000; Tatler, Gilchrist, & Land, 2005; Zelinsky & Loschky, 2005). People have better memory for things they fixate. What makes the current design important is that it allows for highly controlled tests of dissociations in the eye-mind hypothesis driven by a person's previously held attitudes and personality. This extends on the small number of studies that have shown dissociations between narrative comprehension and attentional selection (Hutson et al., 2017; Loschky et al., 2015).

When a person attends to information in their environment, they are more likely to encode that information into memory. However, while attending to information is necessary for memory encoding, it is not sufficient for encoding (Smith, Lamont, & Henderson, 2012). This was perhaps most notably demonstrated in the inattentional blindness studies (Simons & Chabris, 1999). In these studies it was found that under certain circumstances people will *not* notice highly improbable events in scenes (e.g., a gorilla pounding its chest among basketball players (Simons & Chabris, 1999), or a clown riding a unicycle in front of a library (Hyman, Boss, Wise, McKenzie, & Caggiano, 2010)). This can occur even when a person directly fixates the agent of the improbable event (Chabris & Simons, 2010; Memmert, 2006). Importantly, one of the potential causes of inattentional blindness is that a viewer's goals influence the visual information that is processed (Most, Scholl, Clifford, & Simons, 2005; Triesch, Ballard, Hayhoe, & Sullivan, 2003). The resistance strategies a person engages in and whether they want to impress their views on others are also goal-directed behaviors (i.e., resist persuasion and impress beliefs) (Jacks & Cameron, 2003; Saucier et al., 2014). As such, even if people look at the same information in a scene, they could nevertheless have different memories of it.

What all this shows is that while there are clear connections between thought and attention that make the eye-mind hypothesis fairly reliable, there are also many ways in which the eye-mind connection can be broken. To test when the eye-mind hypothesis holds up in political videos, the current study measured attitude and social vigilantism (thought), eye-movements (attention), and memory (thought). With these three important sets of measures, the major strength of the study is that it is able to identify if there are breaks in the eye-mind connection, for example, if people look at the same information, but have different memory representations.

A notable case study of fandom effects on memory and attention

Recent work by Huff and colleagues (2017) tested a conceptually similar research question to the current study. Specifically, does a person's fandom (i.e., the soccer team they support) while watching a soccer match influence their attentional selection (gaze coherence throughout the match), perceived event structure (when something new happens during the game), and memory (cued recall for what happened at specific timepoints throughout the match)? Using similar methods to the current study, Huff and colleagues showed no effects of attitude congruence on eye-movements, event segmentation, or memory, and only small effects on memory confidence. Thus, generally, they supported the tyranny of videos to guide viewer attention despite differences in thought. However, one potentially very important effect not discussed in Huff et al. (2017) was a main effect of memory based on fandom, which was indicated to be a better model than the interaction between fandom and memory type. The figure presented shows this effect likely near significance, but the statistics are not reported. As such, there is some evidence that fandom can influence memory generally across all items, but the cause of that memory effect is unknown.

The study was a well-designed, novel test of how fandom (attitude congruence) affects attention, perception, and memory. The results give support to specific predictions of the current work, but the study also makes many extensions beyond Huff et al. (2017) that could lead to unique results. The major difference between the studies is that Huff et al. (2017) was a case study in which a single soccer match was used as the video stimulus. This allowed the authors to test their research questions with a highly ecologically valid stimulus, but it limited the amount of control they had and meant they could not manipulate their stimulus in any way. This is where the major strengths of the extensions of the current work lie.

Chapter 2 - Study Overview

Videos

One major extension of the current work beyond Huff et al. (2017) is the use of multiple carefully controlled videos. These are important because although we cannot manipulate a participant's attitude, we can use videos that vary in the information they present, which creates different levels of the independent variable of attitude congruence. Specifically, the current study presented 4 videos: a non-controversial advertisement that people should nearly universally agree with (control condition), 2 abortion advertisements (Pro-life and Pro-choice), and a debate on abortion with both the Pro-life and Pro-choice sides. Additionally, due to the differences in filmmaking techniques used in advertisements and debates, the videos differ in the extent to which the bottom-up features in the videos are expected to guide attentional selection. Specifically, the advertisements used frequent cuts and typically framed a single point of interest near the center of the frame to guide viewer attention. Conversely, the debate was a single shot (no editing), and had two points of interest, the two debaters, for viewers to look at. Based on the bottom-up features of the videos, the advertisements should have higher attentional synchrony, which would result in more Tyranny of Film when compared to the debate. As such, the results could differ between the advertisements and the debate.

Attitude congruence manipulations. For the Huff et al. (2017) results to generalize to the current study, it would most likely be to the debate, where, similar to a soccer match, both sides of the argument are present and there are few video techniques used to bias viewer attention. The non-controversial ad serves as a control video to test if there are viewing differences based on attitude and social vigilantism that are not related to attitude congruence. Finally, the abortion ads represent a type of video stimulus that was not present in Huff et al.

(2017), in that participants who had a strong attitude on one side of the abortion issue watched an ad that only had attitude-congruent information and an ad that only had attitude-incongruent information. Together these videos allow for strong tests of attitude congruence based on the content presented (non-controversial, only congruent, only incongruent, and both congruent and incongruent).

Bottom-up feature manipulations. The videos used different video making techniques that varied the strength of the bottom-up features to guide attention. The advertisements used techniques such as actor motion, close ups, and editing, which have been shown to strongly guide where people look in a video (Dorr et al., 2010; Mital et al., 2010; Wang et al., 2012). Conversely, the debate is a static shot with no editing, which theoretically should allow participant attitude to have a larger impact on where a viewer will look. Alternatively, when there are two people speaking, viewers will typically follow the conversation by looking at the speaker (Birmingham, Bischof, & Kingstone, 2008; Flechsenhar & Gamer, 2017; Fletcher-Watson, Findlay, Leekam, & Benson, 2008). In a way, this is similar to how people follow the action in a soccer match (i.e., watch the ball and the players close to it) (Huff et al., 2017), or a tennis match (Taya et al., 2012). If people do just follow the conversation, no top-down effects of attitude congruence would be expected.

Attitude Measures

Another important consideration that was not accounted for in Huff et al. (2017) are moderators that have been shown to influence selective exposure effects (e.g., attitude strength, counter arguing, etc.). The current study includes social vigilantism as a moderating variable, which predicts a two-way interaction with attitude congruence.

Eye-movement Measures

The current study used one of the most sensitive eye-trackers available (SR Research EyeLink 1000). This eye-tracker measures participant eye position 1,000 times a second, which allows for temporally very precise measurements of the screen position at the center of a participant's fovea during both fixations and saccades. Spatial precision with the tracker is also very high, with a maximum average error of 0.5^{o} of visual angle. The quality of this data allows for much more precise eye-movement metrics to be used than were possible in Huff et al. (2017), a tradeoff that was made in their study to allow for mass data collection during a live soccer match.

The two eye-movement metrics that benefit most from the quality of data the EyeLink 1000 affords are gaze deviation and area of interest (AOI). Huff et al. did use a gaze deviation analysis, but the less precise eye-movement measures resulted in a coarser overall analysis. Huff and colleagues did not do any AOI analyses, which are among of the most interesting analyses in the current study. An AOI analysis allows the most direct measure of the connection between fixation locations and memory.

Memory Items

Finally, as an extension of much of the work on attitude congruence and memory, the current study has measures of memory for both the pictorial content of the advertisements, and the verbal arguments presented. This is important, because while the verbal arguments are directly relevant to a person's attitude, the visual information is mostly neutral. In other words, without the pairing of the visual information with the arguments, most of it would have no direct connection to the issue of abortion (i.e., it would just be videos of hands or people sitting at a table). Based on this, differences in memory given the type of information could also be expected. For example, if a person engages in selective exposure they could guide visual attention away from the verbal argument intertitles in the ads and not engage in cognitive processing of the auditory debate verbal arguments, but still look at the visuals presented in the video. Conversely, people may try to entirely avoid attitude-incongruent information, which could include looking away from attitude-incongruent videos altogether.

Experiments

The above extensions and improvements to previous work on the effect of attitude congruence on attentional selection and memory were implemented in a series of two experiments. The first experiment tested for memory effects of attitude congruence and social vigilantism. The second experiment added eye-tracking, which allowed for tests of top-down effects on eye-movements and the relationship between eye-movements and memory in political videos.

General Hypotheses

Both experiments in the study have the same 4 theoretically-based competing alternative hypotheses. The specifics of each of these hypotheses for the eye-movement and memory measures are presented with each experiment below.

Tyranny of Film Hypothesis. The null hypothesis in both experiments is *The Tyranny of Film*. The Tyranny of Film predicts that the bottom-up features of the film will guide viewer attentional selection and subsequent memory. Thus, in turn, there will be no room for top-down processes (e.g., attitude congruence) to affect attentional selection or memory. Importantly, the Tyranny of Film could potentially have different effects on attentional selection and memory encoding. Similarly, the study used videos designed to create different levels of attentional synchrony through the bottom-up features, thus the Tyranny of Film could potentially be present for the videos with stronger bottom-up features (i.e., the advertisements), but not the video with weaker bottom-up features (i.e., the debate).

Note that the Tyranny of Film hypothesis is a *meaningful* null hypothesis. It would be very surprising if people do not show top-down effects of attitude congruence and/or social vigilantism given the effects previous work on selective exposure and resistance strategies have shown on memory and eye-movements. However, top-down effects on attentional selection in videos are not a given (Hutson et al., 2017; Loschky et al., 2015; Taya et al., 2012) based on how strongly bottom-up features have been shown to guide attention in video (Dorr et al., 2010; Mital et al., 2010; Smith & Henderson, 2008).

Selective Exposure Hypotheses. Selective exposure generally states that people will tune out or avoid attitude-incongruent information as much as possible. Behavioral effects of selective exposure would be evidenced by a main effect of attitude congruence on attentional selection and memory encoding. Importantly for selective exposure, since it is such a broadly operationalized construct in the literature, there are multiple hypotheses that would fall under the umbrella of selective exposure. These hypotheses are based on the distinction of tuning out information and avoiding information.

***Full Selective Exposure Hypothesis*.** The Full Selective Exposure Hypothesis maps on to information *avoidance*. It predicts that participants will use a strategy to avoid processing as much counter-attitudinal information as possible. At the extreme, this could be participants choosing to quit the experiment once they learn that it is about abortion and counter-attitudinal messages will be presented. But, even if a participant completes the experiment, they could avoid the information presented in other ways such as looking away from the screen during the videos, and randomly clicking response buttons to get through the memory tests.

***Partial Selective Exposure Hypothesis*.** Partial Selective Exposure maps onto *tuning out* attitude-incongruent information. It predicts that participants will try to complete the experiment to the best of their ability, except they will not attend to attitude-incongruent information. This could manifest in a variety of ways. For example, a participant could let the video guide their eye-movements (overt attention), but not deeply process the argument information.

Social Vigilantism Hypothesis. The Social Vigilantism Hypothesis predicts that participants will attend to video content differently depending on the interaction of attitude congruence and level of social vigilantism. People low in social vigilantism will be lower in belief superiority and be less likely to engage in processes that would allow them to impress their beliefs on others (e.g., counter arguing). As a result, low social vigilantism people may be more likely to engage in selective exposure. Conversely, People high in social vigilantism have higher belief superiority and are *more likely* to engage in processes that allow them to impress their beliefs on others. As such, high social vigilantism people may be more likely to engage in a message oriented resistance strategy, which would mean they would be engaging with counter-attitudinal information. As such, they may follow the argument content of a video as the filmmakers intended, resulting in engagement similar to what would be seen with the Tyranny of Film Hypothesis. Beyond this, processing counter-attitudinal messages and resisting them is likely a highly cognitively demanding task, and thus people engaging in this type of strategic processing would be engaging in deeper processing of the information (Craik, 2002; Craik &

Lockhart, 1972). In terms of attentional selection, increased depth of processing through a message oriented resistance strategy could result in more fixations on attitude-incongruent information or longer fixation durations. Additionally, the cognitive processes involved with resistance strategies like counter arguing also likely increase depth of processing after the information is fixated. As a result, for people high in Social Vigilantism, attitude-incongruent information may be processed at a deeper semantic level, which could produce better memory for attitude-incongruent information. This would potentially even result in more attention and better memory than when information is attitude-congruent.

The reason an interaction is predicted, and not a main effect, is that social vigilantism is based on belief superiority. Thus, if a person's attitude is not taken into account, predictions based solely on social vigilantism would be difficult to interpret. Additionally, in its development, social vigilantism was shown to be a unique predictor above and beyond traits like Need for Cognition (Petty, Cacioppo, & Kao, 1984) that could also be argued to influence a person's attention selection and memory encoding.

Research Overview

The goal of the study was to explore the role of naturally occurring, high-level individual differences on attentional selection and memory encoding in social/political videos.

General Methods

The methods presented below apply to both experiments unless otherwise noted.

Participants

Participants were General Psychology students at Kansas State University. Initial experiments with the same study materials conducted by collaborators Don Saucier, Stuart Miller, & Megan Strain indicated that this participant pool has a relatively uniform distribution of attitudes towards abortion (i.e., in a large sample [$N > 100$] there were roughly an equal number of participants who identified as being Pro-choice and Pro-life). Participants received course research credit for their participation in the study. All participants in the Eye movement experiment were screened to have normal or corrected to normal visual acuity using the Freiburg Visual Acuity Test (Bach, 2006), and for color vision deficiencies using a validated web-based test (Kuchenbecker et al., 2004). Institutional Review Board approved informed consent was obtained from all participants for all experiments.

Based on a power analysis (Faul, Erdfelder, Buchner, & Lang, 2009) using the memory experiment data and the study design, the Eye movement experiment was set up to collect data from 144 participants. This was not including participants whose data would be excluded from the analysis (data exclusion procedure explained in Eye tracking experiment methods). Also, it is based on the number of predictors in the experiment, using the rule of thumb that, in Eye movement experiments, 20 participants are needed for each item in a model. As such, there are 3 main predictors in the experiment: Attitude, video/argument content (together attitude and video/argument content make attitude congruence), and Social Vigilantism. For this model there are 3 main effects, 3 two-way interactions, and a three-way interaction. Additionally, 144 participants allowed for a complete Williams Latin Square counterbalancing of the videos and memory question type blocks. The Williams Latin Square was used in the Eye movement experiment, because it was programmed using software that allowed for strict counterbalancing.

The first step of the counterbalancing was to use a Williams Latin Square for the 4 experiment videos (non-controversial, pro-life, pro-choice, and debate), to avoid a viewing order effect. With 4 videos, a complete Williams Latin Square has 24 unique video orderings in which each video is in each position an equal number of times. Next, the memory task blocks were counterbalanced. A memory task block is all the memory questions for a given video (e.g., all the questions for the non-controversial video), thus there are also 4 memory blocks. The memory blocks were counterbalanced to control for the retention interval between watching a video and completing the memory items for that video. This was important because completing the memory items took longer than watching the videos. Based on this, with a fixed memory block order, there would always be a much longer retention interval for the last video watched compared to the first. Additionally, the debate is much longer than the advertisements, so the retention interval for videos seen after the debate would be shorter than videos seen before the debate. As was the case for the videos, the Williams Latin Square for the memory blocks resulted in 24 unique orderings. Fully counterbalancing the 24 video orders and 24 memory block orders would require far more unique pairings than participants needed in the study, thus memory blocks were randomized within the video counterbalancing. Two procedures were used for this based on the number of participants needed (144) and the number of counterbalance combinations. First, to get to 144 participants, the 24 video counterbalance orders were repeated 6 times. Next, a procedure was used to pair up the memory block counterbalance combinations with the video counterbalances. The following procedure was used for the first 96 participants (i.e., the first 4 Williams Squares for the videos). For these counterbalances, the memory blocks were paired up with the memory counterbalances in sets of 6 that corresponded to the first item in the counterbalance (i.e., the non-controversial memory block). In the first pairing, the first video shown and the first memory block shown matched, but due to the counterbalancing the 2nd, 3rd, and 4th videos and memory blocks did not necessarily match. For the next 24 videos the memory block counterbalance was shifted so that the 6 first video counterbalances were paired with the 6 memory block counterbalances that showed the same memory block first, but that were not the first video seen. This was done so that for the first 96 counterbalances, each first video was paired an equal number of times with each memory block type. To prevent the memory blocks from always being presented in the same order, each block of 6 counterbalanced orders were randomized. The same procedure could not be used for the final 48 participants, because it would not allow for an equal number of pairings of the first video and first memory block. Thus, for the last 48 the memory block counterbalances were randomized within 24 videos counterbalances twice.

Materials

Stimuli

Two types of stimuli were developed for the study: videos and memory stimuli.

Arguments. The arguments used in the abortion advertisements and debate were very carefully developed. First, to identify common arguments on each side of the abortion issue, debates and advertisements on abortion were collected to create a pool of arguments. It was from this pool that the most common arguments were identified. Next, arguments on each side of the abortion issue that addressed similar issues were identified, allowing for the development of parallel opposing arguments to use in the abortion videos. Pilot testing identified 5 parallel opposing arguments (Table 1) that were matched as closely as possible on both side of the abortion debate for their strength, persuasiveness, agreement with the argument based on one's attitude, valence, and clarity. The arguments were matched well on each of these criteria except for some deviations on the clarity of the arguments. Two of the Pro-life arguments, marked with * in Table 1 below, were rated below the midpoint on clarity by more Pro-choice participants. They were retained in the experiments because they met all the other qualifications and seemed clearly worded to the experimenters.

Table 1. Full arguments developed for study

	Pro-Choice	**Pro-Life**
1	The point at which life begins has not been established, and since a fetus cannot survive outside the womb prior to 24 weeks, it cannot be treated as a separate life in need of equal protection under the law.	Life begins at conception/fertilization, and as such a fetus should be treated as a separate life in need of equal protection under the law. *
2	Women's right to choose is protected by the constitutional right to privacy.	The legal system may restrict individuals' rights to protect the innocent.
3	Women of all ages choose to have abortions and most do so after careful consideration of their circumstances.	Women who choose to have an abortion are often young and most do not consider the repercussions.
4	Forcing a woman to carry a pregnancy to term against her will is unethical.	Even legal abortions are not safe, and may result in later health risks (e.g., ectopic pregnancy, miscarriage, breast cancer).
5	The rights of the fetus do not outweigh the rights of the woman to choose.	Social support services are available for children, making abortion unnecessary in light of mothers' financial concerns. *

Note. The two Pro-life argument marked with * were rated as not being as clear as the other arguments. They were retained in the experiment, because they met all the other qualifications, and the experimenters thought they were clearly worded.

Videos. There were 5 videos in each study. Four of the videos were experimental, and the fifth video was a practice video. The 4 experiment videos were: non-controversial (control video), Pro-life, Pro-choice, and Debate. All the videos can be accessed at the following link (https://www.youtube.com/playlist?list=PLChGnR0Bh6QWt2mxpwKau3rXk2kk1y1Qx), and a shot-by-shot breakdown of the advertisements is in Appendix A. The 3 videos on the topic of abortion were created for the study, while the non-controversial and practice videos were found online. Although the videos are from different sources, the videos found online were chosen to match the format of the abortion advertisements created for the experiments.

***Non-controversial video*.** The Non-controversial video takes the form of a public service announcement to promote inclusivity and diversity. Specifically, the advertisement states that a person should not put limits on themselves or others because of a disability. Visually, the advertisement is set on a series of steps. A group of people go up and down the steps in different and creative ways (e.g., dancing, jumping over railings, and crab walking).

***Abortion advertisements*.** The Pro-life and Pro-choice abortion advertisements were created using the same format. The visual information was relatively matched in that both videos used shots that focused on the hands of people. The criteria used to evaluate the arguments were also the same (strength, persuasiveness, agreement with the argument based on one's attitude, valence, and clarity). The advertisements used intertitles to present the arguments, and had imagery that by itself would be neutral, but when paired with the arguments would strengthen the arguments being presented.

Each of the ads started with an intertitle that stated the ad was paid for by either a Pro-life or Pro-choice group (i.e., "Kansans for Life" or "Kansans for Choice"). This was done to ensure that participants knew the position the advertisement was going to take before seeing any intertitles or imagery. After the first intertitle, each video had a series of short segments that focused on hands, and then the first intertitles were shown. The sequence of short video segments and intertitles continued throughout each video. At the end of each video, a final intertitle was presented telling the viewer to either “Vote for Choice” in the Pro-choice video or to “Choose Life” in the Pro-life video. Each video used instrumental music in the background. The Pro-life video was 59 seconds long, and the Pro-choice video was 1 minute and 7 seconds. The Pro-choice video was 8 seconds longer because the intertitle text was slightly longer in the Pro-choice video. To accommodate this, the intertitles were shown for slightly longer in the Pro-choice video to ensure participants had time to read the full text.

The originally developed arguments were changed for the advertisements for a number of reasons that all related to creating high quality advertisements that used a common format similar to typical political advertisements. First, the advertisement intertitles needed to be short enough that viewers could quickly read them, thus the original arguments were shortened (Table 2). Although the arguments were shortened, they were written to still convey the main argument of the originally developed arguments. Similarly, the length of the advertisements was a consideration, and thus only 4 arguments were presented in each video.

To create the advertisements, a collaborator and professional video editor took the top 4 arguments from the pilot study and created intertitles for the videos. The visual theme for each video is “Hands,” meaning that each shot in each video focuses on hands of a person. In the Pro-Life video, the majority of hands are those of children doing things like playing with Play-Doh or holding fruit. In the Pro-Choice video, the hands are mostly adult hands doing things like searching on a computer or holding one’s face. Due to this, the visual content in the ads is very similar, but they have a very different valence. The Pro-life ad is designed to show the positives of being a child, and the Pro-choice ad is designed to show the difficulty of making the decision to have an abortion.

Similar to the original arguments, the ads were pilot tested to balance their strength, persuasiveness, agreement with the argument based on one's attitude, valence, and clarity (Miller et al., In prep). Again, the ads were generally well matched on these criteria.

Table 2. Simplified arguments for abortion advertisements. Pro-choice argument 1 above removed and Pro-life 3 and 4 combined.

	Pro-Choice	Pro-Life
1	Women today have the right to accomplish anything	Innocent lives should be protected
2	Women of all ages choose to have an abortion	Abortion is irresponsible and unsafe
3	There are many reasons for choosing an abortion	Life begins at conception
4	The rights of the fetus should not outweigh a woman's rights	Life should be given a chance

Debate videos. For the debate video, two female students from the Kansas State University Forensics team were recruited. Forensics members are trained in public speaking, to present arguments, and to advocate for a position in debates. Thus, these students were highly qualified to effectively present arguments on each side of the abortion issue. The arguments they presented were developed by the research team by expanding on the 5 parallel arguments identified in the pilot study. Both debaters wore similar dress clothes (black blazers with off-white blouses) and sat behind a table (Figure 1). They took turns presenting their arguments, with each turn taking approximately 45 seconds. This resulted in videos of approximately 8.5 minutes. The debate was filmed twice with the debaters switching arguments. This was done for control in case one of the debaters was found to be more persuasive or attention capturing than the other.

Figure 1. Still image from debate video.

Memory items. The memory stimuli were developed to test both recall and recognition memory, and visual and verbal memory (All Memory Experiment Memory Stimuli in Appendix B). The development of the memory tests was based on a survey of the memory literature to identify methods for testing the memory types of interest.

First, free recall memory was of interest, because previous work has shown that it may be more susceptible to top-down effects than recognition memory (Mandler, 2008). For free recall memory, participants were given prompts to recall as much verbal and then visual information as possible, as if they were explaining the video to a friend who did not see it.

Argument recognition memory was tested using an old/new recognition memory test. For this test, items were the arguments from the videos presented either exactly as they were in the video (“Old”), or with a slightly different surface structure (e.g., synonyms used and tense changed), but the same argument (“New”). Participants responded by indicating if the arguments presented were “Original” or “Reworded.”

The visual multiple choice questions asked specific questions about something presented in the video with 4 multiple choice answer items given as options. For the ads, the questions were about something presented (e.g., What type of fruit was shown in the video?), and for the debate they were mostly about specifics of the debaters (e.g., Of the options below, what type of jewelry was the debater on the left wearing?). The location of the correct answer was randomized for each question to remove experimenter bias from the multiple choice item order. As much as possible, relatively small items were chosen for the memory items, which allowed for the creation of areas of interest to use with the eye-tracking data. Together, the visual multiple choice memory items and areas of interest were used to test the relationship between fixations and memory.

Picture recognition items were used in the Memory experiment, but not included in the Eye movement experiment to limit the length of the experiment. They were cut over the visual multiple choice mainly because in a practical sense it did not work well for the debate (details below after description of task). The picture recognition items used an “Old”/”New” design similar to the argument recognition memory but manipulated the left/right orientation of the pictures. Participants responded by indicating whether the images presented were “Original” or

“Mirror Reversed.” The “Original” pictures were presented as they were in the video. The “Mirror Reversed” pictures were left/right flipped from what was shown in the video. For the debate, since a left/right flip would be too easy given there is only one shot in the entire video, an alternative “Old”/”New” manipulation was used. Since the debate was filmed twice with the debaters switching positions, participants were presented with images from both the debate they watched, “Old”, and the other version of the debate “New”. To select the images used, frames in each debate during which at least one debater was making a facial expression or gesture they did not use in the other video were selected. Generally, participants had a very difficult time with this memory measure for the debate. This was likely due to the fact that the debaters used very similar facial expressions and gestures throughout both videos, so the differences in the “Old” and “New” pictures were very small.

Survey questionnaires. A total of three survey questionnaires were used to measure participant individual differences: abortion attitude, need for cognition, and social vigilantism (Appendix C: Full questionnaires). Need for Cognition was dropped from the Eye movement experiment to reduce the length of the experiment, and because it was not a significant predictor in the Memory experiment. The abortion attitude survey is a 5-item measure that asks participants to identify their thoughts on “abortion as a legal medical procedure” on 9-point Likert scales (example Likert anchors are “Bad” and “Good”; “Unnecessary” and “Necessary”). This measure was chosen because 1) it correlates highly with all other abortion attitude scales used in the pilot experiments, and 2) it was the quickest scale for participants to fill out. Need for Cognition was included as a measure in the Memory experiment to serve as a control variable. Specifically, it was predicted that the extent to which a person enjoys thinking and cognitively demanding tasks may also influence their performance on the memory items. If Need for

Cognition did account for differences in performance, this would be independent of attitude congruence and important to account for. To measure Need for Cognition the short form (17 item) survey was used (Forsterlee & Ho, 1999; Petty, Cacioppo, & Kao, 1984) with a 1 (Strongly Disagree) to 9 (Strongly Agree) scale (e.g., I would prefer complex to simple problems). There were no effects of Need for Cognition on memory performance in the Memory experiment, thus it was removed for the Eye movement experiment to reduce the length of the experiment. Lastly, Social Vigilantism was measured using the 14-item measure (Saucier & Webster, 2010) with a 1 (Strongly Disagree) to 9 (Strongly Agree) scale (e.g., “I feel as if it is my duty to enlighten other people”).

Apparatus

The experiments used different apparatus. The Memory experiment was conducted online using a Qualtrics survey, administered through the Department of Psychological Science’s SONA participant system. The Eye movement experiment was conducted in the Visual Cognition Laboratory using two EyeLink1000(plus) eye-trackers. The experiment was presented on 19” ViewSonic Graphics Series G90fb CRT monitors. Chin and forehead rests set a fixed viewing distance of 64 cm, with the screen subtending 31.8° x 24.1° of visual angle.

Design

Procedures

For all experiments, participants first completed informed consent (online form for Memory experiment and hard copy for eye-tracking). Eye-tracking participants then completed visual acuity and color vision tests. Eye movement experiment participants were calibrated on the eye-tracker using a 9-point calibration procedure before starting the experiment. To start each experiment, participants were instructed that they would be presented with a series of questionnaires and videos on social/political issues. The presentation of the questionnaires (abortion attitude, social vigilantism, and need for cognition [Memory experiment]) was counterbalanced, such that some questionnaires were completed before the videos, and some afterwards. This was done to control for potential effects of answering the questionnaires on video viewing behavior, and effects of viewing the videos on how the questionnaires were answered.

After completing the initial questionnaires, participants were presented with the videos. Participants were not informed of the memory questions until after they viewed the videos. When participants know that they will be given a memory task, this has been shown to influence gaze in videos (Castelhano, Mack, & Henderson, 2009; Mills, Hollingworth, Van der Stigchel, Hoffman, & Dodd, 2011).

After all the videos were watched, participants were asked to complete a series of memory tasks. To learn how to do the memory tasks, participants watched a practice video, and then went through practice examples of each memory task type and were given accuracy feedback for each practice question. After going through the practice tasks participants began the experiment memory tasks. Tasks were presented in video blocks, meaning that all the questions for one video were answered before questions for the next video began. The task blocks were presented in a counterbalanced order to help control for primacy, recency, and other order effects. Within each block, the memory questions were presented by type, always starting with the free recall, followed by argument multiple choice questions, then visual multiple choice questions, and finally picture recognition. This order was maintained for two reasons: 1) to reduce the effects of previous memory questions influencing performance on later questions (e.g., picture recognition questions presented before the free recall would likely result in better recall for the pictures presented in the recognition questions), and 2) maintaining a consistent order allows participants to know what type of memory question is coming next, which could potentially reduce participant errors.

A thorough debriefing procedure was developed to ensure that participants understood the study's purpose. The key points were that the purpose of the research was to test how attitude congruence influences how people consume media, and that we have no interest in influencing their particular views. Abortion was chosen simply because it is topic that many people have an opinion on, and there are a fairly equal number of people on each side of the issue (Pew Research Center, 2017). Additionally, participants were explicitly asked not to discuss the study with anyone else to avoid participants coming in knowing about the memory test.

Analyses

Analyses used multilevel models, with exceptions and specifics of the models outlined below. Multilevel models were used for 3 general reasons: 1) control for as much variance as possible in the analyses, 2) to appropriately treat the data as repeated measures by including participant as a random effect, and 3) to allow for generalized modelling when the dependent variable did not meet the assumption of normality. Memory and eye-movement data was analyzed in separate analyses, and also together to test for associations and dissociations between eye-movements and memory.

In the multilevel models, most categorical predictors were effect coded, although there were a few instances in which dummy coding was used to help models converge. The type of coding used is identified in the note for each table. Additionally, in each table, the level of the categorical variable that a parameter estimate is for is indicated by putting the name of the level in parentheses. For example, analyses for the abortion ads often have the video watched, Pro-choice of Pro-life ad, as a predictor. With effect coding, Pro-choice is coded as 1, and Pro-life as -1. Thus, to interpret a regression table with video as a predictor, the parameter estimate for the Pro-choice video is multiplied by 1 in the regression equation, and the parameter estimate is multiplied by -1 for the Pro-life video.

To score the free recall data, a “wisdom of crowds” method developed by Saunders, Bex, Rose, and Woods (2014), was used. In this method the “crowd” is the participants in a condition or group (e.g., Participants who identify as Pro-life or Pro-choice) in the experiment. Since the experiment only uses continuous predictors, to create a “crowd” the data was trichotomized (i.e., the lowest third of scores on the abortion scale are the third of participants with the most Pro-life views.). This “crowd” was used to create a baseline of words recalled (i.e., for the Pro-life ad, which words did Pro-life people use when recalling arguments from the ad?). Once the baseline was created, each participant’s individual free recalls was compared to the baseline to get a Response Score that indicated how well their response matched “the crowd.” This method does not score the overall accuracy of free recall, but tests whether the predictors influence the free recall responses given. To account for this, the response score analyses was run twice, once using a Pro-life baseline and once with a Pro-choice baseline. This helped control for any group differences not related to the specific predictors, such as if one group generally tended to write more regardless of the attitude congruence relationship. Importantly, since the scoring was done by creating a baseline of responses, if there is not enough data to create a large baseline, the Response Scores for all participants will be relatively low. This would create a floor effect that would make it difficult to identify any differences in Response Scores between groups. Two potential reasons for a poor baseline are 1) that there were not enough participants, and 2) that the free recall responses given did not have enough words. Based on the development of scoring algorithm by Saunders et al. (2014), the current experiment participant numbers of 140 or more are high enough. However, as presented below, the average participant response length was lower than is needed to calculate Response Scores in the Memory experiment. Additional measures were taken to increase the length of responses in the Eye movement experiment (described in detail below).

Given the limitations of the response score analysis using the participant responses as a baseline, for the debate, response scores were also calculated using the debate script. This was done on a turn by turn basis, meaning response scores were calculated for each time a debater spoke (e.g., Pro-choice debater turn 1, Pro-life debater turn 1, Pro-choice debater turn 2, etc.). Using this scoring method will show how well participant free recall responses strictly matched what was presented in the debate.

Data cleaning. All data was cleaned by removing data points that were outside the bounds of what is typically considered possible for a given measure. There are a number of criteria that could be used to create cutoffs based on how liberal or conservative a researcher wants the cutoffs to be. For example, a very liberal fixation duration lower bound (i.e., a cutoff that would potentially remove meaningful eye-movement data) would be an estimate of how much processing time is needed to use the information at fixation to plan and execute a saccade. Estimates for this range from 150-250 ms (Rayner, Slowiaczek, Clifton, & Bertera, 1983; Salthouse & Ellis, 1980). A more conservative lower cutoff for fixation durations, which was used for the current study, is to use the minimum processing time needed to identify an image. In scene gist experiments, it is frequently found that participants are able to categorize scenes at an above chance level after only 40 ms of processing time (Bacon-Mace, Mace, Fabre-Thorpe, & Thorpe, 2005; Fei-Fei, Iyer, Koch, & Perona, 2007; Loschky et al., 2007). Based on this, a cutoff of 40 ms was used as a conservative lower bound for fixation duration cleaning. Conversely, for the upper bound, if a fixation is longer than 3 seconds, it is much more likely that there was tracker error, than the participant actually looked at the same location for 3 seconds. Previous researchers have removed fixations durations greater than 600 ms (Unema, Pannasch, Joos, & Velichkovsky, 2005), and the current cutoff is used to remain conservative. Importantly, using this type of cleaning avoids arbitrarily removing data points because statistically they are an outlier. A statistical outlier could nevertheless be a real and meaningful behavior by a participant. Importantly, these cutoffs are based on previous work, none of which used videos.

For the free recall data, two steps of data cleaning were carried out. First, participants that did not give answers, or wrote that they did not remember anything from a video were removed before the baseline was created. Second, any participant that gave fewer than 5 words in their response was removed from analyses. These criteria were chosen as conservative cut-offs to remove participants that did not follow the instructions to recall as much information from the videos as possible.

Chapter 3 - Memory Experiment

Methods

Participants

There were 235 participants who completed the online Memory experiment. Participants were recruited from Introduction to Psychology courses at Kansas State University and received research credits for their participation. The reason for the high number of participants, was that the experiment was split into an advertisement experiment (118 participants, ages 18-41 [*M* = 19.8, *SD* = 3.1], 57% female, 86% identified as white) and a debate experiment (117 participants, ages 18-50 [*M* = 20.5, *SD* = 5.2], 56% female, 80% identified as White). The experiment was split to keep its length under an hour and a half.

Materials

Stimuli

The stimuli used are the same as those described above. All participants completed the abortion attitude, Social Vigilantism , and Need for Cognition (Petty et al., 1984) scales. In the advertisement experiment participants watched each of the advertisements created for the experiment (Non-Controversial Ad, Pro-life ad, Pro-choice ad). In the debate experiment they watched one of the debate videos. Participants completed free recall memory (verbal and visual), and the three recognition memory types (Argument recognition, Picture recognition, and Visual Multiple Choice). Similar to the Williams Latin Square counterbalancing presented above, the memory block of each video was randomized to control for primacy, recency, and other order effects. The randomization was done through the experiment software (Qualtrics), because it is not possible to input strict counterbalancing.

Apparatus

Participants completed the experiment online using their personal computer. Specific limitations of this are discussed after the results. The experiment was programmed in Qualtrics, and participants accessed the experiment through the Department of Psychological Science's participant portal (SONA).

Analyses

A series of analyses were run for the different memory measures. Effect coding was used for categorical variables, and continuous predictors were centered to test interactions. The random effect structure for all analyses included the participant and question. Additionally, for the signal detection analyses, the memory item type ("New" or "Old") was included as a slope effect. The random effect structures used for each analysis were identified by comparing the AIC values of competing random effect models (e.g., only letting the participant intercept vary) before entering the predictors into the models (Burnham & Anderson, 2004). To use AIC values, the procedure is to select the model with the lowest AIC value, because that is the model that is most likely to fit the data. For selection purposes, if AIC values for two models differ by 3 units or more, the lower value model is considered to be more likely. If the two best models had AIC values within 3 units of one another, the degrees of freedom were used to select the best model, with models that had fewer degrees of freedom being more likely to generalize to the population. To test the best fixed effect structure, the same procedure was used for each memory item type. First, the simplest possible model with only the individual difference main effects was run. The next model also included video or argument type which allowed for tests of attitude congruence (i.e., the interaction of video or argument type with attitude). Then a model was run that included all possible interactions of the individual difference measures. If the best model had higher than a 3-way interaction, any interpretations of that model are made with the limitation that such complex models are typically difficult to replicate.

All models run used multilevel modeling, but the distribution assumed changed based on the outcome variable. The free recall response scores are mostly normally distributed, and thus a general multilevel model was used. An important note, for multilevel models that assume a normal distribution, the analysis used does not return a *p*-value, because the developer of the analysis package does not want to include *p*-values until he is confident the mathematics behind them is entirely correct (Bates, 2006). Due to this, the *t*-values reported are used as effect sizes to interpret the results. There are not well-established guidelines for using *t*-values as effects sizes. For this experiment, a priori guidelines were set for interpreting the *t*-values to allow for fair comparison between the analyses in the document. *t*-values less than 2 were considered very small, 2 – 3 were small, 3 – 5 were moderate, and anything above 5 was large. Argument and Picture recognition memory allowed for Signal Detection analyses, in that there were an equal number of valid ("Old") and invalid ("New") memory items and participants indicated whether each item was "Old" or "New." For the Signal Detection analyses, a binomial multilevel model with the probit link function was used (Wright & London, 2009). For the Signal Detection analyses, results are reported for sensitivity (*d'*) and bias (*c*). Sensitivity is the ability to distinguish between "Old" and "New" items. Bias indicates the probability a response will be given, "Old" or "New," independent of sensitivity. Signal Detection was not used for the Visual Multiple Choice, because there were 4 answer choices for each memory item (multinomial). Based on this, participant accuracy (correct-incorrect) was used as the outcome variable, using a logistic multilevel model. In the results tables below, the main effect of “Item Type (“Old”/”New”)” is sensitivity, and the model intercept is bias. Importantly, the positive and negative signs bias (c) values are flipped from what they should intuitively be, because of how they are calculated in the model. Positive bias values correspond to an “Old” bias and negative values correspond to a “New” bias.

Results

Full study results overview

Throughout the results sections for Experiments 1 and 2 there are many analyses reported, and it can be difficult to keep track of results reported and the hypotheses supported for each analysis. To aid with this, a master summary table has been created to convey the main results of each analysis in a single location for reference (Table 3). The master summary table although very large, is an austere representation of the study’s results. It shows the experiment an analysis was for, the type of measure (eye movement or memory), the dependent variable, which video condition the analysis was for, the main independent variables in the in the analysis, a short verbal description of the result, the *t* or *z* value for the analysis accompanied by an asterisk to indicate of the analysis was significant or not, and which hypothesis was supported by the analysis. Additionally, at the beginning of each results section, the subsection of the master summary table for that section is presented to show the overall trend of results for the analyses to be presented.

To briefly summarize the results in the table, the Memory Experiment showed support for both the Tyranny of Film, Social Vigilantism, and some general top-down effects. Going into the Eye Movement Experiment, there was again a fair amount of support for the Tyranny of Film and other stimulus based effects, and subtle yet reliable general top-down effects along with some support weak support for the Social Vigilantism Hypothesis. Importantly, this general top-down effect was not initially hypothesized, because the original top-down effect hypotheses were based on attitude congruence effects. The subsequent memory analyses showed many of the same effects as the eye movement analyses, and the eye movement and memory analyses showed that eye movement behavior predicted memory behavior.

Table 3

Experiment	Measure	DV	Video	IV(s)	Effect	*t or z*	Hypothesis Supported
Memory Experiment							
	Memory						
		Argument Recognition (SDT)					
			Non-controversial	-	-	-	Tyranny of Film
			Abortion Ads	Attitude, SV, & Video	Attitude congruence and SV trend (Sensitivity)	-1.76	Social Vigilantism
			Debate	Attitude & Argument Type (PC or PL)	Attitude x Argument Type (Bias)	2.89 *	Top-down (Indiv. Diff.)
		Visual Recognition (SDT)					
			Non-controversial	Attitude & SV	Arch (Sensitivity)	-2.59 *	Top-down (Indiv. Diff.)
			Abortion Ads	Attitude & SV	Attitude: Positive Slope (Sensitivity) Arch (Sensitivity)	2.58 * -1.07	Top-down (Indiv. Diff.)
			Debate	-	-	-	Stimulus Effects

	Visual Multiple Choice					
		Non-controversial	-	-	-	Tyranny of Film
		Abortion Ads	Attitude, SV, & Video	Attitude congruence and SV	-2.33 *	Social Vigilantism
		Debate	-	-	-	Stimulus Effects
	Free Recall					
		Non-controversial	-	-	-	Tyranny of Film
		Abortion Ads	-	-	-	Tyranny of Film
		Debate	Attitude, SV, and Recall Type (Verbal or Visual)	Arch (Verbal Only)	2.15 *	Top-down (Indiv. Diff.)
Eye Movement Experiment						
Eye Movements						
	Fixation Durations					
		Non-controversial	Attitude, SV, & Visual Type (Verbal/Visual)	Attitude: Positive Slope	2.2 *	Tyranny of Film Top-down (Indiv. Diff.)
				Arch (Visual Only)	0.8	Top-down (Indiv. Diff.)

	Abortion Ads	Attitude, SV, Video (Pro-choice/Pro-life) & Visual Type (Intertitle/Visual)	Congruence (Pro-choice only)	-2.0 *	Social Vigilantism
	Debate	Attitude & SV	Attitude: Positive Slope Arch	1.9 -1.5	Top-down (Indiv. Diff.)
Saccade Lengths					
	Non-controversial	Attitude & SV	Attitude: Negative Slope U Shape	-2.18 * 1.82	Top-down (Indiv. Diff.)
	Abortion Ads	-	-	-	Tyranny of Film
	Debate	-	-	-	Stimulus Effects
Gaze Deviation					
	Non-controversial	Attitude & SV	Attitude: Negative Slope U Shape	-2.76 * 1.04	Top-down (Indiv. Diff.)
	Abortion Ads	Attitude & SV	Attitude: Negative Slope U Shape	-2.49 * 1.67	Top-down (Indiv. Diff.)
	Debate	Attitude, SV, & Current Speaker	Congruence and SV	4.10 *	Social Vigilantism Top-down (Indiv. Diff.)

	Area of Interest					
		Non-controversial	Attitude, SV, & AoI Type	AoI Type (Fixate Inside AOIs)	-35.99 *	Tyranny of Film
				Arch (AOIs Only)	-2.26 *	Top-down (Indiv. Diff.)
		Abortion Ads	Attitude, SV, & AoI Type	AoI Type (Fixate Inside AOIs)	-14.85 *	Tyranny of Film
				Arch (AOIs Only)	-1.93	Top-down (Indiv. Diff.)
		Debate	Attitude, SV, & Current Speaker	Fixate Current Speaker	35.20 *	Stimulus Effects
				Arch (Mouth AOI)	-1.99 *	Top-down (Indiv. Diff.)
Eye movements and Reading						
	Content Word Fixations					
		Non-controversial	Attitude, SV, & Intertitle Order	Arch (First Intertitle)	1.94	Top-down (Indiv. Diff.)
		Abortion Ads	Attitude, SV, & Video (PC/PL)	Congruence	4.42 *	Selective Exposure
				Congruence & SV (PL Participants)	-1.69	Social Vigilantism
	Intertitle Fixation Durations					
		Non-controversial	-	-	-	Stimulus Effect
		Abortion Ads	-	-	-	Stimulus Effect

	Intertitle Dwell Time					
		Non-controversial	Attitude & SV	Attitude: Positive Slope	2.19 *	Top-down (Indiv. Diff.)
				Arch	-1.33	
		Abortion Ads	-	-	-	Stimulus Effect
	Regressions					
		Non-controversial	-	-	-	Stimulus Effect
		Abortion Ads	-	-	-	Stimulus Effect
Memory						
	Argument Recognition (SDT)					
		Non-controversial	Attitude & SV	U Shape (Sensitivity)	2.30 *	Top-down (Indiv. Diff.)
		Abortion Ads	Attitude & SV	Arch (Sensitivity)	-1.37	Top-down (Indiv. Diff.)
		Debate	Attitude & SV	U Shape (Sensitivity)	3.40 *	Top-down (Indiv. Diff.)
	Visual Multiple Choice					
		Non-controversial	Attitude & SV	SV: Negative Slope	-2.18 *	Top-down (Indiv. Diff.)

		Abortion Ads	Attitude & SV	Arch	-1.59	Top-down (Indiv. Diff.)
		Debate	-	-	-	Stimulus Effects
	Free Recall (Verbal)					
		Non-controversial	Attitude & SV	Attitude: Negative Slope	-2.93	Top-down (Indiv. Diff.)
		Abortion Ads	Attitude & SV	Arch	-1.64	Top-down (Indiv. Diff.)
		Debate	Attitude & SV	Arch	-4.80 *	Top-down (Indiv. Diff.)
	Free Recall (Visual)					
		Non-controversial	Attitude & SV	Arch	-2.40 *	Top-down (Indiv. Diff.)
		Abortion Ads	Attitude & SV	Arch	-2.46 *	Top-down (Indiv. Diff.)
		Debate	Attitude & SV	Arch	-2.44 *	Top-down (Indiv. Diff.)
Eye movements and Memory						
	Visual Multiple Choice & AOI					
		Non-controversial	-	-	-	-
		Abortion Ads	AoI Fixated	Positive Slope	2.43 *	EM -> Memory
		Debate	AoI Fixated	Positive Slope	2.98 *	EM -> Memory

Argument Recognition (SDT) & AoI					
	Non-controversial	Proportion Words Fixated	Positive Slope (Sensitivity)	0.99	EM -> Memory
	Abortion Ads	Proportion Words Fixated	Positive Slope (Sensitivity)	1.99 *	EM -> Memory
	Debate	Proportion Speaker Dwell Time	Positive Slope (Sensitivity) Negative Slope (Bias)	2.11 * 3.90 *	EM -> Memory
Recall and Gaze Deviation					
	Non-controversial	Attitude, SV, & Gaze Deviation	Attitude, SV, & Gaze Deviation Interaction	2.49 *	EM -> Memory
	Abortion Ads	Attitude, SV, & Gaze Deviation	Attitude, SV, & Gaze Deviation Interaction	2.19 *	EM -> Memory
	Debate	Gaze Deviation	Positive Slope	2.93 *	EM -> Memory

Recall (Script Scoring) and AoI Dwell Time					
	Debate (Current Speaker)	Dwell Time	Positive Slope	2.08 *	EM -> Memory
	Debate (Non-speaker)	Dwell Time	Negative Slope	-2.47 *	EM -> Memory

Note. When an * is reported next to a *t* or *z* value, this denotes the reported effects was significant. For the Hypotheses, when the hypothesis is reported, this is the hypothesis there was support for. There are three hypotheses in the table not presented initially as a hypothesis. Stimulus Effect is support for bottom-up effects driven by the stimulus, when the stimulus does not have features that create attentional synchrony (e.g., editing) and subsequent Tyranny of Film. Top-down (Indiv. Diff.) is for individual differences effects that did not include attitude congruency. Lastly, EM → Memory is for eye movement behavior predicting memory performance. If there were no significant effects to report, the cells for that analysis in the table are reported as "-". For the eye-movement and memory analyses, there was not a meaningful null hypothesis. Thus, if the null was not rejected, the hypothesis is marked with a "-".

Individual Difference Scores

For the ads Memory experiment, the average abortion attitude score was 4.89 (*SD* = 2.82), Social Vigilantism was 4.98 (*SD* = 1.22), and need for cognition was 5.28 (*SD* = 1.06) (Figure 2). Each measure was on a scale of 1-9. For the debate experiment, the average abortion attitude score was 4.51 (*SD* = 2.58), Social Vigilantism was 5.12 (*SD* = 1.07), and Need for Cognition was 5.29 (*SD* = .98). Generally, this indicates that each individual difference measure had the expected distribution. Social Vigilantism and Need for Cognition had roughly normal distributions. Abortion attitude was trimodal. The majority of participants identified as being either strongly Pro-life or Pro-choice, and there was a smaller group of participants that indicated they had no strong attitude one way or the other. Importantly, there were roughly an equal number of participants identifying as Pro-life and Pro-choice. One important analysis consideration is that due to Social Vigilantism and Need for cognition having normal distributions, model estimates for the poles of these distributions (1 or 9) have more error than estimates at the center where there are more participants. This is the reason that in many of the figures with SV for both experiments, the error bars are larger at the ends of the distribution.

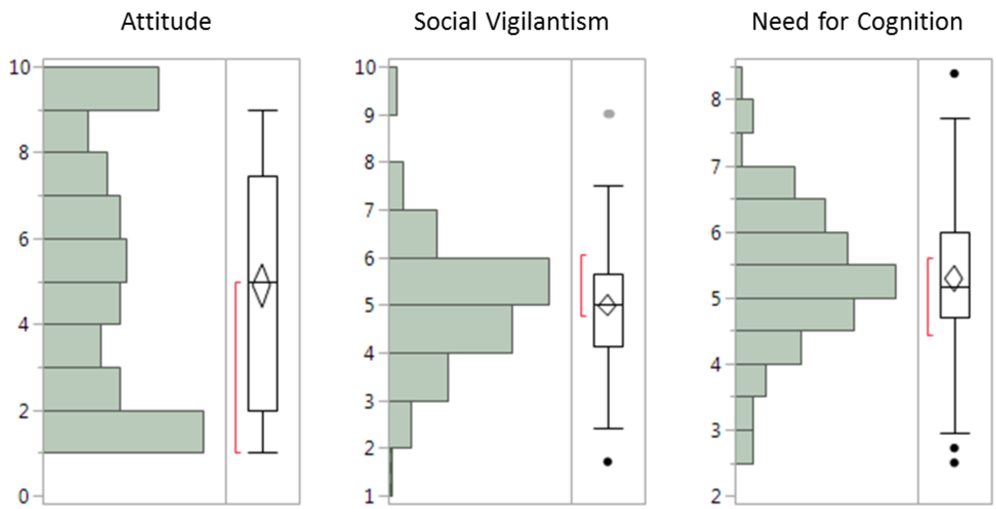

Figure 2. Distributions and box plots for the individual difference measures (Attitude [left], Social Vigilantism [center], and Need for Cognition [right]).

It is important to note that in multilevel models the outcome variable is assumed to be normal, unless the distribution is designated to be something else (e.g., logistic). Conversely, no such assumption is made about the predictor variables. This means that even though abortion attitude does not have a normal distribution, it can nevertheless be entered in models without transforming or trichotomizing.

Memory

Non-controversial advertisement. The Non-controversial ad was the control video, thus any attitude effects on sensitivity and bias affects are important. If people have memory differences based entirely on attitude (i.e., without regard to the content of the video they are watching), these differences should be considered when interpreting attitude congruence effects.

The Non-controversial ad was shown to participants in both the Ad and Debate Memory experiment, so the experiment a participant was in (Ad or Debate) was also used as a predictor.

This was done to control for any effects watching one type of video or the other might have on memory for the Non-controversial ad.

Argument Recognition Memory. The best model included attitude and social vigilantism as predictors, but neither of these influenced sensitivity (d') or bias (c). Overall, for the Non-controversial video argument questions participants were not sensitive, but they showed a strong "Old" bias ($c = .56$, $z = 9.17$, $p < .001$). Thus, participants typically did well for "Old" items, but performed well below chance for "Reworded" memory items (i.e., they falsely judged the reworded items to be the original items). These results do not reject the Tyranny of Film hypothesis, but this was expected for the Non-controversial (control) video.

Visual Recognition Memory. Surprisingly, given this was the Non-controversial ad, the best model based on AIC included the interaction of the three individual difference predictors (Attitude, Social Vigilantism, and Experiment [Ad or Debate]) with memory item type ("Old/Mirror reversed") and the main effect of the experiment (Table 4). Overall, participants were sensitive to the memory items (d' = .95), and Pro-choice participants showed better overall sensitivity. However, the interaction of attitude and SV influenced sensitivity. For people high in SV, Pro-life participants were more sensitive than Pro-choice. This relationship reversed for people low in SV, where Pro-choice participants were more sensitive than Pro-life participants (Figure 3).

What these results show is that even when a video is not on the topic of abortion, a person's attitude towards abortion and their level of social vigilantism can have an effect on their picture memory. Additionally, the experiment a person participated in influenced their overall bias, but not their sensitivity, nor did experiment interact with attitude. Overall, this result does reject the Tyranny of Film hypothesis, but does not support any of the alternative hypotheses.

This is because all of the alternative hypotheses include attitude congruence. It is important to consider these effects when interpreting the Picture Recognition memory for the abortion ads and debate.

Table 4

Summary of Multilevel Logistic Signal Detection Analysis for Non-controversial Ad Picture Recognition Memory

Variable	*B*	*SE(B)*	*t*	Sig. (*p*)
Intercept (Bias)	.25	.18	1.40	.16
Item Type (Sensitivity)	.95	.37	2.59	.009
Attitude	.002	.01	.15	.88
Social Vigilantism	-.01	.03	-.42	.67
Experiment (Ad)	.08	.04	2.23	.03
Item Type x Attitude	.08	.04	2.18	.03
Item Type x SV	.06	.08	.70	.48
Attitude x SV	.001	.01	-.10	.92
Item Type x Attitude x SV	-.07	.03	-2.59	.009

Note. The intercept of the model is the overall bias (c). Positive c values indicate an “Old” bias. Item Type shows the overall sensitivity (d’) to the memory items. Variables without “Item Type” (Attitude, Social Vigilantism, Experiment, and Attitude x SV) show that variables adjustment to bias. Interactions with Item Type show adjustments to sensitivity.

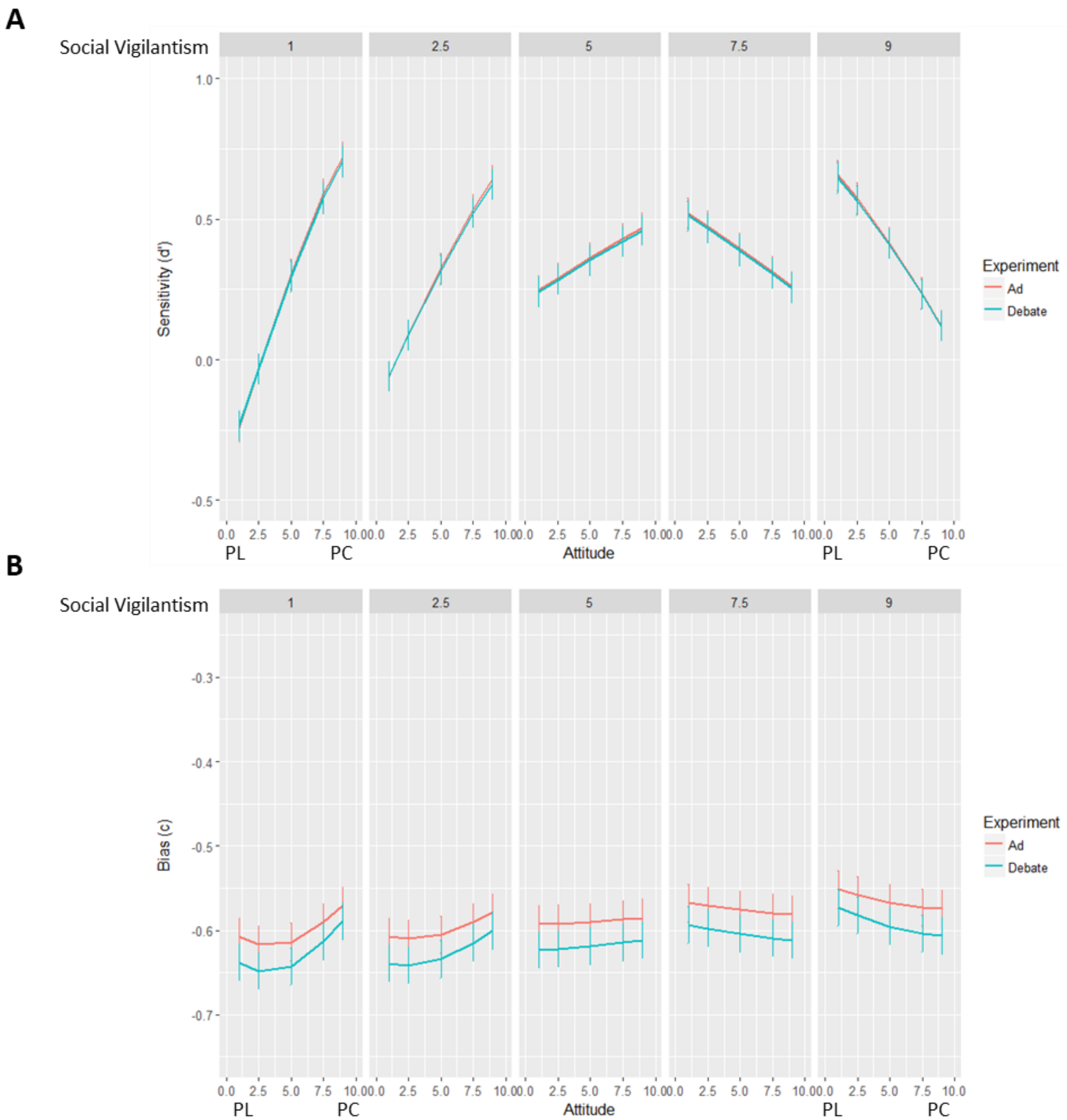

Figure 3. Signal detection analysis for Non-controversial visual recognition questions. A) The Y-axis is the sensitivity (d') to the memory items. The X-axis is attitude PL = Pro-Life, PC = Pro-Choice (1 = most Pro-life; 9 = most Pro-choice). The blue line is for the Debate Experiment, and the red line is for the Advertisement Experiment. The panels labeled at the top of the graph are cross sections of the Social Vigilantism measure (1 = Very low in Social Vigilantism; 9 = Very high in Social Vigilantism). B) The Y-axis is the predicted bias (c). All other axes are the same as for A. Attitude on the X-axis, Social

vigilantism for the panels, and the lines are the Debate Experiment (Blue) and Advertisement Experiment (Red). Error bars are 1 standard error.

Visual Multiple Choice. As expected, the three individual difference variables in the accuracy model showed no significant differences (p's > .05). The performance predicted by the model was relatively low, 38%, but significantly above chance performance (25%).

When taken together, the results of the recognition memory items for the Non-controversial ad were mostly consistent with our expectation that the individual differences in abortion attitude, NFC and SV would not have an effect. There was one exception in that for visual recognition memory there were effects of attitude and SV. These effects are considered when interpreting results based on attitude congruence.

Free recall. The free recall data was scored using the Saunders et al. (2014) scoring algorithm that returns a Response Score based on how well a participant's response matches the responses given by all other participants in a baseline. The quality of the match is based on whether the words a given participants used in their response match the words in the baseline, with more weight given to words that occur more in the baseline. This free recall scoring algorithm is relatively new, which means that the typical range of scores one should expect are unknown. However, the average Response Scores presented below seem relatively low, but within the bounds of what an expected score would be based on the data presented in Saunders et al. (2014).

Initially, these the two sets of participants (Ad experiment and Debate experiment) were analyzed separately. Overall, the two sets of data returned similar results. The only significant effect for both groups of participants was the type of recall (Verbal or Visual). Thus, the data for the Non-controversial ad for both experiments were combined to report general trends found.

Overall, there were no effects of the individual difference measures on free recall scores (*p*'s > .05). The lack of an effect of individual differences for the Non-controversial ad shows that there were no systematic differences in our participants' free recall when the video content was something non-controversial. Based on this, effects on free recall in the controversial videos can be attributed to the relationship between participants' individual differences scores and the content of the video. As can be seen in Figure 4, the one effect that did come out was that participants tended to have better recall for the visual information ($M = 5.39$, $SD = 1.97$) in the ad than the arguments presented ($M = 3.54$, $SD = 1.65$) ($b = -.93$, $t = -15.43$, $p < .001$). The likely reason for this is simply that there is more visual information in the Non-controversial ad than verbal. As such, this is likely support for the Tyranny of Film.

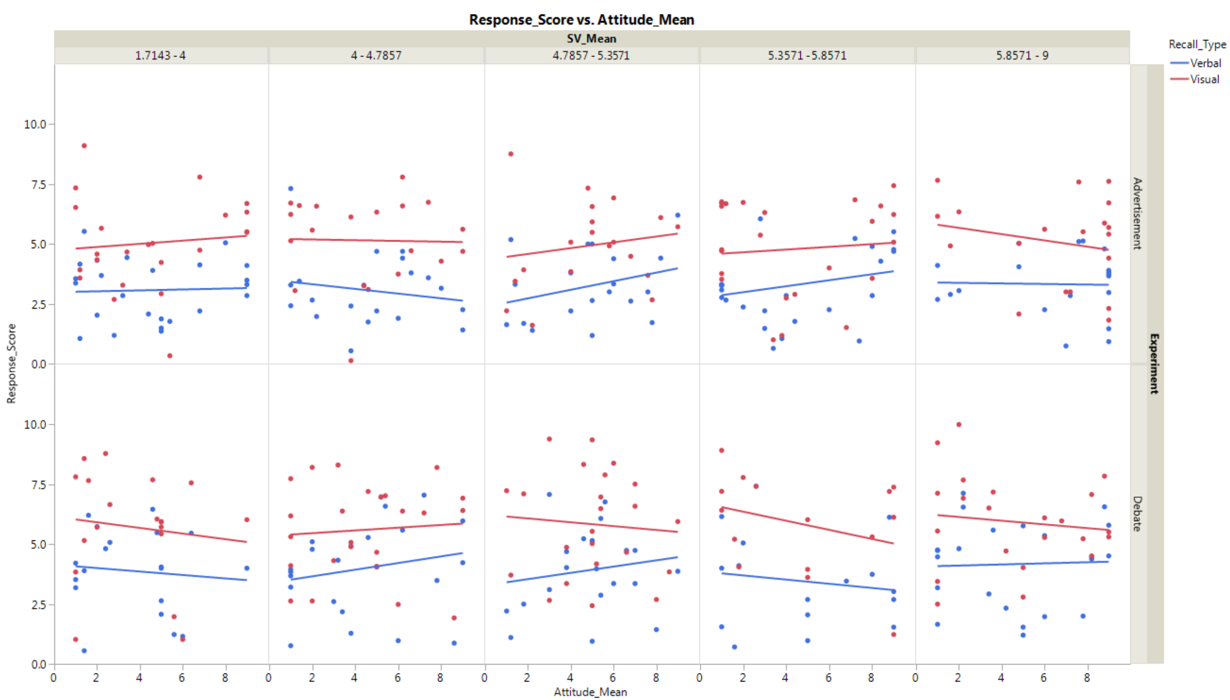

Figure 4. Non-controversial ad free recall. Response Score as predicted by attitude mean (Low scores = more Pro-life; High scores = more Pro-Choice). The vertical panels are divisions based on social vigilantism (1 = low, 9 = high). The top half is for participants from the advertisement experiment, and

the bottom half those in the debate experiment. Lastly, the red lines are for visual recall, and the blue are for verbal.

When taken together, the memory results for the Non-controversial control ad were mostly consistent with the expectation that the individual differences in abortion attitude, SV, and Need for Cognition would not have an effect. There was one exception in that for picture recognition memory there were effects of abortion attitude and SV. These effects are considered when interpreting results based on attitude congruence. Additionally, what appears to have been generally low free recall response performance based on the work presented in Saunders et al. (2014), may have been driven by low word counts (*M* = 24.9 words; *SD* = 16.7). Saunders et al. (2014) did not report the average length of the responses in the data they used to test the scoring algorithm, but their instructions to participants were to first use multiple sentences to describe a video clip and to then also report any additional details they thought were important. Based on this, participants in their experiment would have likely written 3 or more sentences for each video they watched. If each sentence had at least 10 words, their lowest expected average would have been 30 words, but it could have also been much higher. The free recall data for each video presented below appears to be relatively low compared to what Saunders et al. (2014) asked their participants for, thus the low word counts are a potential issue that came up throughout the Memory experiment, but were addressed in the Eye movement experiment.

Abortion Advertisements.

Argument Recognition Memory**.** As with the non-controversial ad, model comparisons showed that the only significant effect was the “Old” bias, with participants more likely to indicate that memory items presented had appeared in the video ($c = -.61$, $z = 5.39$, $p < .001$). Although none of the individual difference measures were significant, there was a trend toward an interaction of attitude congruence and social vigilantism on sensitivity (*d'* = -.04, *z* = -1.76, *p* = .08) in the predicted direction for the Social Vigilantism hypothesis. The trend of the interaction was that participants low on social vigilantism tended to show better sensitivity for the attitude-congruent video, but participants higher on social vigilantism tended to show better memory for the attitude-incongruent video. Again, this interaction was not significant, but was trending in support of the Social Vigilantism hypothesis that SV would moderate the effect of attitude congruence on argument recognition memory. This trend is consistent with results presented below.

Visual Recognition Memory. As noted above, visual recognition showed a number of attitude and SV effects for the Non-controversial video. Some of these effects were found again for the abortion advertisements. The best model included Item Type, Attitude, and SV—there were no attitude congruence effects. Overall, there was an "Old" bias, and participants were moderately sensitive to the memory items (*d'* = .79) (Table 5). Interestingly, as participants indicated being more Pro-choice, they were also higher in sensitivity.

Table 5

Summary of Multilevel Logistic Signal Detection for Abortion Ad Picture Recognition Memory

Variable	*B*	*SE(B)*	*t*	Sig. (*p*)
Intercept (Bias)	.46	.08	5.60	< .001
Item Type (Sensitivity)	.79	.16	4.80	< .001
Attitude	.0004	.009	-.04	.97
Social Vigilantism	.03	.02	-1.45	.15

Item x Attitude	.05	.02	2.58	.01
Item x SV	-.06	.05	-1.22	.22
Attitude x SV	-.01	.007	1.41	.16
Item x Attitude x SV	-.01	.01	-1.07	.28

Note. The intercept of the model is the overall bias (c). Positive c values indicate an "Old" bias. Item Type shows the overall sensitivity (d') to the memory items. Variables without "Item Type" show that variables adjustment to bias. Interactions with Item Type show adjustments to sensitivity.

Visual Multiple Choice. The two best models for the visual multiple choice questions based on AIC values included 1) participant attitude x video (i.e., attitude congruence) and 2) participant attitude x video x social vigilantism. The second model was chosen, because it was more descriptive of the data in that it qualified the interaction in the first model (Table 6). The interaction, displayed in Figure 5, shows the same relationship as the trend found for argument memory. The pattern of effects was that higher levels of SV were associated with better memory for attitude-incongruent content. This pattern is especially clear for the Pro-life video, for which, at low levels of SV, participants who were more Pro-life showed better memory, and, at high levels of SV, participants who were more Pro-choice showed better memory. Although this pattern was not as pronounced for the Pro-choice video, the same general trend was found. Namely, at lower levels of SV, participants who were more Pro-choice had better memory for the Pro-choice video, but the slope did not reverse direction at higher levels of SV. Based on the attitude congruence and SV interaction, this analysis shows support for the Social Vigilantism Hypothesis. As described above, however, the data is not a perfect fit for the hypothesis due to the effect being driven more by the interaction for the Pro-life ad than the Pro-choice.

Table 6

Summary of Multilevel Logistic for Abortion Ad Visual

Multiple Choice Memory

Variable	*B*	*SE(B)*	*z*	Sig. (*p*)
Intercept	-.26	.23	-.94	.349
Attitude	.02	.02	.90	.367
Social Vigilantism	-.01	.06	-.23	.816
Video (Pro-choice)	-.33	.23	-1.47	.141
Att. x SV	.02	.02	1.10	.271
Att. x Video	.04	.02	2.20	.028
Video x SV	.07	.05	1.5	.134
Att. x SV x Video	-.03	.01	-2.33	.020

Note. Describes model for predicted accuracy for the Visual Multiple Choice Memory questions. The continuous variables were centered for the interaction. Video was effect coded (Pro-choice = 1; Pro-life = -1).

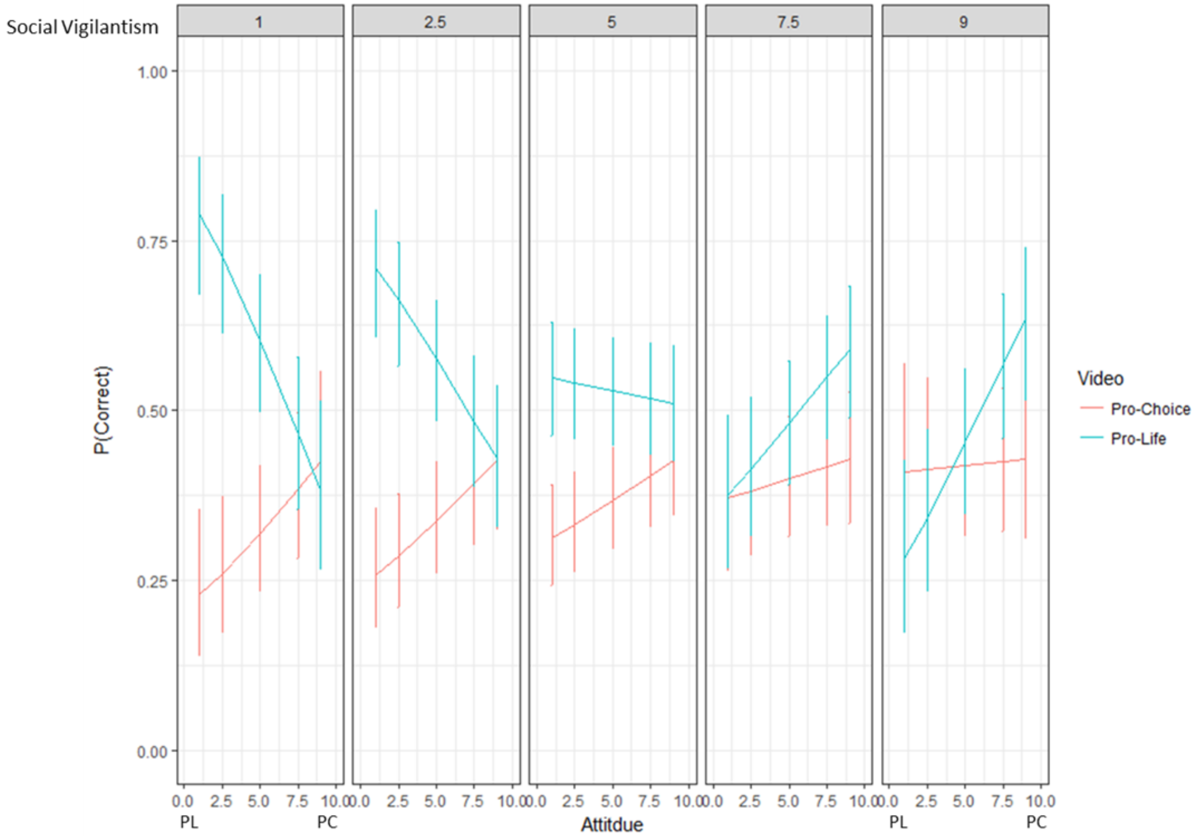

Figure 5. Abortion ads' visual multiple choice. Y-axis is predicted accuracy. The X-axis shows abortion attitude (Low scores = more Pro-life; High scores = more Pro-Choice). The panels labeled at the top of the graph are cross sections of the Social Vigilantism measure (1 = Very low in Social Vigilantism; 9 = Very high in Social Vigilantism). Error bars are 1 standard error.

Free recall. The multilevel model showed that there were no significant effects of the individual difference measures or recall type (Verbal or Visual) on memory performance. Figure 6, however, shows a significant interaction of recall type (Verbal vs. Visual) and Video (Pro-life vs. Pro-choice) with participants overall doing better for visual content for the Pro-life video, and verbal content for the Pro-choice video ($b = .21$, $t = 4.95$, $p < .001$). As with the non-controversial ad, this result indicates that the video may have an effect on overall recall score for a given type of information. The most important takeaway here is that there was not a significant effect of attitude congruence on free recall memory. However, there is an important caveat that participants gave relatively short recall responses (*M* = 19.4; *SD* = 15.2), which inevitably makes it more difficult for the free recall scoring system to identify differences. By comparison, for the practice video the example recall responses for the verbal and visual information that all participants saw had 64 and 97 words respectively. These examples were developed in lab while research assistants piloted the experiment, thus participants in the experiment should theoretically be capable of writing similar responses. In the work testing this free recall scoring algorithm, Saunders et al. (2014) needed approximately 60 responses per group (with a categorical design) to show effects of visual acuity loss on recall performance, although testing indicated groups as small as 12 could return reliable results. Additionally, participants were instructed to give multiple sentence responses. In the current experiment, participants were removed if they gave a short response (5 words or less) that did not refer to the video shown (i.e., “I don’t remember the video”). After creating the baseline, the largest baseline group had 39 participants. Based on all the above, the lack of an effect could be the result of either attitude congruence not having an effect on free recall, or effects could be hidden by a measure not sensitive enough to pick up on differences in the limited responses for this experiment. This issue with short free recall responses was addressed in the Eye movement experiment.

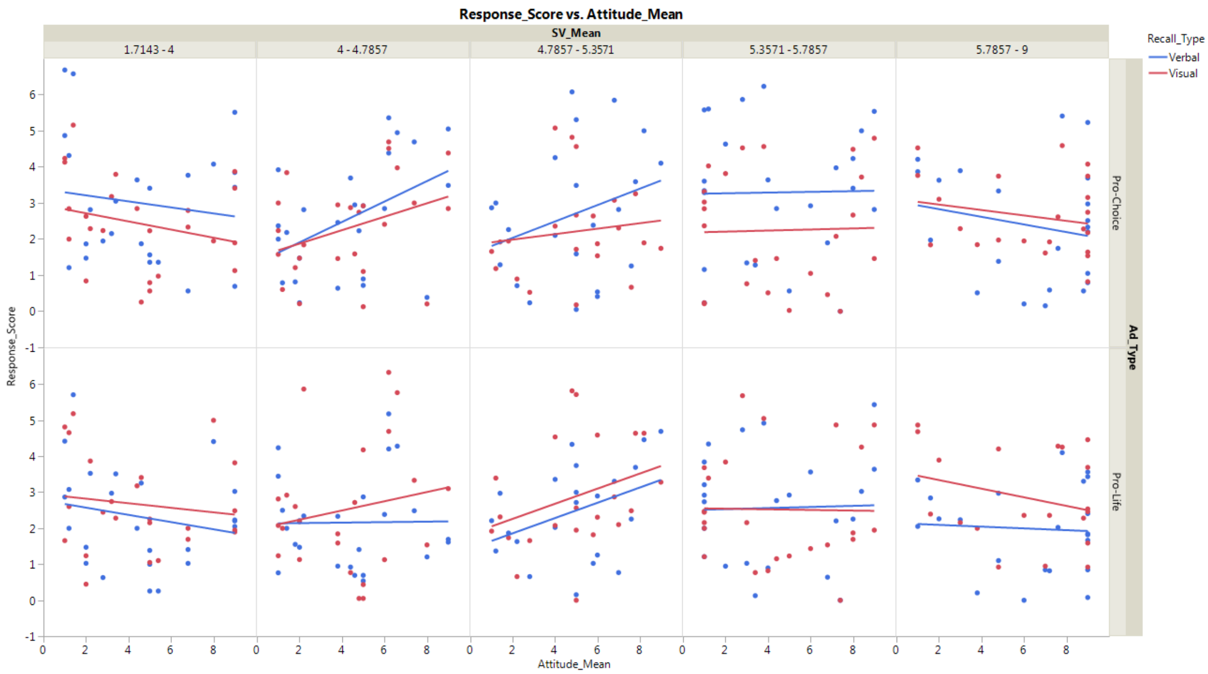

Figure 6. Abortion ads free recall. Response Score as predicted by attitude mean (Low scores = more Pro-life; High scores = more Pro-Choice). The vertical panels are divisions based on social vigilantism (1 = low, 9 = high). The top half is for participants from the advertisement experiment, and the bottom half those in the debate experiment. Lastly, the red lines are for visual recall, and the blue are for verbal.

Abortion ad preliminary discussion. The most interesting trend that emerged from the abortion ad memory questions was that social vigilantism moderated the effect of attitude congruence on memory performance. Namely, people lower in SV tended to do better on attitude-congruent items, while those higher in SV tended to do better on attitude-incongruent items. This effect was only significant for the visual multiple choice questions, but the Argument Recognition items trended in the same direction. It is interesting that SV moderated the effects of attitude congruence for questions based on visual information and trended for argument questions, but not for the picture recognition questions. One potential reason for this, based on Mandler's (2008) dual process model of recognition memory, is that immediate picture recognition memory operates at a perceptual level (Langley, Cleary, Kostic, & Woods, 2008) that may not be affected by top-down processing. Future work could test this assumption by making larger perceptual changes to the recognition test images (e.g., adding/removing objects, changing the color of objects, using “New” items that were not in the videos, etc.). Nevertheless, we found a significant effect of attitude on argument recognition memory, which is assumedly a top-down effect, so we do not have a clear explanation for the visual recognition memory results for the ads.

Debate Video.

Argument Recognition Memory. Model tests showed “Old”/”New” x Attitude x Argument Type to be the best predictors (Table 7). Importantly, the best model did not include social vigilantism. Generally, there was an “Old” bias. Also, participant sensitivity was statistically above 0, but relatively low (d' = .19). Additionally, all participants performed better on the Pro-choice items, regardless of attitude congruence. Of more interest, bias was influenced by attitude congruence (Argument Type x Attitude) (Figure 7b). The bias was for participants to have a stronger “Old” bias for attitude-congruent information. Thus, if they agreed with a statement presented, they were more likely to say it was something they had read in the ad, regardless of whether they had actually done so. This could be the result of a response bias, which would suggest that the memory differences were not occurring while participants watched the videos but were the result of biases while participants answered the Argument recognition memory questions. However, a memory bias could also be due to effects on the retrieval process. Thus, these results are inconclusive as to which hypothesis they support. There were attitude effects, which would potentially support one of the alternative hypotheses – most likely selective exposure in this case. However, since the effect was on bias, if the effects were occurring after participants watched the video, this would not exclude stimulus driven memory effects.

Table 7

Summary of Multilevel Logistic Signal Detection for Debate Argument Memory

Variable	*B*	*SE(B)*	*z*	Sig. (*p*)
Intercept (Bias)	.21	.04	5.92	< .001
"Old"/"New" (Sensitivity)	.19	.08	2.36	.02
Attitude	-.005	.01	-.48	.63
Argument Type (Pro-choice)	-.02	.04	-.49	.63
"Old"/"New" x Attitude	.0002	.02	.006	.99
"Old"/"New" x Argument	.23	.07	3.30	< .001
Argument Type x Attitude	.03	.01	2.89	.004
"Old"/"New" x Attitude x Argument	.004	.02	.21	.84

Note. The continuous variables were centered for the interaction. Video was effect coded (Pro-choice = 1; Pro-life = -1). The intercept of the model is the overall bias (c). Positive c values indicate an "Old" bias. Item Type shows the overall sensitivity (d') to the memory items. Variables without "Item Type" show that variables adjustment to bias. Interactions with Item Type show adjustments to sensitivity. Argument Type was effect coded (Pro-choice = 1, Pro-life = -1)

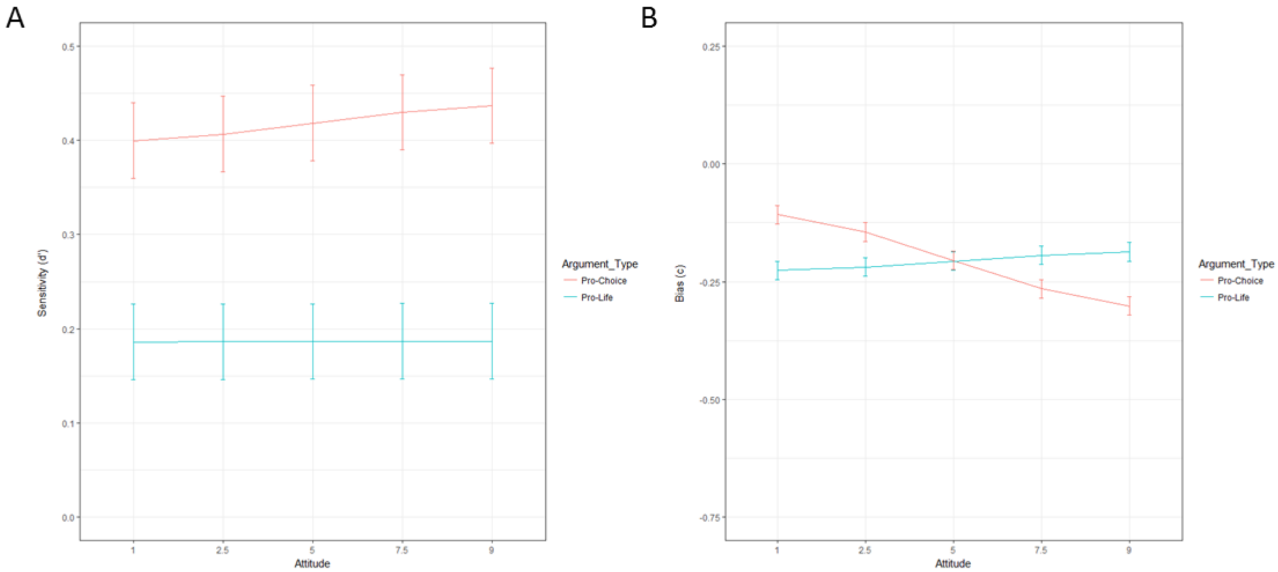

Figure 7. Abortion debates' argument signal detection analysis. A) The Y-axis is the models predicted sensitivity (d') at each level of the independent variables. The X-axis is attitude (1 = most Pro-life; 9 = most Pro-choice). The red line is for Pro-choice arguments, and the blue line is for Pro-life. B) The Y-axis is the models predicted bias (c) for each level of the independent variables. The X-axis and lines are the same as figure A. The X-axis is attitude (1 = most Pro-life; 9 = most Pro-choice). The red line is for Pro-choice arguments, and the blue line is for Pro-life. PL = Pro-Life, PC = Pro-Choice. Error bars are 1 standard error.

Debate visual recognition and visual multiple choice. The best models for the visual recognition and visual multiple choice questions did not show effects based on any of the individual difference measures (*p*'s > .05) for the debate video. Overall, the effects found did show that there were some dissimilarities between the debaters and potentially also the videos. The visual recognition memory results showed that overall there was an "Old" bias (c = -.20, z = 2.80, p = .005). Additionally, although it was not the best model, there was some evidence that sensitivity varied between the videos (d' = .30, z = 2.98, p = .002).

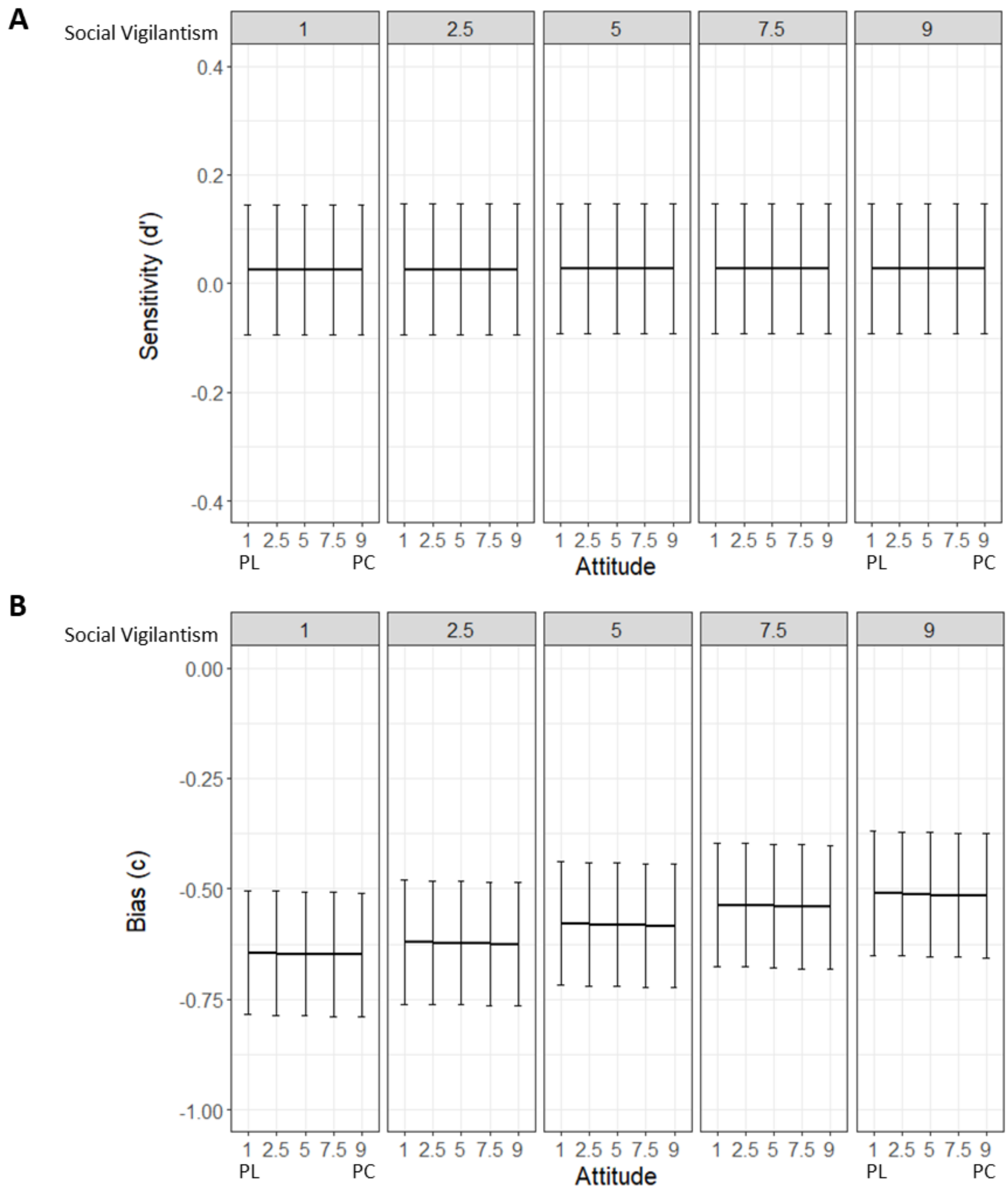

Figure 8. Debate video Visual Recognition Signal Detection Analysis. A) The Y-axis is the sensitivity (d') to the memory items. The X-axis is attitude (1 = most Pro-life; 9 = most Pro-choice). The panels labeled at the top of the graph are cross sections of the Social Vigilantism measure (1 = Very low in Social Vigilantism; 9 = Very high in Social Vigilantism). B) The Y-axis is the predicted bias (c). All other axes are the same as for A. Attitude on the X-axis, and

Social Vigilantism for the panels. PL = Pro-Life, PC = Pro-Choice. Error bars are 1 standard error.

For the visual multiple choice questions (Figure 9), performance was better for the debater on the left ($b = .31$, $z = 3.83$, $p < .001$) regardless of video (i.e., which side of the abortion issue they were arguing), and visual multiple choice was better for questions about the debaters than for the background information ($b = .94$, $z = 2.60$, $p = .009$).

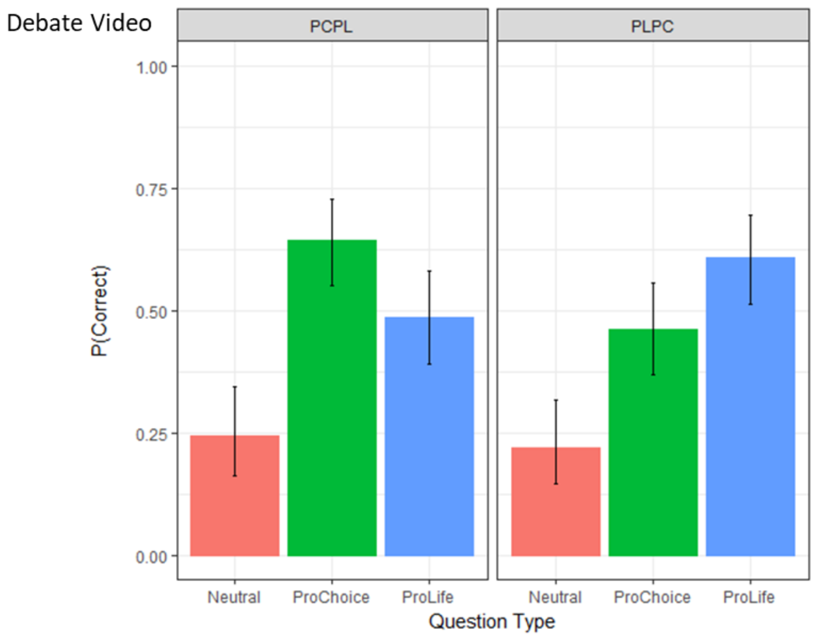

Figure 9. Debate video Visual Multiple Choice predicted performance. Y-axis shows predicted accuracy. X-axis is the what video feature the multiple choice question was about (Pink = Neutral or Background information, Green = the Pro-choice debater, and Blue = the Pro-life debater). The two panels are for the 2 debate videos (PCPL = the video with the Pro-choice speaker on the left, and PLPC is the video with the Pro-life speaker on the left). Error bars are 1 standard error.

Free recall. The response scores for participants who watched the debate video were analyzed using a multilevel model with Attitude, Social Vigilantism, and Type of Recall (Verbal vs. Visual) as fixed effects. Participant was included as a random effect to treat this as repeated measures data, because participants did both recall types. Data was first analyzed using Pro-life participants as the baseline group for the word similarity scorer. None of the individual difference main effects were significant (p's > .05). There was a main effect of recall type (b = 1.48, t = 7.38, p < .001), with participants overall doing better on verbal recall (M = 9.84, SD = 5.23) than for visual recall (M = 7.02, SD = 3.25). Importantly, there was also a significant interaction of Attitude, Social Vigilantism, and Recall Type (b = -.15, t = .2.15, p = .034). The interaction (Figure 10) shows that for visual information recall there was essentially no difference based on attitude or social vigilantism. For verbal information, at low levels of SV, participants who were more Pro-choice scored higher, but at high levels of SV, participants who were more Pro-life scored higher. Importantly, this relationship is based on the Pro-life baseline, which, if there are differences in recall responses based on attitude, should be similar to Pro-life participants. However, at low levels of SV, it was participants that were more Pro-choice that showed that highest response scores with the Pro-life baseline. Interestingly, when the analysis was rerun with a Pro-choice baseline, the three-way interaction was no longer significant, but it trended in the same direction (b -.12, t = .07, p = .071). In other words, Pro-choice participants low in SV generally tended to have higher response scores, and participants who were more Pro-life high in SV tended to have higher response scores. Thus, this effect was found regardless of the baseline used.

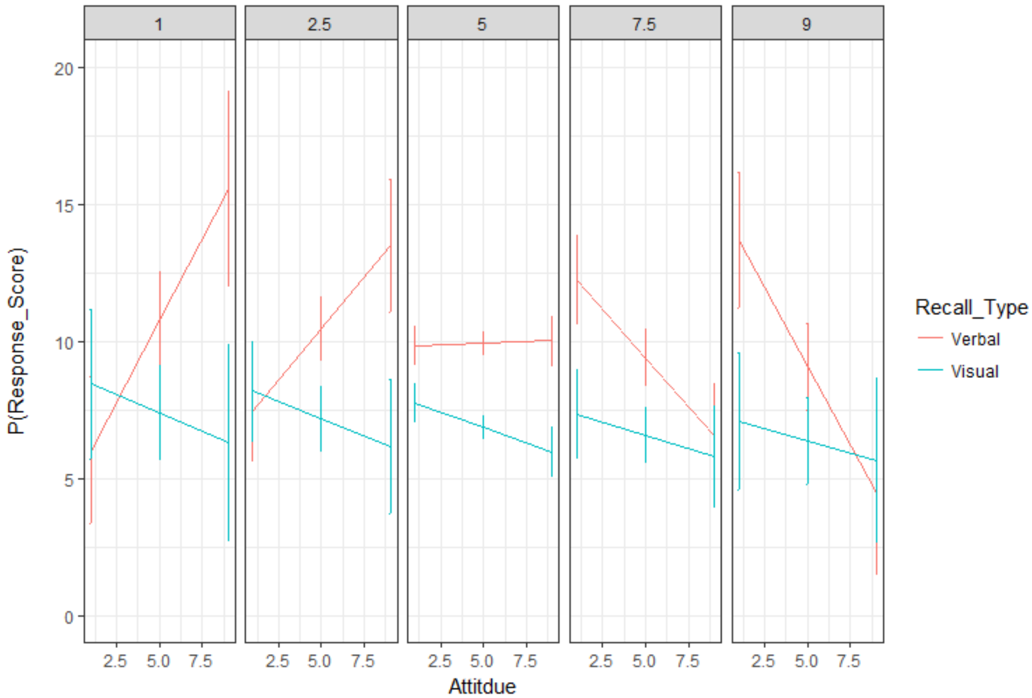

Figure 10. Debate video free recall (scored using Pro-life respondents' data as the baseline). Predicted response score by attitude (Low scores = more Pro-life; High scores = more Pro-Choice). The panels show social vigilantism (1 = low, 9 = high). There is little effect of the predictors on visual recall (blue line). Verbal recall (red line) changes direction as SV increases, with Pro-choice participants scoring higher at low levels of SV, and Pro-life participants scoring higher at high levels of SV. Error bars are 1 standard error.

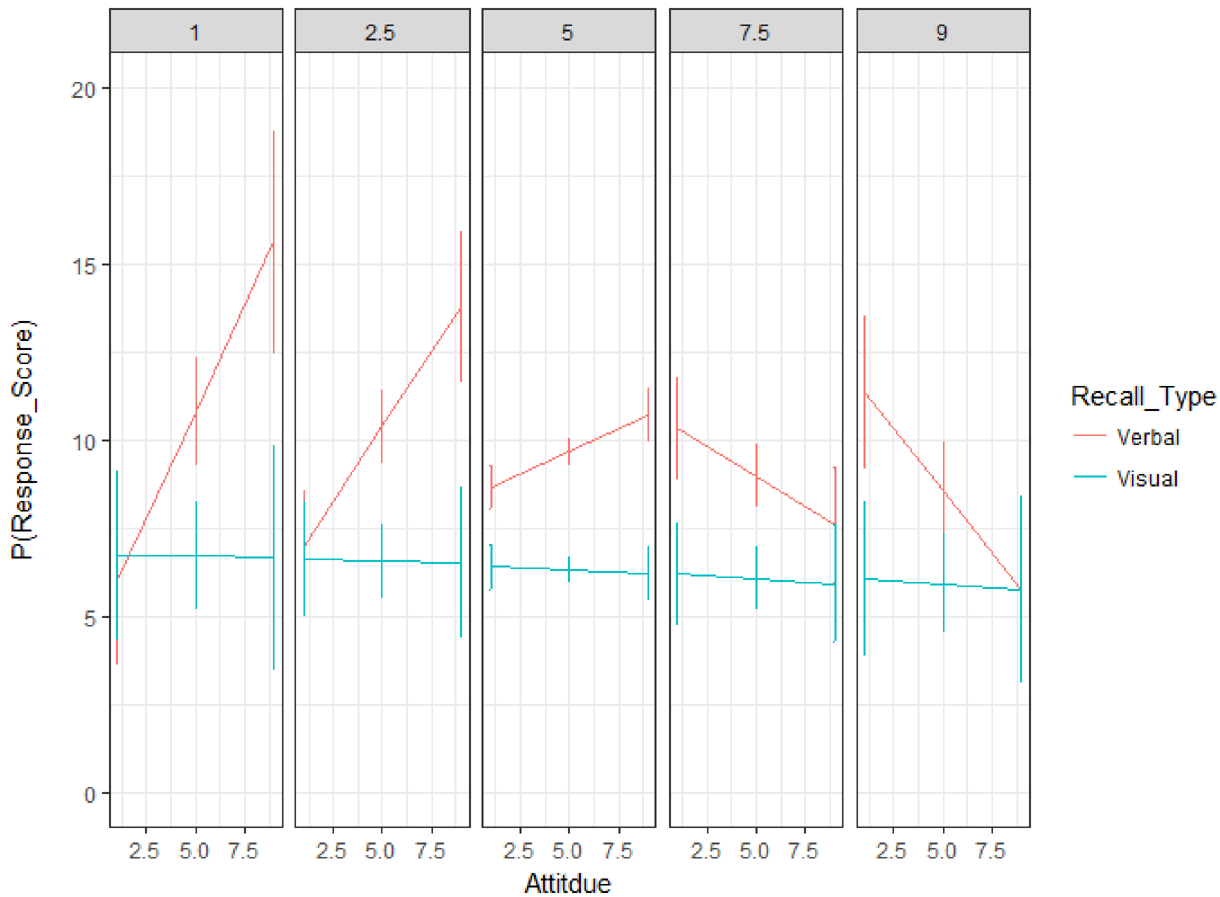

Figure 11. Debate video free recall (scored using Pro-choice respondents' data as the baseline). Predicted response score by attitude (Low scores = more Pro-life; High scores = more Pro-Choice). The panels show social vigilantism (1 = low, 9 = high). There was little effect of the predictors on visual recall (blue line). Verbal recall (red line) changes direction as SV increases, with Pro-choice participants scoring higher at low levels of SV, and Pro-life participants scoring higher at high levels of SV. Error bars are 1 standard error.

To further investigate this effect, a generalized multilevel model with a Poisson distribution was run on word count in free recall responses (i.e., the number of words a participant wrote in their response). Word count does not rely on a baseline. The model used the same fixed and random effects as that for response scores. For word count, recall type was still significant ($b = .32$, $z = 31.38$, $p < .001$), with longer responses for the verbal recall than the visual recall. There was a significant interaction of attitude and recall type ($b = .03$, $z = 8.30$, $p < .001$), with participants who were more Pro-choice giving longer responses. Lastly, the three-way interaction of attitude, social vigilantism, and recall type was again significant ($b = -.03$, $z = -8.27$, $p < .001$). Figure 12 shows that the relationship for word count is very similar to that for response scores. Namely, for people low in SV, Pro-choice participants were more likely to give longer verbal responses. For people high in SV, Pro-life participants were more likely to give longer verbal responses.

The debate free recall shows that there were effects of attitude and social vigilantism on recall performance, but that these are independent of attitude congruence. This indicates that Pro-life and Pro-choice participants treat the content differently based on their level of social vigilantism. This is an overall effect and is not specific to only congruent or incongruent information, for example, high SV, Pro-life participants recalling more Pro-life information (or vice versa).

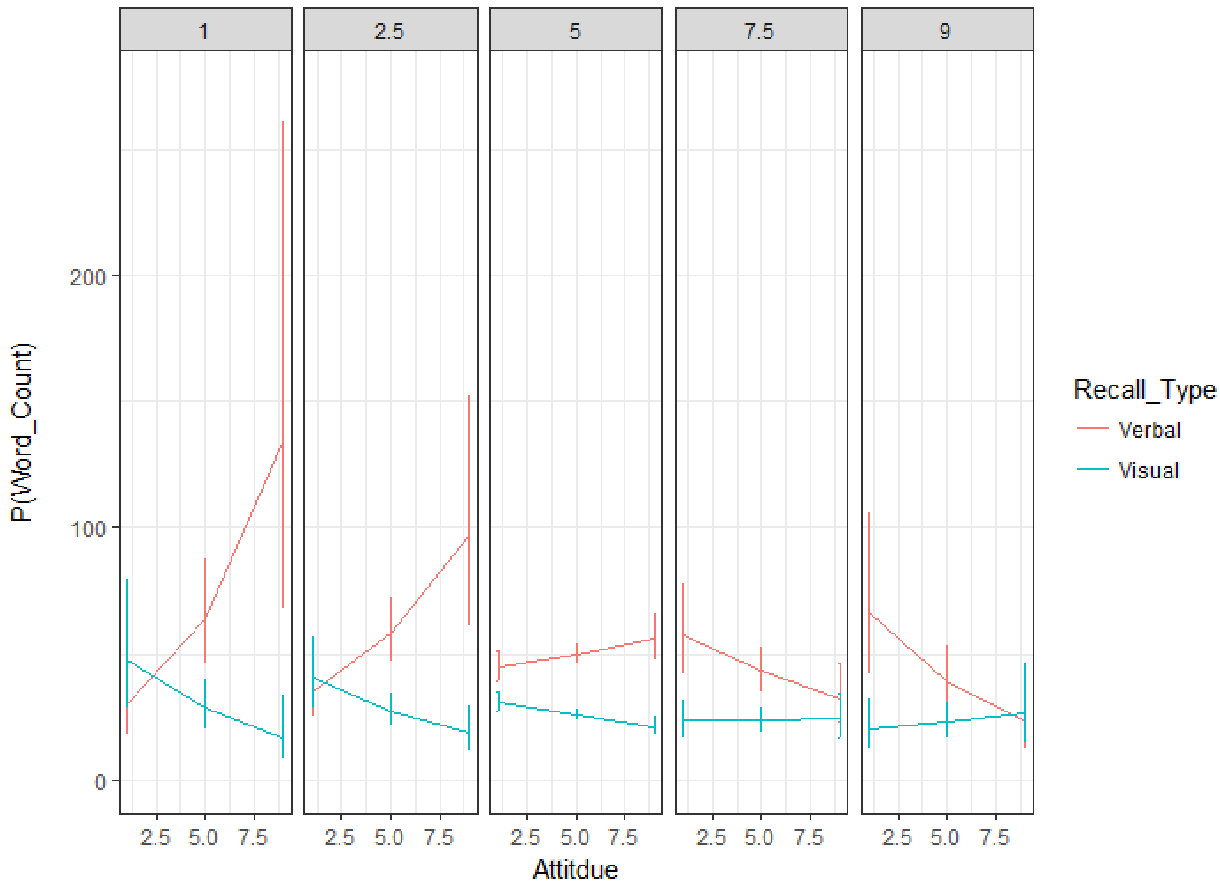

Figure 12. Debate video free recall word count. Predicted word count by attitude (Low scores = more Pro-life; High scores = more Pro-Choice). The panels show social vigilantism (1 = low, 9 = high). There was little effect of the predictors on visual recall (blue line). Verbal recall (red line) changes direction as SV increases, with Pro-choice participants predicted to use more words at low levels of SV, and Pro-life participants using more words at high levels of SV. Error bars are 1 standard error.

Debate preliminary discussion. For the debate recognition and multiple choice questions, there was an effect of attitude congruence on bias for the argument recognition questions. However, this effect was only for the argument questions, and there were no other individual difference effects for the other memory question types. Although there were no individual difference effects for the other memory item types (visual recognition or multiple choice), both visual memory question types did show other significant effects, indicating they were sensitive to differences. Thus, the lack of individual difference effects is not likely due to the items being insensitive to memory differences.

One potential reason that the debate did not show individual differences effects on visual memory is that the debate video was much longer (approximately 8 minutes) than the ads used (about 1 minute), and the visual information did not change during the debate. With such a long video and so little change in the visual information, even if there were differences in viewer attention, participants likely still attended to both debaters for a relatively long time.

Another important note for the debate is that social vigilantism did not show effects on recognition memory, and in the debate the SV effect was independent of attitude congruence with the baseline. As the selective exposure literature has shown, once a person has engaged with the information they agree with, they are more likely to then consume counter-attitudinal information (Knobloch-Westerwick & Meng, 2009). In the debate, as the debaters took turns presenting their arguments, participants may be willing to listen to each side of the debate, because they know they will agree with approximately half of the debate. As a result, regardless of participant attitude, participants might recall information from both sides of the debate, which would explain why there was not an attitude congruence effect.

Memory Experiment Discussion

Both attitude congruence and social vigilantism influenced memory for political videos, but the presence of an effect varied with the video type (advertisement vs. debate) and memory type (argument recognition vs. visual multiple choice). First, let us consider the results for the non-controversial ad, which was included in the study design as a baseline condition against which to compare the controversial topic videos. Surprisingly, viewers' visual recognition memory showed differences based on their attitudes and their level of social vigilantism. This was shown in the finding that participants who were more Pro-choice were more sensitive for visual recognition memory items (which was also found for the abortion ads). However, this attitude effect did not interact with attitude congruence. Thus, the non-controversial ad showed top-down effects of attitude and social vigilantism, an individual difference variable, on memory, even for a non-controversial topic that was, assumedly, unrelated to their attitude.

Of key importance for the current study, the abortion ad results showed effects of both attitude and social vigilantism, consistent with the social vigilantism hypothesis. Namely, at higher levels of social vigilantism, participants showed better memory for attitude-incongruent information. This effect was strongest for the Visual Multiple Choice measure, and somewhat less so for Argument Recognition. Together these findings indicate effects of attitude congruence, social vigilantism, and their interaction on memory for politically controversial content.

We did not find much of an effect of attitude congruence, social vigilantism, or their interaction for viewers' memory for the debate video. This difference in memory results due to difference in information presentation format is consistent with our hypothesis that different political media formats would produce differences in processing, as measured by memory. However, the differences were in the opposite direction of our predictions. Specifically, we predicted that because the debate videos were produced using fewer film making techniques (i.e., the camera was static, there were no cuts, and no close-ups) than the ads, viewers' attention would be less influenced by the stimulus, leaving more chances for individual differences and attitude congruence to affect cognitive processing, and thus memory. Contrary to these predictions, we found fewer effects of attitude congruence and individual differences in memory for the debate. For the visual memory measures, a plausible explanation for this is that in the debate all the same visual information is presented for the full video. Due to this, even if, for example, participants attended to the debaters in the video at different times based on attitude congruence, they would nevertheless still have attended to all the visual information they needed to answer the visual multiple choice questions (i.e., viewers could pay attention to the same things, but at different times). Conversely, in the ads, not attending to or engaging in a deep level of processing for a single shot on the screen for 2 seconds would mean that the viewer may not be able to answer a question for that shot. For the debate argument recognition memory, the length of the debate could have washed out any effects of individual differences in social vigilantism or attitude congruence due to the sheer volume of information presented. That is, there may have been too many complex arguments to keep them all clearly in mind, regardless of their congruence with viewers' attitudes, or viewers' level of social vigilantism. This explanation suggests that the lack of effects on argument memory in the debate were due to a floor effect (overall, predicted sensitivity [d'] was below .25 at all levels of attitude and SV [Figure 4]). Nevertheless, the debate Argument Recognition memory results showed evidence attitude congruence, in terms of a stronger "Old" bias for attitude-congruent information. However, since this effect of attitude congruence was on response bias and not sensitivity, it likely did not result from selective exposure while participants watched the video, but rather occurred when responding to the recognition memory questions (i.e., attitude-congruent items may seem more "familiar," regardless of whether they were heard while watching the video).

Chapter 4 - Eye Movement Experiment

The Eye movement experiment extended the Memory experiment in two important ways. First, it tested the role of attitude congruence and selective exposure on attentional selection in videos (i.e., do high-level cognitive processes influence eye-movements in videos?). Second, it allowed for tests of downstream effects of eye-movements on memory. Typically, eye-movements and memory are highly related, with people having better memory for things they fixate (Hollingworth & Henderson, 2002; Loftus, 1972; Pertzov et al., 2009; Tatler et al., 2005; Zelinsky & Loschky, 2005). The Memory experiment showed support for Social Vigilantism effects on memory in the advertisements, but it is not clear if the memory effects were a result of how people overtly attended to the videos (eye-movements), how they thought about the information in the videos, or some other factor. For the debate, there were memory bias effects that generally were consistent with Selective Exposure. A bias effect could be due to either a response bias or differences in retrieval. Thus, by recording eye movements at the time of encoding, the Eye movement experiment allowed for tests to disentangle the potential sources of memory differences.

Research Question 1

Are there top-down effects of attitude congruence and social vigilantism on attentional selection?

Research Question 2

Does the where and when of viewers' fixations influence their memory, or is there a dissociation between eye-movements and memory in political videos?

Research Question 3

Does the video format (Ad vs. Debate) result in differences in the eye-movement effects, and the eye-movement/memory relationship?

Hypotheses

Tyranny of Film. During visual imagery in the advertisements, eye-movements will be driven by the bottom-up features of the video stimuli, resulting in all participants looking in the same places at the same times.

Note: The ads were constructed such that for the visual imagery the bottom-up features should guide attention. As such, in the ads, when compared to the debate, it is more likely that the participants will look in the same places and subsequently have similar memory.

Partial Selective Exposure.

***Eye-movements influence memory*.** Eye-movements will differ based on attitude congruence. When attitude is congruent with video content, information in the video will be more closely attended to, and thus better remembered.

Eye-movement and memory dissociation. Eye-movements will be driven by the bottom-up features of the video, but participants will not deeply process attitude-incongruent information. This would result in Tyranny of Film for the eye-movements, but not for memory. Thus, there would be a dissociation between eye-movements and memory.

Full Selective Exposure. Attitude-incongruent information will be avoided. Disengagement with the material at this level would predict eye-movements to the least visually salient scene regions (e.g., the corners, blank areas of the screen, or even outside of the screen), or the least thematically relevant areas (background elements of the scene). Memory would similarly be poor for attitude-incongruent information.

Social Vigilantism. Low SV viewers will show a selective exposure effect (as described above), while high SV viewers will show the opposite relationship due to their increased depth of processing for attitude-incongruent information.

Methods

The Eye movement experiment had almost identical methods to the Memory experiment, but there were a few exceptions due to moving the experiment into the lab and improvements made based on the results of the Memory experiment.

Participants. Participants (*N* = 167) completed the experiment for course research credit. Of these participants, 144 (Average Age = 18.7; 69% female) were included in analyses. The 23 participants not included in data analyses were participants whose data was recollected based on their meeting a criterion for rerunning the data session. These criteria included participants not following the instructions for the memory items (e.g., not giving free recall responses; *N* = 6), if the eye-tracker lost calibration during a video (*N* = 13), experimenter error in data collection (*N* = 2), or if the participant was told about the experiment by an earlier participant (*N* = 2).

This experiment was not split into an Advertisement and Debate experiment like the Memory experiment. This was done to keep the needed number of participants lower, because eye-tracking data collection requires participants be run individually. Finally, video was treated as a within-participant factor, which added greater sensitivity.

Materials. The stimuli used in the experiment were the same those in the Memory experiment, including the survey scales, videos, and memory items. However, to reduce the length of the experiment, changes were made to which memory measures were used (All Eye movement experiment stimuli in Appendix B). First, the Picture Recognition Memory Items were removed. This was done because, of the visual recognition memory items, Picture Recognition was the least sensitive to attitude congruence effects in the Memory experiment. With the removal of the Picture Recognition items, participants completed the Visual Multiple Choice and Argument Recognition memory tasks. Additionally, half of the argument recognition memory items were removed to reduce the length of the experiment. Items that participants were sensitive to, but did not have a ceiling effect for, in the Memory experiment were selected to be included in the Eye movement experiment. The one caveat is that items were also selected to maintain an equal number of "Old" and "New" items, and, for the ads, there was an item for each argument presented (there were too many arguments in the debate to have an item for each argument).

The Need for Cognition scale was also removed from this experiment, because it did not predict memory effects in the Memory experiment.

Lastly, a major issue encountered with the Memory experiment was that participants did not give long enough free recall responses to analyze. A variety of steps were taken to increase the length of the free recall responses participants gave. First, it is likely that having participants in the lab with a researcher present provided more incentive than the online experiment to follow the instructions to recall as much information as possible. Second, word counts were automatically reported by the textbox software for each free recall response, so participants knew how many words they wrote. Lastly, perhaps most importantly, participants were asked to write their name on a form and record on it how many words they wrote for each free recall response they completed. At the end of the experiment, participants gave this word count record sheet to the researcher. Together, these steps did work to increase the length of participants' free recall responses.

Apparatus. Experiments were conducted in the Kansas State University Visual Cognition Laboratory. Eye-tracking was done with two EyeLink 1000(plus) eye-trackers. The experiment was presented on 19" ViewSonic Graphics Series G90fb CRT monitors. Chin and forehead rests were set a fixed viewing distance of 64 cm, with the screen subtending 31.8° x 24.1° of visual angle.

Analyses

Overview. The analyses to test the 4 main hypotheses for eye-movements followed an a priori progression. First, analyses of fixation durations and saccade length analyses were run. If attitude congruence and/or social vigilantism influence where and when people look in the videos, those affects should first show in these basic analyses. Following these analyses, gaze deviation from screen center for the advertisements and gaze deviation from the current debate speaker (Tseng, Carmi, Cameron, Munoz, & Itti, 2009; Vitu, Kapoula, Lancelin, & Lavigne, 2004) were used as measures of gaze variability between participants[1]. If there were no effect on gaze deviation, this would indicate that regardless of attitude congruence and social vigilantism,

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[1] The gaze deviation measures were used instead of a specific measure of attentional synchrony or gaze similarity (Hutson et al., 2017; Loschky et al., 2015; Mital et al., 2010) due to the individual difference measures used in the study. The use of measures that calculate a metric of the similarity between participant eye movements require that a comparison group be created. Identifying a comparison group is fairly straight forward when the experiment uses random assignment to conditions, in that the comparison group is typically the control condition. In the current experiment, there are no experimental groups, and the independent variables that could be used to create groups are continuous. Based on this, the decision was made to use the gaze deviation measures, which allowed the independent variables to be maintain their continuous format throughout the eye movement analysis.

participants were looking in the same place(s) at the same time(s). Alternatively, with differences in gaze deviation, the next steps were to identify if the differences were due to participants looking at different locations. To test if participants were looking at different locations, a dynamic region of interest analysis was used (Area of Interest videos: https://www.youtube.com/playlist?list=PLChGnR0Bh6QWt2mxpwKau3rXk2kk1y1Qx). Specifically, regions of interest were created for the focal point of each shot. In the ads this was the objects placed near the center of the screen that are in focus. For the debate it was the two debaters. If people look at different places in the video based on attitude congruence and/or social vigilantism, some participants will likely be looking where the filmmaker intended, while others will likely be looking away from the area the filmmaker intended. In the debate video there are not intended locations like in the advertisements. Nevertheless, there are viewing norms in conversations (Birmingham et al., 2008; Flechsenhar & Gamer, 2017; Fletcher-Watson et al., 2008), namely to look at the person speaking. Attitude congruence and/or social vigilantism effects could result in attentional selection effects incongruent with typical viewing conversation behavior.

A separate set of eye-movement analyses was carried out specifically for the text presented on screen in the advertisements. These analyses utilized methods developed in research on eye-movements during reading. Specifically, regions of interest were created for each word of the text. These regions of interest allowed for tests of, first, if people were reading the text. For participants that were reading the text, the regions of interest also allowed for tests of fixation durations and overall dwell time on words, and regressive eye-movements (Liversedge, Paterson, & Pickering, 1998; Rayner, 1978, 1998).

The last set of analyses tested the relationship between eye-movements and memory. As there were 3 memory measures in the Eye movement experiment, analyses tested for relationships with each. The visual multiple choice items allowed for clear tests of if a viewer fixated an item (e.g., the apple being held), and if they correctly answered the question on the item (e.g., what color was the apple?). In the advertisements' written arguments, the same procedure was used for argument recognition memory (i.e., did the participant read the argument, and did they correctly answer the recognition memory question on it?). The eye-movement memory analyses that did not allow for region of interest analyses that directly map onto the memory items were not as clear cut. For argument recognition in the debate video, a region of interest analysis was still used, but it was based on whether the participant was looking at the debater when they made the argument presented in the recognition memory question. The limitation of this analysis is that since the arguments are spoken a participant could be looking anywhere on the screen and still hear the argument. Free recall memory, although likely tightly related to where a person looks, is a relatively unstructured outcome variable that does not as easily lend itself to such analysis. As such, the analyses for this memory measure were more exploratory than for the other measures. For this analysis, the free recall response scores were correlated with gaze deviation values. Note however, this analysis was blind to the content of memory, which is a limitation. To address this limitation, a similar analysis was run specifically for the debate. Instead of using the overall response score, individual responses scores were calculated for each turn a debater took, using their script as the baseline that participants' responses were compared to. Dwell time on the debater during each turn was then used as a predictor of response score for that turn. For the debate, in addition to the typical eye movement and memory relationships shown in previous research, there is additional evidence that fixating the debater should improve memory for the arguments they present. First, at a perceptual level, fixating a person speaking increases the likelihood of correctly identifying the words they are saying (Lansing & McConkie, 2003). Second, at the memory level, fixating a speaker while they present information improves memory for that information (Richardson & Spivey, 2000).

***Multilevel model comparison procedure*.** For each analysis, as outlined above, a series of multilevel models were tested, and then the best model was selected using AIC values (Burnham & Anderson, 2004). Additionally, 2 categories of analyses were considered: 1) Analyses that strictly tested the competing hypotheses by only including the individual difference predictors (Attitude towards abortion and Social Vigilantism) and the congruence variable for the abortion ads (attitude congruence with the video) and the debate (congruence with the current debate speaker), and 2) more fine grained analyses that also broke down the videos by their component parts (e.g., the advertisements can be divided into sections with intertitles and sections with pictorial content). An important statistical reason for making this distinction is that the more fine-grained analyses require tests of 4- and 5-way interactions that can be descriptively meaningful, but are often unstable (i.e., models with complex high order interaction often do not converge) and unreliable (i.e., replicating high order interactions is much less likely than main effects).

The strict hypothesis tests were used to test for general effects, and the fine-grained analyses tested if effects only occurred when certain types of information were presented in the videos, or if the effects changed based on the type of information. For each analysis below, the specific predictors used will be presented and identified as necessary to testing the competing hypotheses, or as informative as a more fine-grained predictor.

Results

Overview

The focus of this work was to test the Tyranny of Film hypothesis (Hutson et al., 2017; Loschky et al., 2015), and specifically to use what was intended to be a very strong top-down manipulation, attitude congruence with political information, to try and break the Tyranny of Film. As shown in the analysis overview above, due to the complex nature of videos, a diverse set of eye movement analyses was run to test if and when the Tyranny of Film can be broken. These analyses were designed to 1) test for top-down influence of the individual difference predictors throughout video viewing, and 2) isolate behaviors specific to unique time points in the videos (e.g., while reading intertitles in the advertisements).

Throughout all the analyses presented below, and specifically the area of interest analyses, it is clear that participants in the study did view the content in the videos that filmmakers intended viewers to attend to (e.g., the text in an intertitle, the focal point of a shot), or where film viewers can be readily predicted to attend to (e.g., the current debate speaker). Overall, this shows support for the Tyranny of Film, and shows that the fundamental core of what is driving eye movements is the video stimulus. However, on top of this stimulus guidance, there are also consistent top-down effects of attitude and social vigilantism on both eye movements and memory. Thus, while the film stimulus is the most predictive of what drives viewer's visual selective attention in videos, the individual difference measures of attitude towards abortion and social vigilantism importantly account for some of the previously unexplained variance in viewing and memory behavior. Surprisingly, many of these effects are independent of attitude congruence (i.e., participants' attitude towards abortion has a general effect, but the congruence of their attitude with the information presented in the video does not have a reliable effect). Another way of putting this is that the top-down individual difference effects shown are independent of the video stimulus, and do not interact with whether viewers agree with the content of the video stimulus.

As a template to interpret the individual difference top-down effects, overall there tends to be an interaction of attitude towards abortion and social vigilantism. Depending on the dependent variable, this interaction takes the shape of either an arch or a “U” in the figures. With this interaction, at the middle level of SV (5 on the 1 – 9 Likert scale), attitude does not have an effect on the dependent variable (i.e., the regression weight shows a relatively flat slope). Conversely, for participants who fall at the extremes of the SV scale (1 and 9 on the Likert scale), there are strong opposing effects. Specifically, if at low levels of SV attitude shows a positive slope, at high levels of SV attitude shows a negative slope (this creates an arch shape in the figure). Importantly, this attitude by SV interaction is also shown for the Non-controversial ad, and in the abortion ads and the debate video the interaction is often independent of attitude congruence. Based on this, there is some evidence inconsistent with the Tyranny of Film hypothesis; however, a more nuanced interpretation is that this evidence weakens the Tyranny of Film hypothesis. While the Tyranny of Film hypothesis suggests total guidance of selective attention irrespective of the viewer’s understanding of the film, or in this case the viewer’s reaction to their understanding of it, the results of the study support strong guidance by the film stimulus moderated by individual differences.

Individual difference distributions

The individual difference distributions for the Eye movement experiment were similar to the Memory experiment but had a slightly more limited range or participants (Figure 13). The abortion attitude distribution was trimodal, with clustering at the lower end of the scale (more Pro-life), in the center (no strong attitude), and at the higher end of the scale (more Pro-choice). However, the Pro-choice cluster is much smaller than in the Memory experiment, which generally made fitting models for more Pro-choice participants more difficult. For the Social Vigilantism measure, there was again a fairly normal distribution. However, there were no participants that indicated being on the extremes of the scale (i.e., there were no participants at 1 or 9 on the SV scale). Similar to analyses for the Pro-choice attitude, model fits at the extremes of the SV scale had more error than at the middle. Given the wide range of values and the large number of participants, these limitations should not have undue influence on the model fits but are important to consider when interpreting the below results. Specifically, the predictions of the models for the extremes of the SV scale are just that, predictions based on the data, not estimates of the actual results.

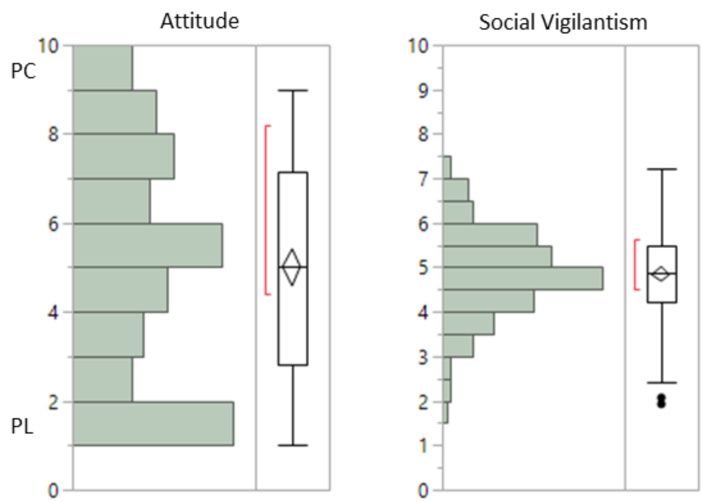

Figure 13. Distributions and box plots for the individual difference measures (Attitude [left] and Social Vigilantism [right].)

Eye movements

The summary table (Table 8) shows the general trends for all of the eye movements analyses reported below. As discussed in the results overview, the main effects are evidence for the Tyranny of Film, as well as a general top-down effect of attitude and SV, identified as either an arch or "U" shaped interaction.

Table 8

Eye Movement Experiment

Eye Movements						
	Fixation Durations					
		Non-controversial	Attitude, SV, & Visual Type (Verbal/Visual)	Attitude: Positive Slope	2.2 *	Tyranny of Film
						Top-down (Indiv. Diff.)
				Arch (Visual Only)	0.8	Top-down (Indiv. Diff.)
		Abortion Ads	Attitude, SV, Video (Pro-choice/Pro-life) & Visual Type (Intertitle/Visual)	Congruence (Pro-choice only)	-2.0 *	Social Vigilantism
		Debate	Attitude & SV	Attitude: Positive Slope	1.9	Top-down (Indiv. Diff.)
				Arch	-1.5	
	Saccade Lengths					
		Non-controversial	Attitude & SV	Attitude: Negative Slope	-2.18 *	Top-down (Indiv. Diff.)
				U	1.82	

	Abortion Ads	-	-	-	Tyranny of Film
	Debate	-	-	-	Stimulus Effects
Gaze Deviation					
	Non-controversial	Attitude & SV	Attitude: Negative Slope	-2.76 *	Top-down (Indiv. Diff.)
			U	1.04	
	Abortion Ads	Attitude & SV	Attitude: Negative Slope	-2.49 *	Top-down (Indiv. Diff.)
			U	1.67	
	Debate	Attitude, SV, & Current Speaker	Congruence and SV	4.10 *	Social Vigilantism Top-down (Indiv. Diff.)
Area of Interest					
	Non-controversial	Attitude, SV, & AoI Type	AoI Type (Fixate Inside AOIs)	-35.99 *	Tyranny of Film
			Arch (AOIs Only)	-2.26 *	Top-down (Indiv. Diff.)
	Abortion Ads	Attitude, SV, & AoI Type	AoI Type (Fixate Inside AOIs)	-14.85 *	Tyranny of Film
			Arch (AOIs Only)	-1.93	Top-down (Indiv. Diff.)
	Debate	Attitude, SV, & Current Speaker	Fixate Current Speaker	35.20 *	Stimulus Effects
			Arch (Mouth AOI)	-1.99 *	Top-down (Indiv. Diff.)

Note. When an * is reported next to a *t* or *z* value, this denotes the reported effects was significant. For the Hypotheses, when the hypothesis is reported, this is the hypothesis there was support for. There are three hypotheses in the table not presented initially as a hypothesis. Stimulus Effect is support for bottom-up effects driven by the stimulus, when the stimulus does not have features (e.g., editing) that create attentional synchrony and subsequent Tyranny of Film. Top-down (Indiv. Diff.) is for individual differences effects that did not include attitude congruency. Lastly, EM → Memory is for eye movement behavior predicting memory performance. If there were no significant effects to report, the cells for that analysis in the table are reported as "-".

Fixation durations and saccade lengths. The foundational measures of eye-tracking are fixation durations and saccade lengths, which can be used to give a general picture of how people are using selective attention (saccades) to pick up information from their environment (during fixations), and if there are differences based on any of the predictors measured.

Both fixation durations and saccade lengths are sensitive to top-down processes (Henderson & Pierce, 2008; Henderson & Smith, 2009; Rayner, 1998; Smith & Mital, 2013). If there are no differences in fixation durations or saccade lengths based on attitude congruence or social vigilantism, it would be support for the Tyranny of Film hypothesis. Alternatively, if there are effects of attitude congruence or social vigilantism on fixation durations or saccade lengths, that would be support for one of the competing alternative hypotheses. If the effect is only attitude congruence based, it would be support for Selective Exposure, and if there were an interaction between attitude congruence and selective exposure it would be support for Social Vigilantism. Importantly, if there were top-down effects on fixation durations or saccade lengths, the direction of the relationship could be argued to go in different directions. For example, engaging in selective exposure could be considered a highly cognitively demanding task, because it would require inhibiting attentional capture to highly salient bottom-up features. Based on the high cognitive load of this inhibition process and the typical eye movement effects of increased cognitive load (Loftus & Mackworth, 1978), it would be expected that selective exposure would result in longer fixation durations and shorter saccade lengths. Alternatively, engaging in selective exposure would indicate that a person was not attempting to comprehend that arguments presented, and would thus potentially be under less cognitive load, which would likely result in shorter fixation durations (shallow processing depth) and longer saccade lengths (e.g., looking away from the center of the screen). Finally, if there is support for the social vigilantism hypothesis, it is predicted that a person high in social vigilantism will engage in message oriented resistance strategies when presented with attitude-incongruent information. Engaging in a message oriented resistance strategy is predicted to increase cognitive load, which, as above, would be predicted to increase fixation durations and shorten saccade lengths compared to people who are simply watching the video for more passive comprehension.

To analyze fixation durations, the cleaning procedure removed upper and lower data points that were well outside the bounds of meaningful eye-movement behavior (below 40 ms and above 3 seconds). The distribution of fixation durations was highly positively skewed, thus analyses used a generalized multilevel model with a gamma distribution.

Saccade lengths were cleaned and analyzed using a procedure similar to that for the fixation durations. The lower cutoff for saccade lengths was .15 degrees of visual angle. This threshold is set by the algorithm that identifies saccades ("EyeLink 1000 Plus User Manual Version 1.0.9," 2013). The upper cutoff was 41.9 degrees of visual angle, as this is the maximum distance a person could move their eyes and still be within the screen (i.e., it is the distance between opposing corners of the screen). Saccade lengths also have a strong positive skew, so the gamma distribution was again used for the generalized model.

Fixation durations and saccade lengths (Smooth pursuit analyses). One very important consideration for analyzing fixation duration data from videos is that participants are more likely to engage in smooth pursuit eye-movements, namely eye movements that track a moving object, while watching videos. Smooth pursuits are slow, non-ballistic eye-movements that allow a person to continue to process the visual information from a moving target (Eckmiller & Bauswein, 1986; Larsson, Nyström, Ardö, Åström, & Stridh, 2016; Munn, Stefano, & Pelz, 2008). In other words, smooth pursuit eye-movements are slow eye-movements that have characteristics of fixations (visual information is being processed) and saccades (the eyes are moving) that make them unique. The presence of smooth pursuit eye movements can potentially have a large effect on fixation duration analyses, because eye-movement parsing algorithms typically struggle to identify them. As a result, smooth pursuit eye-movements are typically identified as a long fixation, many short fixations with short saccades between them, or a combination of the two (Munn et al., 2008). To deal with this issue, fixation duration analyses were carried out a second time with an additional cleaning to remove potential smooth pursuit movements from the analysis. This was done taking the location of the eye at the start and end of a fixation. If the end of a fixation was more than 1 degree of visual angle away from the start of the fixation, the individual was likely engaging in smooth pursuit. A similar logic holds for saccade length analyses, thus a similar approach will be taken.

Overall, the smooth pursuit cleaning had an influence on the results of the fixation duration and saccade length analyses. When running the additional smooth pursuit cleaning, between 8% (Debate video) and 27.8% (Non-controversial ad) of the observations were removed from the analysis. The removal of this data does not necessitate that the results change, but in general the fixation duration and saccade length effects did become weaker, and often became insignificant, following the smooth pursuit cleaning. However, the direction of the relationships did not change. Based on this, when interpreting the fixation duration and saccade length results, all interpretations are made cautiously. More interestingly, since the cleaning of smooth pursuit eye movements resulted in the loss of significant effects, future analyses could parse the data specifically to identify smooth pursuit eye movements to identify if individual differences predict their use.

Non-controversial ad fixation duration and saccade length results. The fixation duration and saccade length analyses for the Non-controversial ad used the individual difference predictors attitude towards abortion and social vigilantism. As this was the Non-controversial ad, there was no congruence variable. Additionally, the predictor of ad visual type (intertitle and pictorial) was tested. A limitation of the visual type predictor for the Non-controversial ad is that one of the intertitles was presented while there was also pictorial information.

The best model included all of the predictors (Attitude, SV, and Visual Type). Only Attitude and Visual Type were significant predictors (Table 9), and the Attitude by SV interaction creating the arch, although not significant, can be seen in Figure 14. For Attitude, as participants indicated being more Pro-choice, fixation durations increased. Also, regardless of the predictors, participants had shorter fixation durations on the intertitles than the imagery, which fits with the typical viewing patters for text versus scenes (Henderson, 2007; Rayner, 1998).

The smooth pursuit cleaning for this data removed 17.8% of the data. The data trends were in the same direction as the fixation duration analysis, although the attitude effect was no longer significant (Attitude B = .009, $SE(B)$ = .007, t = 1.240, p = .22). The visual type (intertitle) predictor was still significant, and in the same direction (B = -.13, $SE(B)$ = .013, t = -10.29, p < .001). Since the smooth pursuit cleaning resulted in the loss of the attitude effect, the interpretations of the effect of attitude on fixation durations are made cautiously.

Table 9

Summary of Multilevel Gamma Regression for Non-controversial Fixation Durations

Variable	*B*	*SE(B)*	*t*	Sig. (*p*)
Intercept	5.81	.02	322.7	< .001
Attitude	.016	.01	2.2	.025
SV	.026	.02	1.4	.16
Visual Type (Intertitle)	-.22	.01	-21.6	< .001
Att x SV	-.008	.01	-1.1	.28
Att x Visual Type	-.002	.004	-.4	.70
SV x Visual Type	-.004	.01	-.4	.69
Att x SV x Visual Type	.004	.004	.8	.42

Note. The continuous variables were centered for the interaction. Visual type was effect coded (Intertitle = 1; Visual = -1).

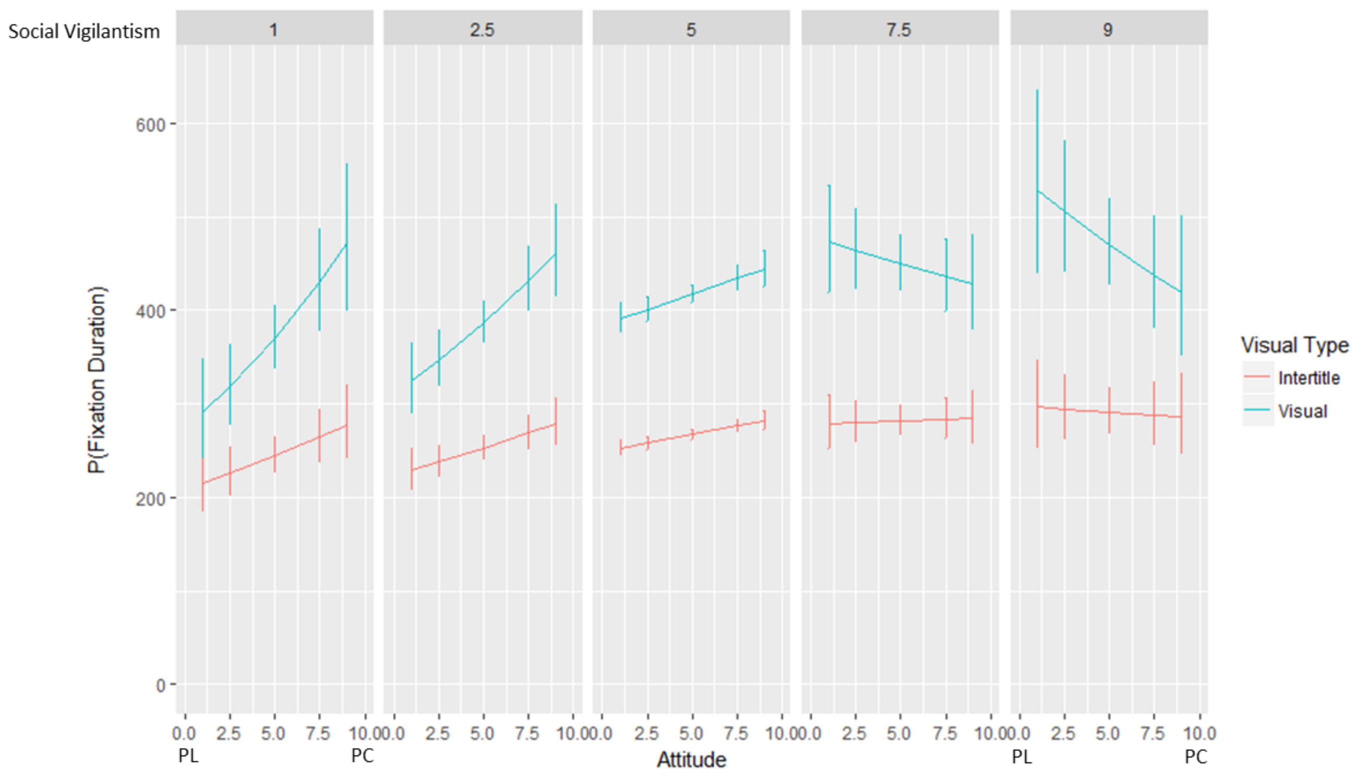

Figure 14. Non-controversial ad fixation duration analysis. The Y-axis shows the predicted average fixation duration for a participant given their attitude toward abortion (X-axis) and their level of Social Vigilantism (Panels labeled on the top 1 – 9). The blue line is for visual imagery, and the red line is for the intertitles. Error bars are 1 standard error.

For saccade lengths, the effects followed similar trends to the fixation durations (Table 10). The model only included the individual difference predictors. Participant attitude had a significant effect. As participants reported being more Pro-choice, they tended to have shorter saccade lengths. Additionally, this Attitude effect was further explained by the Attitude by SV interaction, which was marginally significant, producing the U shape in Figure 15. Descriptively, this means that participants low in SV and more Pro-life had longer saccades than low SV, Pro-choice participants. This relationship reversed as participants increased in SV. The smooth pursuit cleaning did not change these results.

Table 10

Summary of Multilevel Gamma Regression
for Non-controversial Saccade Lengths

Variable	*B*	*SE(B)*	*t*
Intercept	2.13	.01	168.31
Attitude	-.01	.005	-2.18
SV	.02	.01	1.39
Att x SV	.01	.005	1.82

Note. The continuous variables were centered for the interaction. No *p*-values are reported, because the developer of the statistical package does not provide them for the mathematical reasons. The *t*-values are used to interpret the effects.

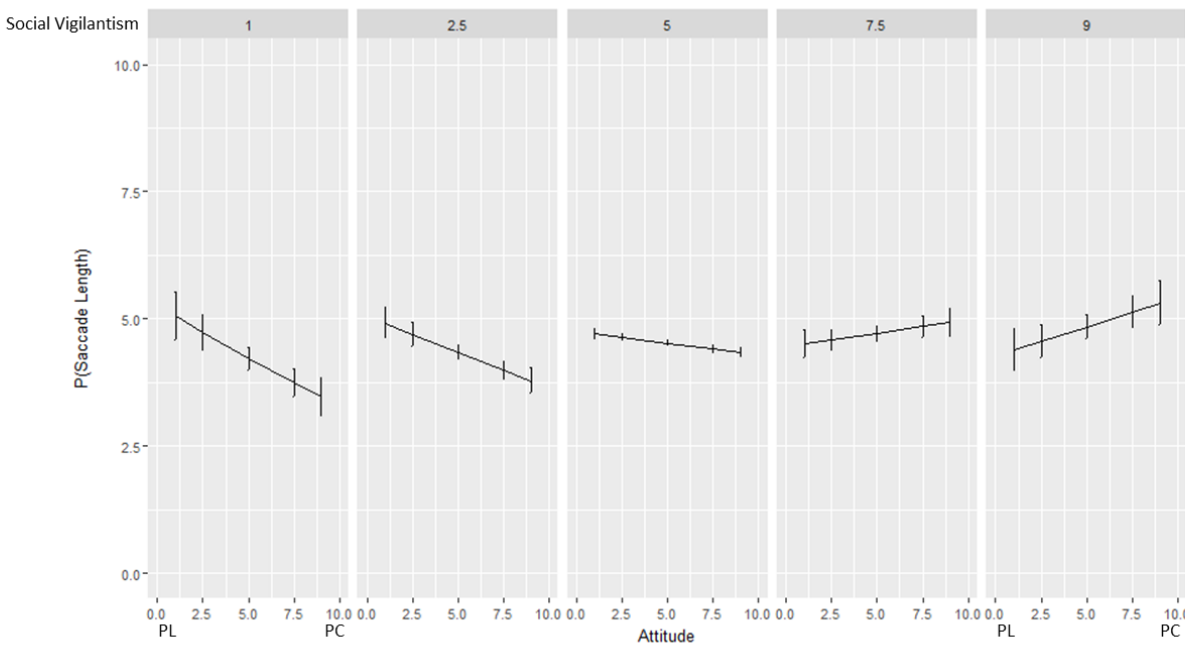

Figure 15. Non-controversial ad saccade length analysis. The Y-axis shows the predicted average saccade length for a participant given their attitude toward abortion (X-axis) and their level of Social Vigilantism (Panels labeled on the top 1 – 9). Error bars are 1 standard error.

Both the fixation duration and saccade length results descriptively showed the attitude by SV interaction, as seen in the figures as an arch and "U" pattern respectively. Having the inverse pattern for these two measures generally makes sense given that as fixation durations increase saccade lengths usually decrease (Antes, 1974). Taken together these results show weak support for top-down effects on eye movements when watching videos, but, as this is the control video, no support for the hypotheses.

Abortion ads fixation duration and saccade length results. The above Non-controversial ad results are very interesting, in that they show some general top-down individual difference effects, that are independent of attitude congruence. Overall, the abortion ad analyses show similar effects.

When doing the model tests for fixation durations in the abortion ads, based on the AIC values, the most complex model had the best fit. This model included the predictors Attitude, SV, Video (Pro-choice vs. Pro-life), and Visual Type (Intertitle vs. Visual). Despite this being the best model based on AIC values, one potential issue with it is that it could have overfit the data. That is to say, the model had a complex random effect structure (participant intercept, video intercept, and visual type slope), and was fitting up to a 4-way interaction. As can be seen in Table 11, many of the effects were not significant, but trending towards significance. However, the exception to this is the Visual Type variable, which clearly shows that for intertitles there was little variability in participants' fixation durations (Figure 16), while the visual imagery had a large amount of variability.

The smooth pursuit cleaning of the fixation durations for the abortion ads resulted in a similar decrease in effect sizes compared to the non-controversial ad analysis. Importantly, video type was no longer a significant predictor with the smooth pursuit cleaning, and the only significant effect was for visual type (B = -.26, $SE(B)$ = .008, t = -33.30, p < .001).

Table 11

Summary of Multilevel Gamma Regression for Abortion Ad Fixation Durations

Variable	*B*	*SE(B)*	*t*	Sig. (*p*)
Intercept	5.46	.01	421.2	< .001
Attitude	.007	.005	1.4	.16
SV	.004	.01	0.3	.75
Video Condition (Pro-life)	.08	.009	9.6	< .001
Visual Type (Visual)	.59	.02	34.2	< .001

Att x SV	-.0008	.005	-0.2	.87
Att x Video Condition	.004	.004	1.1	.27
SV x Video Condition	-.002	.009	-0.2	.86
Att x Visual Type	.002	.007	0.3	.78
SV x Visual Type	.03	.02	1.6	.12
Video Condition x Visual Type	-.04	.01	-3.2	.001
Att x SV x Video Condition	-.0009	.004	-0.3	.79
Att x SV x Visual Type	.006	.007	0.8	.41
Att x Video Condition x Visual Type	-.007	.005	-1.4	.17
SV x Video Condition x Visual Type	-.03	.01	-2.5	.01
Att x SV x Video Condition x Visual Type	-.007	.005	-1.3	0.19

Note. The continuous variables were centered for the interaction. The categorical variables were dummy coded (Visual type Intertitle = 0, Visual = 1; Video Condition Pro-choice = 0, Pro-life = 1).

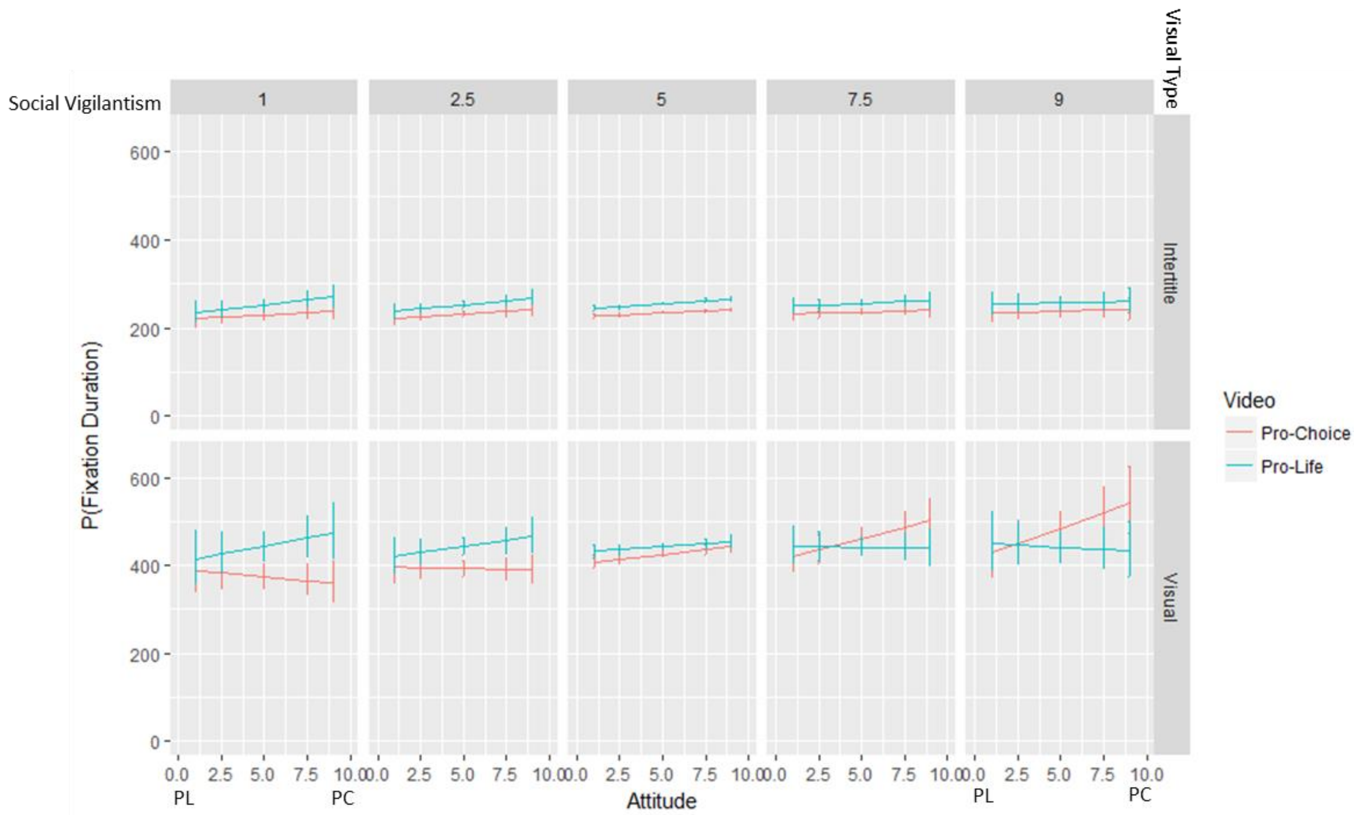

Figure 16. Abortion ads fixation duration analysis. The Y-axis shows the predicted average fixation duration for a participant given their attitude toward abortion (X-axis) and their level of Social Vigilantism (Panels labeled on the top 1 – 9). The blue line is for the Pro-life ad, and the red line is for the Pro-choice. The horizontal panels, labeled on the right, show the effects for the Intertitles (Top) and the Visual information in the video (Bottom). Error bars are 1 standard error.

Based on the potential issue of overfitting the data due to the complexity of the model, and the significant Visual Type effects, an additional analysis was run on only the fixation durations for the Visual imagery (Table 12). This analysis should be interpreted with caution, but it shows the trending Attitude by SV by Video interaction for the visual information in the full model as significant. Specifically, for both the Pro-choice and the Pro-life video, the direction of the relationship based on Attitude reverses as participants increase in their level of social vigilantism. Interestingly, this effect was driven by Pro-choice participants. For highly Pro-life participants, regardless of level of SV, there was little difference in the duration of their fixations on the visual imagery of either abortion ad. Conversely, for highly Pro-choice participants, at low levels of SV, they were more likely to have greater fixation durations for the Pro-life ad. As Pro-choice participants increase in their level of SV, this relationship flips, and they were more likely to have longer fixation durations on the Pro-choice video. Thus, the top-down effects of Attitude and SV on fixation durations in the abortion advertisements was driven by the Pro-choice participants.

Table 12

Summary of Multilevel Gamma Regression for Abortion Ad Fixation Durations Visual Information Only

Variable	*B*	*SE(B)*	*t*	Sig. (*p*)
Intercept	6.05	.02	339.2	<.001
Attitude	.009	.007	1.3	.19
SV	.03	.02	1.7	.08
Video Condition (Pro-life)	.05	.009	5.0	<.001
Att x SV	.005	.007	.7	.49
Att x Video Condition	-.003	.004	-.8	.45
SV x Video Condition	-.03	.009	-3.5	<.001
Att x SV x Video Condition	-.008	.004	-2.0	.05

Note. The continuous variables were centered for the interaction. The categorical variables were dummy coded (Video Condition Pro-choice = 0, Pro-life = 1).

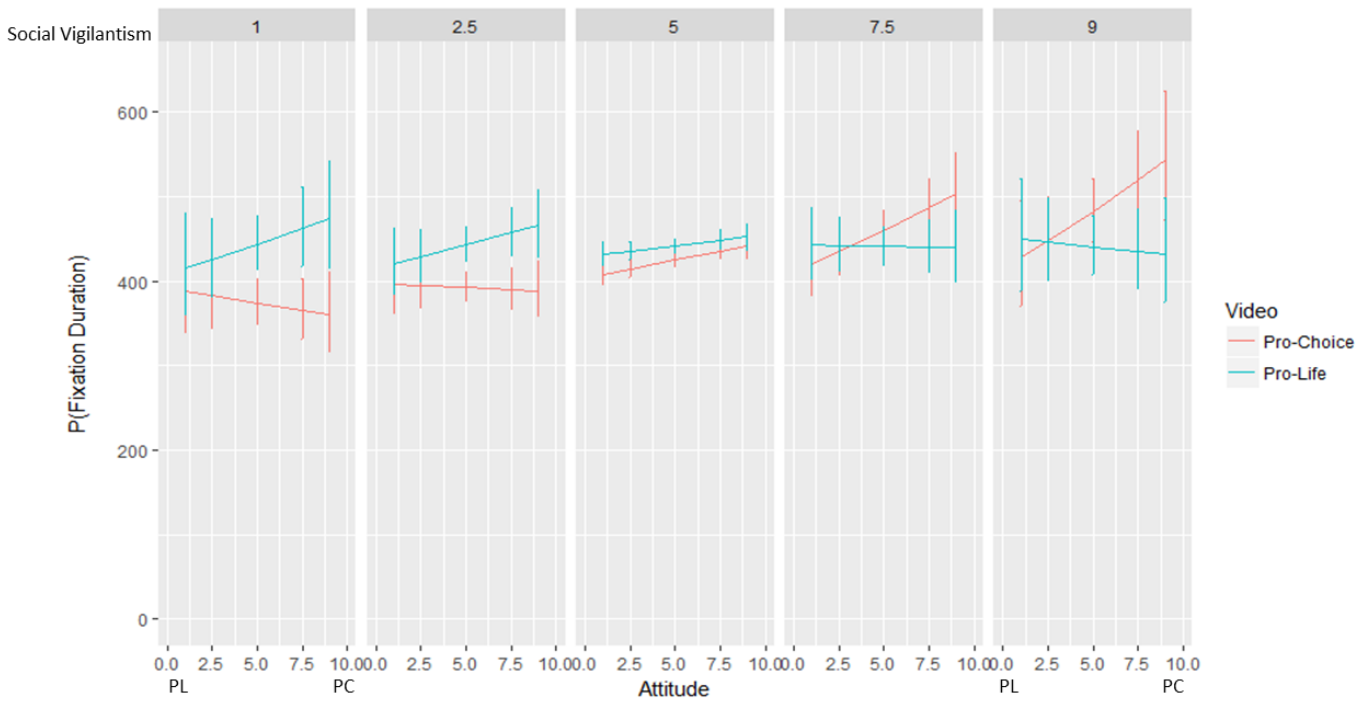

Figure 17. Abortion ads fixation duration analysis for only the visual information. The Y-axis shows the predicted average fixation duration for a participant given their attitude toward abortion (X-axis) and their level of Social Vigilantism (Panels labeled on the top 1 – 9). The blue line is for the Pro-life ad, and the red line is for the Pro-choice. Error bars are 1 standard error. Note: The continuous variables were centered for the interaction. Visual condition was dummy coded (Pro-choice = 0; Pro-life = 1).

Concerning the hypotheses, the Pro-life participants showed some support for the Tyranny of Film for the visual information in the abortion ads, in that they did not show top-down effects of the individual differences. On the other hand, highly Pro-life participants showed some level of support for the Social Vigilantism hypothesis, in that their Attitude congruence interacted with SV. Additionally, given the direction of the effect (i.e., longer fixation durations for attitude-incongruent information at low levels of SV), one reason for the differences in the fixation durations may have been participants engaging in inhibitory processes. In other words, at a low level of SV, in order to selectively expose themselves to only the information they agree with, Pro-choice participants may have inhibited their processing of the Pro-life information. Conversely, at high levels of SV, the Pro-choice participants may have inhibited processing of the Pro-choice information. This however, is only one possible interpretation, and the further gaze deviation and area of interest analyses below will allow for more diagnostic interpretations.

The saccade length analyses for the abortion ads did not show any effects. The best model included Attitude, SV, and their interaction. Despite being in the best model, there were no significant effects of Attitude or Social Vigilantism (Table 13).

Table 13

Summary of Multilevel Gamma Regression for Abortion Ad Saccade Lengths

Variable	*B*	*SE(B)*	*t*	Sig. (*p*)
Intercept	1.28	.02	70.64	<.001
Attitude	-.002	.005	-.48	.63
SV	.003	.01	.24	.81
Att x SV	.001	.005	.26	.79

Note. The continuous variables were centered for the interaction.

Debate fixation duration and saccade length results. Similar to the abortion ads, the debate fixation duration and saccade length results have some similarities to the Non-controversial ad, but overall there were few strong effects in the debate videos.

For fixation durations, testing only the predictors strictly related to the hypotheses, the best model included Attitude and SV (Table 14). In this model, the attitude effect was trending with fixation durations increasing as participants indicated being more Pro-choice. Also, to a lesser extent, a non-significant trend for the Attitude by SV interaction creating the arch (Figure 18) was present.

Table 14

Summary of Multilevel Gamma Regression for Abortion Debate Fixation Durations (Strict Hypothesis Model)

Variable	*B*	*SE(B)*	*t*	Sig. (*p*)
Intercept	6.17	.02	328.7	< .001
Attitude	.01	.007	1.9	.06
SV	.01	.02	.7	.50
Att x SV	-.01	.008	-1.5	.13

Note. The continuous variables were centered for the interaction.

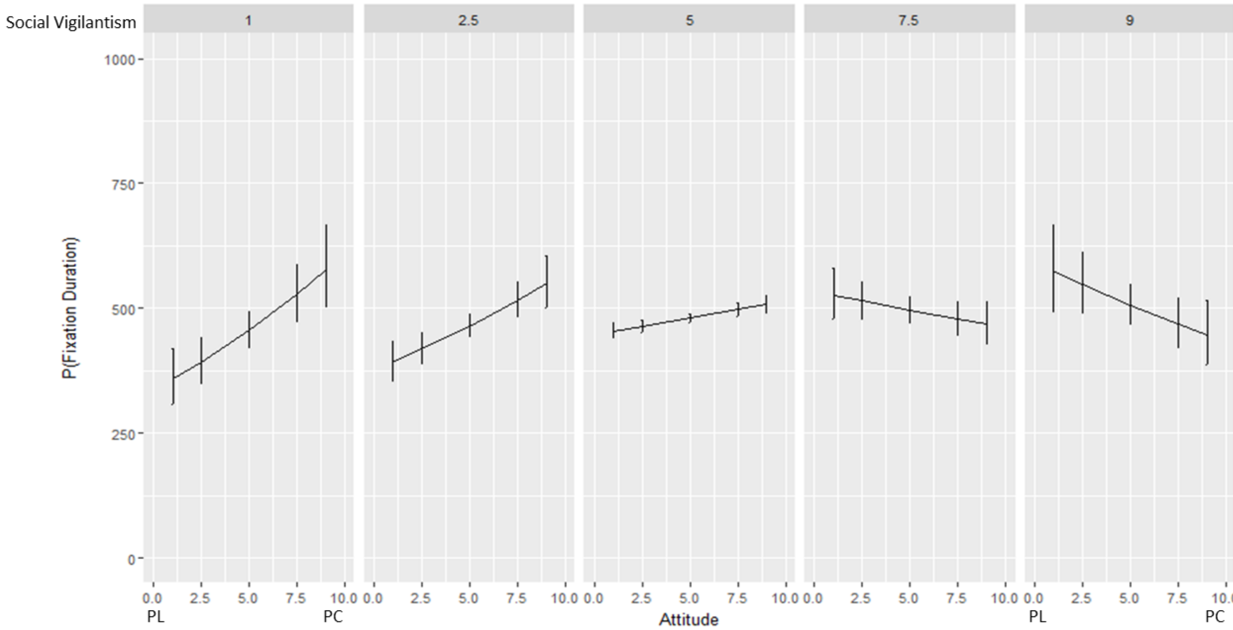

Figure 18. Debate video fixation duration analysis. The Y-axis shows the predicted average fixation duration (msec) for a participant given their attitude toward abortion (X-axis) and their level of Social Vigilantism (Panels labeled on the top 1 – 9). Error bars are 1 standard error.

Extending on the strict hypothesis model above, based on AIC values, the best model for fixation durations in the debate also included predictors for the current debate speaker (Table 15), which allows for tests of attitude congruence, and the debate video (control variable). Comparing Figures 18 and 19, the overall pattern of results are very similar. The attitude effect is significant in this model, with fixation durations increasing as participants reported being more Pro-choice. Also, generally, the arch pattern is again visible in Figure 19, although it is weaker in this model. The smooth pursuit cleaning of the fixation durations for the debate video, unlike for the advertisements, did not influence the results for the best model.

Table 15

Summary of Multilevel Gamma Regression for Abortion Debate Fixation Durations (Full Model)

Variable	*B*	*SE(B)*	*t*	Sig. (*p*)
Intercept	6.17	.03	223.53	< .001
Attitude	.03	.01	3.02	.003
SV	.03	.03	1.01	.31
Debate Speaker (Pro-life)	-.06	.02	-3.30	< .001
Video (PLPC)	.006	.04	.15	.88
Att x SV	-.01	.01	-.98	.33
Att x Debate Speaker	-.009	.007	-1.45	.15
SV x Debate Speaker	-.006	.02	-.32	.75
Att x Video	-.04	.02	-2.38	.02
SV x Video	-.03	.04	-.66	.51
Debate Speaker x Video	.12	.02	5.05	< .001
Att x SV x Debate Speaker	.001	.007	.21	.83
Att x SV x Video	.005	.02	.33	.74
Att x Debate Speaker x Video	.007	.009	.69	.48
SV x Debate Speaker x Video	-.05	.03	-1.83	.07
Att x SV x Debate Speaker x Video	-.005	.009	-.46	.64

Note. The continuous variables were centered for the interaction. The categorical variables were dummy coded (Debate speaker Pro-choice = 0, Pro-life = 1; Video Pro-choice left/Pro-life right [PCPL] = 0, Pro-life left/Pro-choice right [PLPC] = 1).

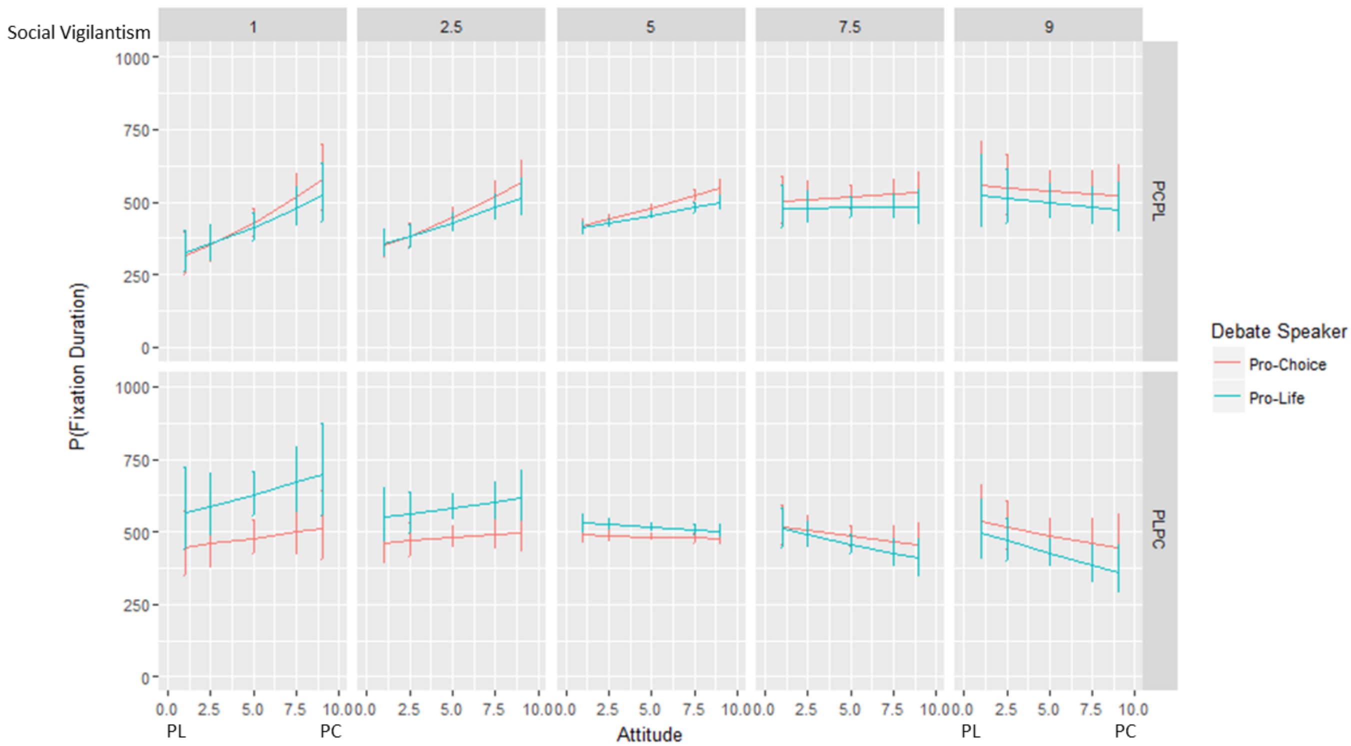

Figure 19. Debate video fixation duration analysis (Full model). The Y-axis shows the predicted average fixation duration for a participant given their attitude toward abortion (X-axis) and their level of Social Vigilantism (Panels labeled on the top 1 – 9). The blue line is for the Pro-life speaker, and the red line is for the Pro-choice. The horizontal panels, labeled on the right, show the effects for the 2 versions of the debate video (PCPL (Top) = Pro-choice debater on the left and Pro-life on the right; PLPC (Bottom) = Pro-life debater on the left and Pro-choice on the right). Error bars are 1 standard error.

Interestingly, the saccade length data for the debate video had a very different distribution than for the ads. Specifically, it had an even more positive skew (Figure 20), that a Box-Cox (Box & Cox, 1964) analysis indicated would be normalized with an inverse square root transformation. Based solely on the saccade length distribution, it seems clear that participants were using the structure of the video to guide their eye movements. The very large number of short saccades were likely the result of participants simply watching the current debate speaker (i.e., using small saccades to maintain fixation on current speaker). The area of interest results below corroborate this. Additionally, the small mode near 18 degrees of visual angle was likely for saccades between the debaters.

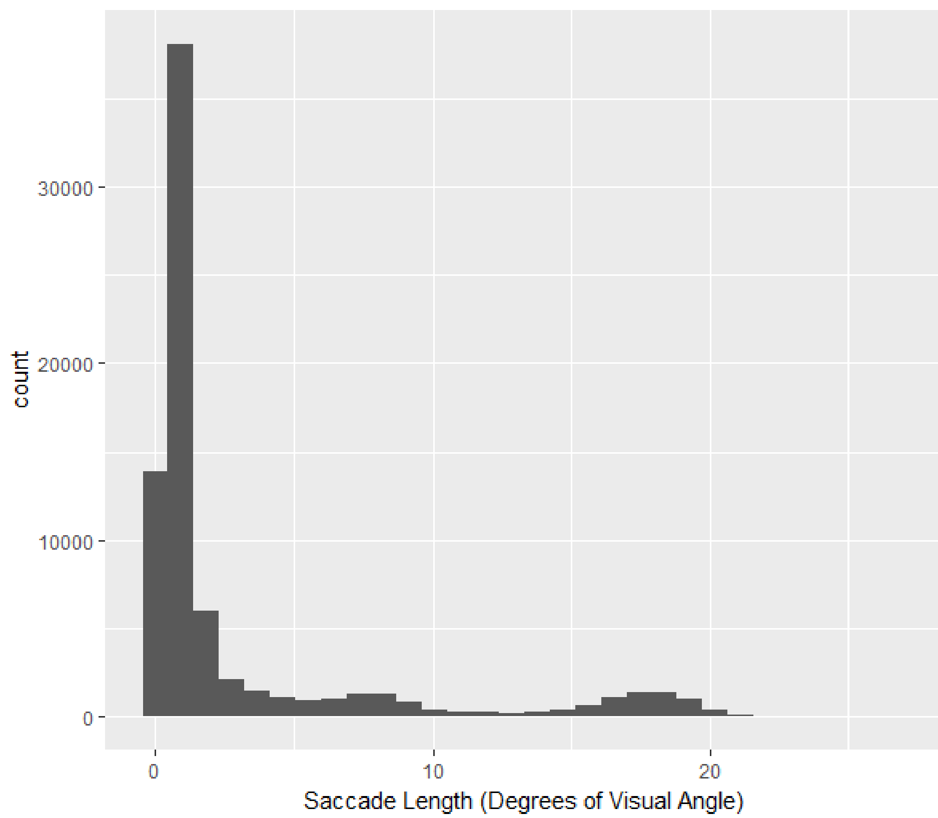

Figure 20. Saccade length distribution for debate video.

As with the abortion ads, there were no significant effects of Attitude or SV (Table 16), nor were there any trending effects either. Also, when the data was cleaned for smooth pursuits, the direction and magnitude of the parameter estimates remained unchanged.

Table 16

Summary of Multilevel Gamma Regression for

Abortion Debate Saccade Lengths

Variable	*B*	*SE(B)*	*t*
Intercept	1.05	.01	75.13
Attitude	.004	.006	.69
SV	-.01	.01	-1.00
Att x SV	-.001	.006	-.24

Note. The continuous variables were centered for the interaction. No *p*-values are reported, because the developer of the statistical package does not provide them for the mathematical reasons. The *t*-values are used to interpret the effects.

The fixation duration and saccade length results for the Eye movement experiment generally showed weak support for top-down processes influencing eye movements in political videos. The most common effect was the attitude by SV interaction producing an arch or a U, though this was rarely statistically significant. There was also the targeted congruence effect in the visual information in the abortion ads, such that participants who identified as Pro-choice had longer fixation durations for attitude-incongruent information at low levels of SV, while for high SV participants they had longer fixation durations for congruent information.

Gaze deviation. To test the similarity of where participant look on the screen, a gaze deviation metric was used. For the advertisements, gaze deviation from the center of the screen was calculated using the Euclidean distance of each fixation from screen center. The cleaning procedure for this data first followed the same procedure as the fixation duration cleaning, because fixation based data was used to calculate the distances. This removed fixations that likely had tracker error. Next, the Euclidean distance from screen center measure was cleaned to only include fixations that could have fallen on the screen. This was done by calculating the pixel distance from the screen center to the top-left corner of the screen (819.6 pixels) plus the average error of the eye tracker (.5 degrees of visual angle; 19.6 pixels) and removing Euclidean distances greater than that value. The average error of the eye tracker was added to identify the maximum possible deviation, because if a person was looking at the corner of the screen (true deviation of 819.6 pixels), the tracker error (19.6 pixels) could have them looking at the plastic frame of the computer monitor. Based on this, a person could be looking at the screen, but the eye tracker would indicate they were looking off of the screen. For the analyses, the pixel values were converted to degrees of visual angle, as degrees of visual angle is a more meaningful unit of measurement to interpret.

The deviation from screen center was used, because the advertisements were created to guide attention to a single point of interest, typically at or near the center of the screen. As such, greater gaze deviation from the screen center would indicate greater deviation from the point of visual interest in the scene. As such, the measure also taps into the amount of gaze clustering. As viewers' deviation from the point of interest in the screen center increases, the amount of gaze clustering is likely decreasing. The notable exception to this would be if, for example, there is something highly salient in the top-right corner of the screen that everyone looks at. In this instance the deviation from screen center would be high, but gaze clustering would also be high. However, the advertisements were created to focus viewers' attention near the center of the screen throughout most of the visual imagery presented, not the edges of the screen, so this would be an unlikely event. Nevertheless, it is important to test for something like this in the advertisements. Importantly, the Area of Interest analyses did just this. Described in more detail below, the areas of interest were created for the scene regions the filmmaker intended viewers to look. When these areas deviated from screen center, the AOIs also deviated from screen center. Thus, if the gaze deviation metric were to increase at a certain point for a given range of participants based on their attitude and/or level of SV, the AOI analysis would make it possible to diagnose whether that deviation was due to gaze clustering away from screen center or instead due to a general lack of gaze clustering.

For the debate video, deviation from screen center was not used, because the issue discussed above of areas of interest being away from screen center is a characteristic of the debate. Specifically, the two debaters were seated in the left and right quarters of the screen. As such, if participants follow the debate by looking at the current speaker, which is what would be expected based on previous research (Birmingham et al., 2008; Flechsenhar & Gamer, 2017; Fletcher-Watson et al., 2008), gaze deviation from the center of the screen would be high, indicating low gaze clustering, whereas the gaze clustering would actually be very high. Thus, for the debate, deviation from the current debate speaker was instead calculated. Similar to the ads, this is a measure of the deviation from the expected point of the highest gaze clustering.

To calculate distance from the debate speaker, the debate speaker location was identified using areas of interest created for each of the debate speakers. Specifically, the AOIs for each debate speaker's head was used, and the distance from the center of that AOI was used. This metric was calculated using the eye tracker's data processing program (DataViewer; SR-Research). The same general cleaning procedure from the gaze deviation from screen center analysis was used for this analysis. Specifically, fixations with durations less that 40ms or greater than 3000ms were removed. Next, deviations from the current debate speaker that could not have fallen on the screen were removed. The greatest distance from a debate speaker to a corner of the screen was 41.9 degrees of visual angle. Adding the average error of the eye tracker (.5 degrees of visual angle) returns a distance of 42.4 as the upper bound for deviations from the debate speaker.

Gaze deviations, and other similar metrics, have been shown to be sensitive to various top-down processes (Hutson et al., 2017; Loschky et al., 2015; Mital et al., 2010; Smith & Mital, 2013). As such, there are a variety of possible gaze deviation results that would show support for each competing alternative hypothesis. If there are no effects of the individual difference predictors on gaze deviation, this would generally indicate relatively high gaze clustering, and support the Tyranny of Film. Generally, there are two reasons that participants would show comparable gaze similarity: 1) participants are looking in the same places at the same time with tight gaze clustering, or 2) there is relatively low gaze clustering (i.e., attentional synchrony) for all participants. In the case of the second option, the amount of deviation would indicate if there was an overall lack of clustering, and the area of interest analysis would test the proportion of viewers fixating the points of visual interest.

Similar to support for the Tyranny of Film, there are different ways gaze deviation can vary between participants. Again, to diagnose any of these differences, the area of interest analyses are necessary. There would be support for the Selective Exposure Hypothesis if gaze deviation varied based on attitude and independent of social vigilantism. If gaze deviation differences were predicted by both attitude and SV, this would be support for the Social Vigilantism Hypothesis.

Importantly, the reason gaze deviation from screen center (or debate speaker) was used instead of more sophisticated metrics such as gaze similarity (Loschky et al., 2015; Mital et al., 2010; Smith & Mital, 2013), was that the more sophisticated metrics require a baseline of gaze behavior to be identified. When an experiment has categorical predictors (e.g., a control and treatment group), one level of the predictor can be used as the baseline group (e.g., the control group). This allows for a statistical test of whether the treatment changed gaze behavior compared to the control. However, the current experiment did not have a control group, and all of the predictors were continuous. As such, creating a baseline would require categorizing participants based on continuous predictors, and even if a baseline were created using this procedure, there would not be a clear "control" group to use for comparisons. Thus, the decision was made to use gaze deviation, which does not require a baseline comparison group to be specified.

Advertisement gaze deviation results. The argument that effects of fixation duration and saccade length effects would indicate effects of more specific analyses at a broad level carried over to the deviation from screen center analyses for the advertisements. Specifically, attitude effects were again significant in the best models, and there were non-significant trends for the Attitude by SV interaction. Again, these individual difference effects were on top of video-specific effects, which in the case of the below models were significant differences in deviation from gaze center for the intertitles compared to the visual information.

For the Non-controversial advertisement, there was less deviation from the screen center for the visual imagery than for the intertitle text (Table 17). This effect makes sense when considering the video content, and, specifically, that one of the intertitles was presented off-center, in the top-right corner of the screen. In addition to this effect, there was a significant attitude effect, such that, as participants indicated being more Pro-choice, they had less deviation from screen center. In addition to these significant effects, the trending Attitude by SV interaction (seen as the U patter in Figure 21) was again present. Although not significant, this pattern is very similar to those for fixation durations above and appears to be driven by eye movement behavior during the visual imagery (as opposed to the intertitles).

Table 17

Summary of Multilevel Regression for Non-controversial Ad Fixation Deviation from Gaze Center (Degrees of visual angle)

Variable	*B*	*SE(B)*	*t*
Intercept	13.6	.07	201.85
Attitude	-.07	.03	-2.76
SV	.04	.07	.62
Visual Type (Visual)	-.91	.09	-9.98
Att x SV	.03	.03	1.04
Att x Visual Type	.02	.04	.55
SV x Visual Type	-.12	.09	-1.28
Att x SV x Visual Type	.04	.04	1.02

Note. The continuous variables were centered for the interaction. Visual Type was dummy coded (Intertitle = 0, Visual = 1). No *p*-values are reported, because the developer of the statistical package does not provide them for the mathematical reasons. The *t*-values are used to interpret the effects.

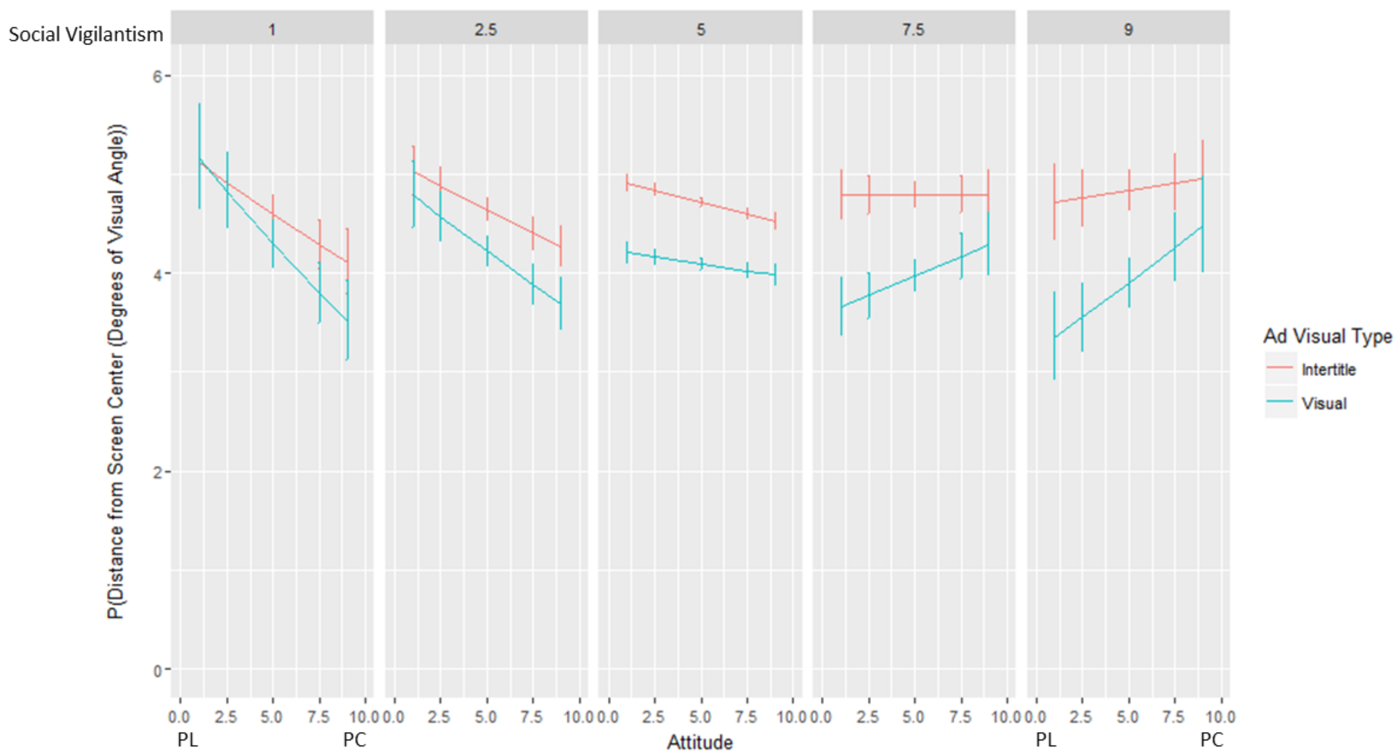

Figure 21. Non-controversial ad deviation from screen center analysis. The Y-axis shows the predicted average fixation deviation from the screen center for a participant given their attitude toward abortion (X-axis) and their level of Social Vigilantism (Panels labeled on the top 1 – 9). The blue line is for the visual imagery in the ad, and the red line is for the intertitles. Error bars are 1 standard error.

Comparing Figure 21 to Figure 22, it is clear that the results for the Abortion ads are very similar to those for the Non-controversial ad. The exception is that in the Abortion ads, none of the interactions with the Visual Type were significant or trending (Table 18). Interestingly, the Visual Type effect flipped for the Abortion ads, with more deviation from screen center for the Visual information. However, as with the Non-controversial ad, this makes sense given the placement of the intertitles. While in the Non-controversial ad one of the intertitles was not presented at the center of the screen, all of the intertitles in the Abortion ads were presented at the center of the screen.

The attitude effect was again significant, and in the same direction for the Abortion ads as in the Non-controversial ad (Table 18). As participants indicated being more Pro-choice, their gaze showed less deviation from screen center. Importantly, the Attitude x SV interaction was again trending, as seen in the U shape in Figure 22.

Table 18

Summary of Multilevel Regression for Abortion Ads

Deviation from Gaze Center (Degrees of visual angle)

Variable	*B*	*SE(B)*	*t*
Intercept	1.79	.05	36.19
Attitude	-.01	.003	-2.49
SV	.001	.008	.13
Visual Type (Visual)	.22	.01	19.12
Att x SV	.005	.003	1.67
Att x Visual Type	.007	.005	1.54
SV x Visual Type	-.009	.01	-.74
Att x SV x Visual Type	-.001	.005	-.20

Note. The continuous variables were centered for the interaction. Visual Type was dummy coded (Intertitle = 0, Visual = 1). No *p*-values are reported, because the developer of the statistical package does not provide them for the mathematical reasons. The *t*-values are used to interpret the effects.

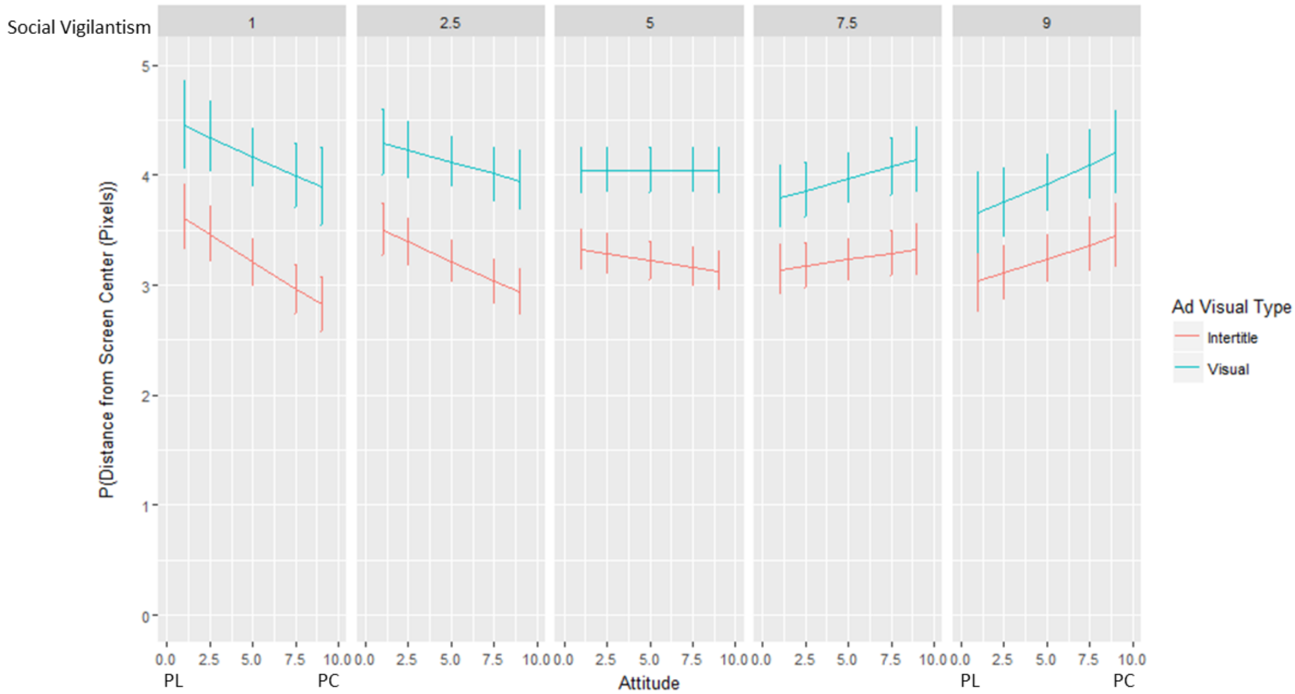

Figure 22. Abortion ads deviation from screen center analysis. The Y-axis shows the predicted average deviation from the screen center for a participant given their attitude toward abortion (X-axis) and their level of Social Vigilantism (Panels labeled on the top 1 – 9). The blue line is for the visual information in the ad, and the red line is for the intertitles. Error bars are 1 standard error.

The gaze deviation from screen center results indicated that overall the type of information presented (Intertitles vs. Visual Imagery) had a large influence on participants' gaze deviation. This is support for the Tyranny of Film, because regardless of congruence of the film with the viewer's attitudes, the film stimulus is guiding eye movements. Nevertheless, there was also an overall attitude effect across the advertisements, such that participants who identified as being more Pro-choice showed less overall deviation from the screen center (i.e., their fixation tended to be closer to the center of the screen). There was also again a descriptive (but not statistically significant) attitude by SV interaction seen as the "U" pattern in the gaze deviation figures. Together, these latter two results again show weak support for top-down effects that are independent from attitude congruence.

Debate speaker gaze deviation results. Testing the role of the individual difference predictors on the deviation from the debate speaker showed some very interesting results. When looking at the strict hypothesis test model, there is a relatively strong interaction of attitude congruence and SV (Table 19). However, when incorporating the debate video watched (control variable), the attitude congruence by SV interaction is no longer significant, though other interactions are significant, and, most intriguingly, many of the relationships in the strict model appear to show little slope or be in the opposite direction. Due to the variability in the two models, below the strict hypothesis model will be described and interpreted, and the comparisons will be made to the full model. Next, potential reasons for the divergent results will be discussed.

Overall, the strict hypothesis model shows many of the same effects as the previous results (Table 19). As can be seen in Figure 23, there is a general interaction of the individual difference predictors, creating the U-like pattern, particularly for the Pro-choice speaker. In addition to these reoccurring effects, additional effects are present. First, as participants increase in their social vigilantism, their gaze deviation from the debate speaker tends to be greater. This indicates that high SV participants were spending more time looking away from the current debate speakers face. Based on this analysis, it is unclear if this deviation was towards the other debate speaker, or in another direction. The AOI analysis can speak to this. Next, there were significant two-way interactions of both Attitude and SV with Debate Speaker, that were qualified by a significant 3-way interaction of Attitude, SV, and Debate Speaker (t = 4.10 is a moderate effect compared to the overall effects in the study). Interestingly, the reason for the 3-way interaction was that at low levels of SV there were attitude congruence effects, but at high levels of SV there are only attitude effects (Figure 23). Specifically, at low levels of SV, for the Pro-choice speaker, there is an attitude congruence effect where Pro-choice participants have less gaze deviation from the Pro-choice debater than Pro-life participants—evidence of selective exposure. However, for the Pro-life debater, there was no difference based on participant attitude. Conversely, at high levels of SV, attitude had an effect on gaze deviation, but it did not interact with who was the current speaker. Put differently, for those high in SV, and highly Pro-choice, regardless of the debate speaker, they had greater gaze deviations from the current speaker. This pattern of results is very complex, and as a result there is not clear support for an individual hypothesis. Given the Attitude and SV effects, it is clear top-down processes are influencing attentional selection. The attitude congruence effects for lower SV, Pro-life participants is weak support for the Social Vigilantism hypothesis.

Table 19

Summary of Multilevel Gamma Regression for Deviation from Current Debate Speaker (Strict Hypothesis Model)

Variable	*B*	*SE(B)*	*t*	Sig. (*p*)
Intercept	1.48	.03	46.25	< .001
Attitude	.007	.01	.53	.59
SV	.09	.03	2.65	.008
Debate Speaker (Pro-choice)	.06	.004	15.62	< .001
Att x SV	.01	.01	.85	.39
Att x Debate Speaker	-.006	.002	-3.61	< .001
SV x Debate Speaker	-.02	.004	-4.64	< .001

Att x SV x Debate Speaker	.006	.002	4.10	< .001

Note. The continuous variables were centered for the interaction. Debate speaker was effect coded (Pro-choice = 1, Pro-life = -1).

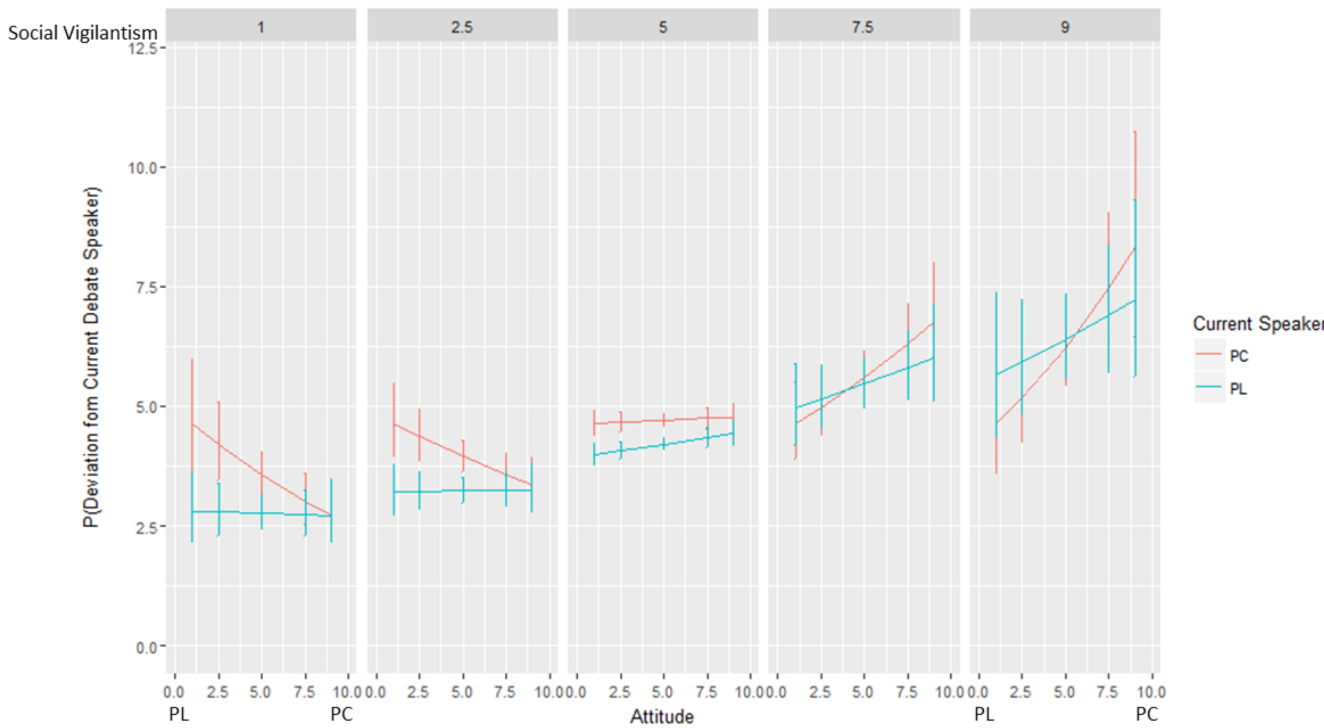

Figure 23. Debate video deviation from screen center analysis. The Y-axis shows the predicted average deviation from the current debate speaker for a participant given their attitude toward abortion (X-axis) and their level of Social Vigilantism (Panels labeled on the top 1 – 9). The blue line is for when the Pro-life debater is the current speaker, and the red line is for the Pro-choice speaker. Error bars are 1 standard error.

Moving to the Full Model, what is shown at a very broad level is that there were differences between the 2 debate video versions. While all of the main effects and 2-way interactions were nearly identical between the two models, the 3-way interaction of Attitude, SV, and Debate Speaker was no longer significant, and the slope estimate was in the opposite direction. Within the model, the likely reason for this was that the Video predictor accounted for additional variability in the model, including multiple high level 3- and 4- way interactions. Overall, what Figure 24 shows is that the only significant effect for the Pro-life/Pro-choice (Pro-life debater on the left) video was the SV main effect. The interactions occurred for the Pro-choice/Pro-life video (Pro-choice debater on the left). The location of the interactions is essentially flipped from the strict hypothesis model, with the attitude congruence effect occurring at high levels of SV, particularly among those who were pro-life, when the speaker on the left was Pro-choice.

Table 20

Summary of Multilevel Gamma Regression for Deviation from Current Debate Speaker (Full Model)

Variable	*B*	*SE(B)*	*t*	Sig. (*p*)
Intercept	1.49	.03	48.29	< .001
Attitude	.007	.01	.54	.59
SV	.10	.03	3.28	.001
Debate Speaker (Pro-life)	.05	.003	14.00	< .001
Video (PCPL)	.12	.03	3.91	< .001
Att x SV	-.001	.01	-.07	.94
Att x Debate Speaker	-.003	.002	-2.20	.03
SV x Debate Speaker	-.006	.004	-1.58	.11
Att x Video	-.01	.01	-1.17	.24
SV x Video	.03	.03	1.01	.31

Debate Speaker x Video	.09	.004	23.67	< .001
Att x SV x Debate Speaker	-.001	.002	-.70	.48
Att x SV x Video	-.001	.01	-.11	.91
Att x Debate Speaker x Video	-.001	.002	-.81	.42
SV x Debate Speaker x Video	.01	.004	2.36	.02
Att x SV x Debate Speaker x Video	-.003	.002	-1.86	.06

Note. Video PCPL refers to the video in which the Pro-Choice speaker was on the left, and the Pro-life speaker was on the right. The continuous variables were centered for the interaction. Debate speaker and video were effect coded (Debate).

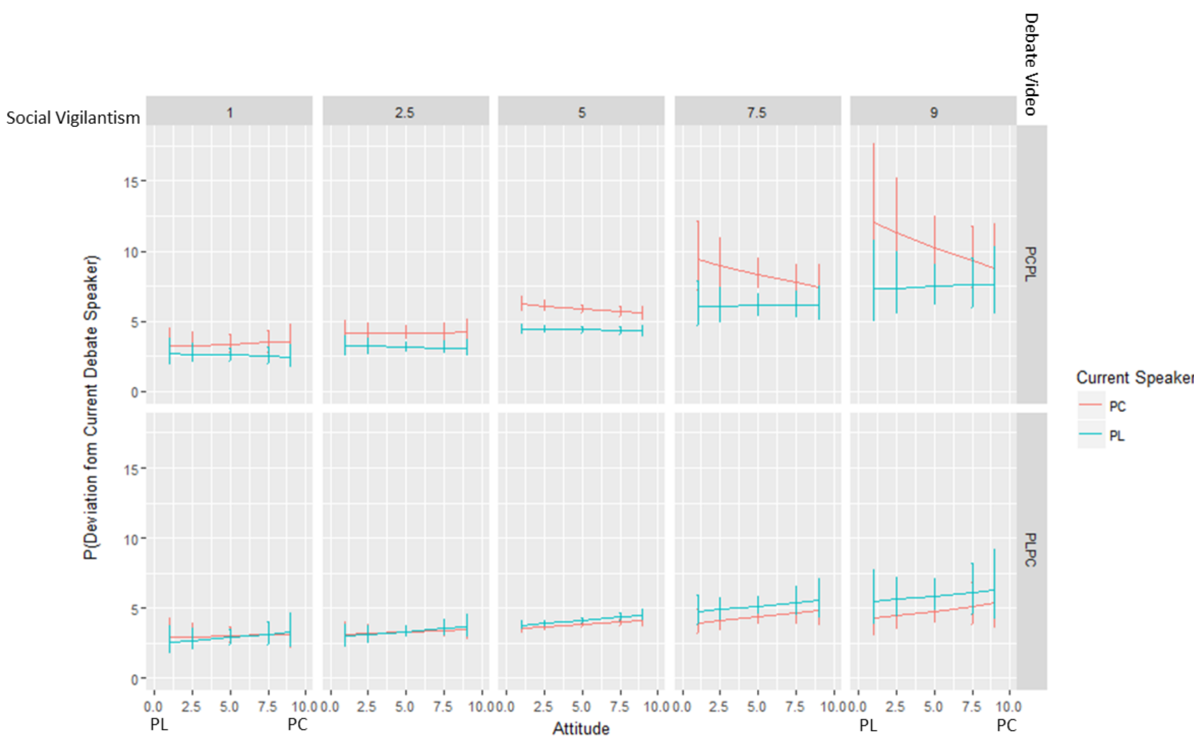

Figure 24. Debate video deviation from screen center analysis. The Y-axis shows the predicted average deviation from the current debate speaker for a participant given their attitude toward abortion (X-axis) and their level of Social Vigilantism (Panels labeled on the top 1 – 9). The blue line is for when the Pro-

life debater is the current speaker, and the red line is for the Pro-choice speaker. The horizontal panels with the labels on the right are for the debate video versions (PCPL = Pro-choice speaker on the left and Pro-life on the right; PLPC = Pro-life speaker on the left and Pro-choice on the right). Error bars are 1 standard error.

Upon seeing such divergent models that used the exact same data, an obvious hypothesis is that an error was made somewhere in the data analysis process. However, after carefully checking each level of the data analysis, no errors were found. First, it was verified that the same data was used in the analyses. Next, the model specifications were checked, and the only differences in the models was the inclusion of the Debate Video Version predictor. Looking at the model parameters in Tables 19 and 20, it can be seen that overall the intercepts and main effects are nearly identical, showing that the models are agreeing on the low-level parameter estimates. It is the high-level interactions where the models are diverging. Thus, the differing results are not due simply to an error in the creation of the figures for the models, but rather that the models are truly making different predictions.

Based on this, the next question is which model is more likely to generalize. Based on the AIC values used, the full model has a better fit to the data. However, one limitation of AIC values is that they do not take into account the complexity of the model, and, as such, using the AIC values without considering model complexity can result in the reporting of overfitted models.

Dynamic area of interest. Based on the gaze deviation results, area of interest analyses were carried out. Of all the analyses presented, the area of interest analyses allow for perhaps the most concrete descriptions of the eye movement behavior, because they are based on objects and features of the videos presented. In concrete terms, the area of interest analyses test, for example, if a participant looked at the blueberries shown in the Pro-life ad. As such, these analyses are some of the most important for interpreting participant eye movement behavior.

For these analyses, areas of interest were created to test if participants looked at the focal point(s) in each video. Focal points were identified as the main point of interest in each shot. In the advertisements, for the visual imagery, these were objects centered in the frame and in focus, and for the intertitles, this was text. In the debate, it was the 2 debaters, with each debater's area of interest coded for the side of the argument they were on.

For the advertisements, due to the two types of area interest, visual and intertitle, being categorically different stimuli types, there are two types of analyses presented below. First, an analysis with both types of area of interest is presented to give an overall picture of eye movement behavior in the advertisements. However, a major limitation of this analysis is that dwell time on the visual and intertitle AOIs have very different distributions that when combined are bimodal. In other words, an analysis with each type of area of interest violates the assumption of normality. Further, transformations and generalized modeling techniques cannot fully alleviate this violation based on the bimodal distribution. To run analyses that do fully meet the normality assumption, the overall AOI analysis was broken down into analyses for the visual imagery, and analyses of the intertitles. The intertitle analyses are presented in their own section as the reading analyses. This was done because a series of reading analyses were run to test specific hypotheses related to the individual difference effects on reading attitude-congruent and incongruent information.

The main area of interest analyses were on the overall dwell times in regions of interest. These analyses tested if attitude congruence and social vigilantism influenced the amount of time participants fixated attitude-congruent and –incongruent information. The type of model used to analyze the area of interest dwell times varied based on video. The Non-controversial ad had a close to normal distribution of dwell times, so a general multilevel model was used. The abortion ads and the debate both had highly positively skewed dwell time data, so generalized multilevel models with a gamma distribution were used. However, the data for both videos were still bimodal.

There are a number of ways in which the dwell time for an area of interest can be calculated. The approach used for the current study calculated dwell times by aggregating the fixation durations in a given area of interest to get the overall dwell time in that area of interest. This procedure was used because before aggregating the data, the fixation data could be cleaned using the same procedure as the fixation duration analyses. Thus, for the area of interest analyses, fixations were cleaned to exclude fixations less than 40ms and greater than 3000ms.

An important limitation of these analyses is that by aggregating fixation durations for areas of interest, if an area of interest is not fixated, it does not receive a value (i.e., it is not included in the analysis). Overall, in the current study this was not a major issue because the analyses were not done at a fine enough level that 0 values for a small number of AOIs would have an effect. Thus, in general, each participant had a value for each level of each within-subjects predictor variable. Instances where this was not the case are indicated below. Importantly, for cases where participants were dropped from the analysis, it could be run as a logistic regression testing dwell time in the area of interest.

Non-controversial ad area of interest results. The effects below are very similar to those of the previous eye movement results. There were strong effects showing that the video stimulus was guiding attention, seen here through participants generally having high dwell times in the areas of interest (i.e., fixating the focal point of the video). In addition to these effects, there are attitude and SV effects, including their interaction that creates the arch/U shape in the figures.

Non-controversial ad area of interest full video. The strongest effects (*t*-values of 223.88 and -35.99) for the area of interest analysis are that participants had high dwell times for the visual and intertitles information and spent a relatively small amount of time outside of the AOI regions (Table 21). In addition to these strong effects were two significant interactions with relatively small effects (*t*-values of -2.26 and 2.29). First, the Attitude by SV interaction was significant, creating the arch pattern with this data (Figure 25). Second, this interaction was qualified by a higher-level interaction with AOI Type. Specifically, the Attitude by SV interaction only occurs for the Visual and Intertitles, and not for fixations outside of the AOIs.

The lack of the interaction between Attitude and SV for the "Outside AOI" is a little odd, given the videos have a set viewing time, so any explained variability for the AOIs should be mirrored in the Outside the AOI measure. In other words, if someone is not looking in an AOI, they are looking outside of the AOI. However, one potential reason for this is that since participants mostly stayed in the AOIs, there was a floor effect for the Outside the AOI level of the AOI Type factor. As such, the model had trouble predicting variability for the Outside the AOI level of the factor beyond the main effect. In addition to this statistical explanation, the fixation duration results showed the same general pattern (Figure 14). Based on this, the participants that had the shortest dwell times also had the shortest fixation durations. Given the set length of the videos, if a person has shorter fixation durations, they also necessarily have more fixations that require more saccades. Since dwell time was calculated using fixations durations, a participant that had more time taken up executing saccades would have less fixation time accounted for in the dwell time analysis. In concrete terms, if 2 participants spend 5 seconds looking around the screen, and each of their fixations lands on the screen, their dwell time on the screen will not be 5 seconds unless they never move their eyes. Further, directly concerning the point above, if one of the participants has an average fixation duration of 330 ms and the other has an average of 250 ms, given the fixed interval of the viewing session (5 seconds), the participant with the 330ms fixation durations will necessarily have more dwell time on the screen. This is because the participants with 330ms fixation durations will have made fewer saccades[2].

Table 21

Summary of Non-controversial ad Multilevel Regression for Area of Interest Dwell Time (Full Video)

Variable	*B*	*SE(B)*	*t*
Intercept	6644.31	126.40	52.56
Attitude	89.72	49.81	1.80
SV	46.43	130.80	.35
AOI Type (Intertitle)	3126.28	130.91	23.88
AOI Type (Outside AOI)	-4711.85	190.91	-35.99
Att x SV	-114.91	50.81	-2.26
Att x AOI Type (Intertitle)	33.04	51.59	.64

[2] Doing the math for this, in 5 seconds, if a participant has 330ms fixation durations, assuming saccades are approximately 50ms, they would make 13 saccades, which would account for 650ms of the 5 seconds. Conversely, with 250ms fixation durations, 17 saccades would be made, accounting for 850ms of the 5 seconds. Based on these values, given the 80 ms difference in fixation durations, for approximately every 25 seconds of viewing time, the participant with the shorter fixation durations would have 1 second less dwell time in an AOI.

Att x AOI Type (Outside AOI)	-101.10	51.59	-1.96
SV x AOI Type (Intertitle)	-175.62	135.46	-1.30
SV x AOI Type (Outside AOI)	66.00	135.46	.49
Att x SV x AOI Type (Intertitle)	-8.15	52.62	-.15
Att x SV x AOI Type (Outside AOI)	120.26	52.62	2.29

Note. The continuous variables were centered for the interaction. Area of Interest Type was effect coded (Intertitle = 1, 0; Outside AoI = 0, 1; Visual = -1, -1). No *p*-values are reported, because the developer of the statistical package does not provide them for the mathematical reasons. The *t*-values are used to interpret the effects.

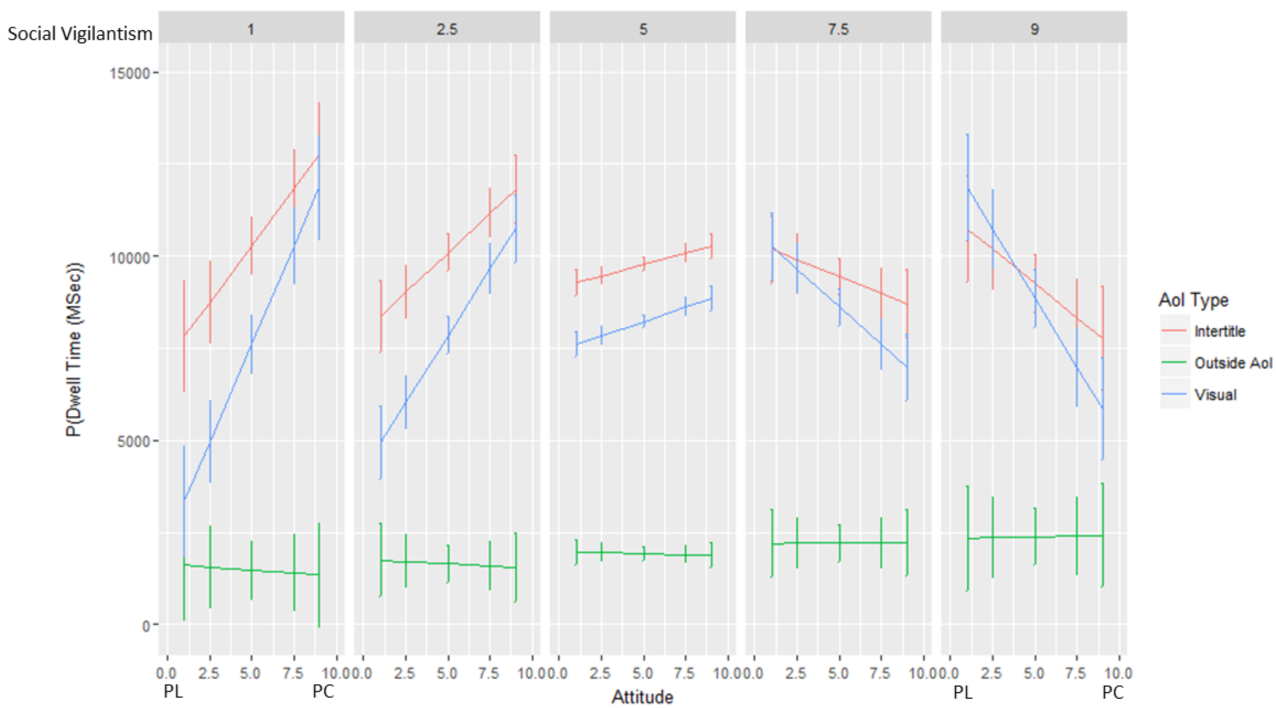

Figure 25. Non-controversial ad area of interest dwell time in milliseconds. The Y-axis shows the predicted dwell time for a participant given their attitude toward abortion (X-axis) and their level of Social Vigilantism (Panels labeled on the top 1 – 9). The red line is for the video intertitles, the blue line

is for visual information in the ad, and the green line is for information outside of the areas of interest. Error bars are 1 standard error.

Non-controversial ad area of interest visual only. Testing individual difference effects on only the Visual AOIs returned essentially the same effects (Table 22), but overall more fully met the assumptions of the analysis used. With only one area of interest and video included in the analysis, a multilevel model was no longer necessary, so a linear regression was run. The distribution of the dwell times for the visual AOIs had a small negative skew, likely driven by the few participants who did not spend a large amount of time fixating the visual AOIs. Based on the negative distribution a square root transformation was run on the data to normalize it.

Table 22

Summary of Non-controversial Ad Multilevel Regression for Area of Interest Dwell Time (Visual AOI Only)

Variable	*B*	*SE(B)*	*t*	Sig. (*p*)
Intercept	8604.4	1743.2	24.36	< .001
Attitude	1496.3	1094.3	1.87	.06
SV	1455.3	1773.3	.67	.50
Att x SV	-1884.5	1105.2	-2.91	.004

Note. The B and SE(B) values are the untransformed values from the model, which was done to increase the interpretability of the values. The values are now in milliseconds of dwell time. The data was initially squared, so the square root was calculated to untransform the data. The continuous variables were centered for the interaction.

Taken together, the area of interest results for the Non-controversial video show that participants tended to follow the intended information in the advertisement (support for Tyranny of Film), but that some of the variability was accounted for by the interaction of participants' level of attitude and SV (top-down effects). At low levels of SV, Pro-choice participants showed greater dwell time on the intended video content, and at high levels of SV Pro-life participants had higher dwell times. From an attentional selection perspective, this indicates at low levels of SV, Pro-choice participants attend more to the intended information presented in the ad, and the opposite was the case at high levels of SV. As these effects were not driven by attitude congruence, the specific source and function of these differences is not clear. However, at a broad level it appears the effects may be driven by trait-like personality factors. Some similar examples of this have been shown for participants who report being conservative or liberal, and their selective attention for aversive and appetitive stimuli respectively (Dodd et al., 2012).

Abortion ads area of interest results.

Abortion ads area of interest full video. The abortion ad area of interest results for the full video mirrored the results for the Non-controversial video fairly well, but the effects in general were not as strong (Table 23). There was still the strong effect of area of interest type (*t*-values of -14.85 and 22.41). Participants had the greatest dwell time for the visual imagery followed by the intertitles. This makes sense given that the visual imagery was presented for a larger proportion of the video than the intertitles were. These results show that overall participants were attending to the video focal content, supporting the Tyranny of Film. The Attitude by SV interaction does not reach significance in this analysis, but it trended (t = -1.93) in the same direction as found for the Non-controversial ad (Figure 26). Importantly, the best model based on AIC values did not included the video (Pro-choice or Pro-life ad), which means that attitude congruence did not reliably influence whether participants fixated the AOIs.

Table 23

Summary of Abortion Ads Gamma Multilevel Regression for Area of Interest Dwell Time (Full Videos)

Variable	*B*	*SE(B)*	*t*	Sig. (*p*)
Intercept	9.07	.08	114.01	< .001
Attitude	.001	.02	.09	.93
SV	-.06	.04	-1.28	.19
AOI Type (Outside AOI)	-1.03	.07	-14.85	< .001
AOI Type (Visual)	.94	.04	22.41	< .001
Att x SV	-.03	.02	-1.93	.05⁺
Att x AOI Type (Outside AOI)	.02	.03	.57	.57
Att x AOI Type (Visual)	.006	.02	.37	.71
SV x AOI Type (Outside AOI)	.14	.07	1.91	.06
SV x AOI Type AOI Type (Visual)	.03	.04	.61	.54
Att x SV x AOI Type (Outside AOI)	.02	.03	.65	.51
Att x SV x AOI Type AOI Type (Visual)	.004	.02	.22	.82

Note. The AOI Type variable was dummy coded for this analysis (Intertitle = 0, 0; Outside AOI = 1, 0; Visual = 0, 1), which aided with the convergence of the models. Following standard rounding procedure, the p-value marked with a ⁺ is reported as p = .05. Carrying this p-value out to 3 decimal places shows the value is above the standard .05 cutoff ($p = .053$). The continuous variables were centered for the interaction.

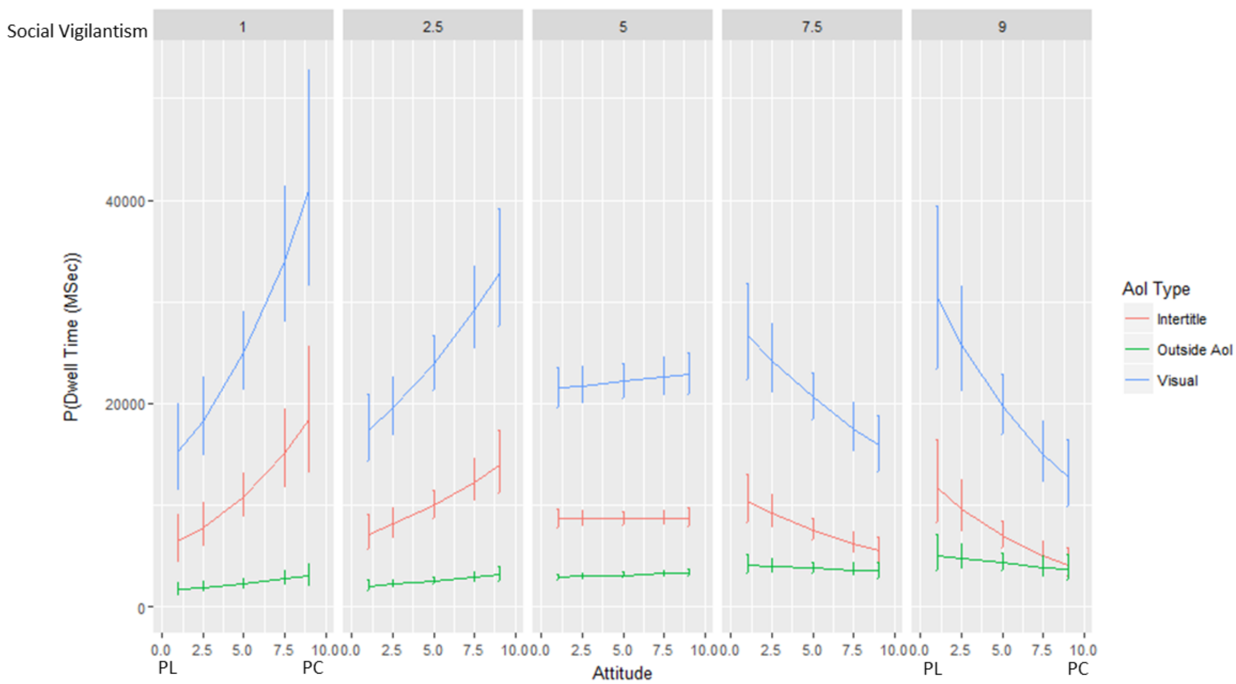

Figure 26. Abortion ads area of interest dwell time in milliseconds. The Y-axis shows the predicted dwell time for a participant given their attitude toward abortion (X-axis) and their level of Social Vigilantism (Panels labeled on the top 1 – 9). The red line is for the video intertitles, the blue line is for visual information in the ad, and the green line is for information outside of the areas of interest. Error bars are 1 standard error.

Abortion ads area of interest visual only. When only including the Visual information AOI, the results are consistent with the full video analysis. The only significant effect was the Attitude by SV interaction (Table 24), which can be seen as the arch pattern in Figure 27. This was a small effect ($t = -2.87$).

One difference in the visual AOI model, was that the best model included the Video (Pro-choice or Pro-life ad). The regression terms with Video did not have effect sizes that would indicate they were significant (Table 24), but they are almost all above a *t*-value of 1. This indicates there may be some variability accounted for by the video watched, but Figure 27 shows the dwell times were not driven by attitude congruence, since the patterns were essentially the same for both the Pro-life and Pro-choice ads.

Table 24

Summary of Abortion Ads Linear Multilevel Regression for Area of Interest Dwell Time (Visual AOI Only)

Variable	*B*	*SE(B)*	*t*
Intercept	23665.43	2959.38	7.99
Attitude	170.90	191.19	.89
SV	-858.76	495.96	-1.73
Video (Pro-choice)	2978.38	2929.49	1.02
Att x SV	-556.70	194.32	-2.87
Att x Video (Pro-choice)	117.71	95.13	1.24
SV x Video (Pro-choice)	-110.47	246.42	-.45
Att x SV x Video (Pro-choice)	99.97	96.55	1.35

Note. The Video variable was effect coded for this analysis (Pro-choice = 1, Pro-life = -1). The continuous variables were centered for the interaction. No p-values are reported, because the developer of the statistical package does not provide them for the mathematical reasons. The t-values are used to interpret the effects.

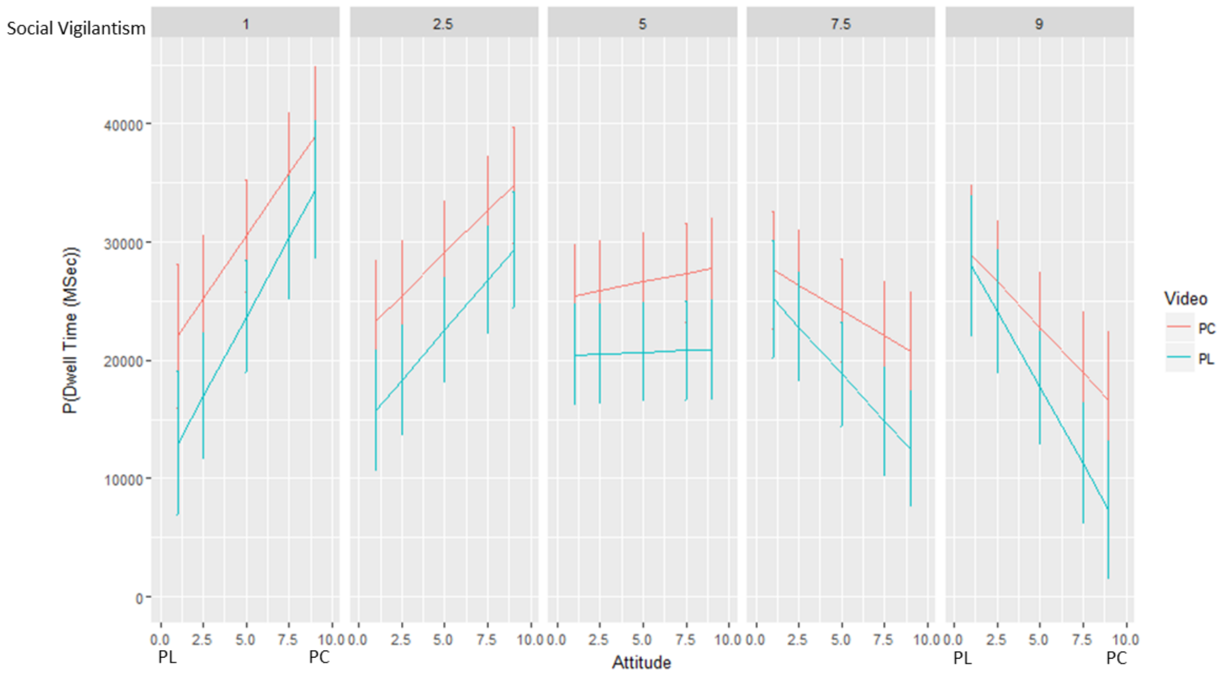

Figure 27. Abortion ads area of interest dwell time in milliseconds for only the visual information area of interest. The Y-axis shows the predicted dwell time for a participant given their attitude toward abortion (X-axis) and their level of Social Vigilantism (Panels labeled on the top 1 – 9). The red line is for the Pro-choice ad, the blue line is for the Pro-life ad. Error bars are 1 standard error.

The area of interest results for the abortion ads are congruent with the non-controversial ad. Overall, participants followed the intended information in the video (e.g., read the text and guided their attention towards the points of focal visual interest) regardless of congruence of the ads with viewers' attitudes, supporting the stimulus driven effects. In addition to these bottom-up effects, there was also the interaction of attitude and SV, indicating top-down effects that are independent of attitude congruence.

Debate area of interest results. Three sets of debate AOIs were created to allow for tests of attentional selection effects at different levels of specificity. The first AOI set was the entire debater, the second set was each debater's head, and the third set was for each debater's mouth.

As with the previous AOI analyses, the data used to calculate dwell time in the AOI was based on the sum of fixation durations. Another important benefit of using this data for the debate is that it allows for the inclusion of the current debate speaker as a variable.

Debate full area of interest results. Two AOI analyses are presented for the full AOI. First, the extent to which participants were fixating the AOIs (i.e., looking at the debate speakers, as opposed to somewhere else on the screen) was tested. This was done by including in the AOI fixated variable a level for not being fixated in one of the AOIs similar to what was done above for the advertisement analyses. As with the advertisement analyses, additional analyses were run for the debate that excluded this level. Especially for the debate AOIs, this was very beneficial in getting the models to converge. The reason for this is that, as will be seen in the analysis with Outside AOI included as a level in the analysis, participants mostly fixated the debaters. As such, there were a relatively large number of participants who never fixated outside of the debaters' AOI (n = 50). Additionally, for the participants that did fixate outside of the debater AOIs, it was for a very low proportion of the time the video was playing. Due to these 2 factors, including Outside AOI in the analysis makes model fits more difficult.

When including the Outside AOI level of the Area of Interest factor in the analysis, the best model includes Attitude, Area of the Interest, and Current Debate Speaker (Table 25). With this model, the Area of Interest variable is significant, with participants having greater dwell times for the Pro-choice and Pro-life AOIs than Outside of the AOIs. Additionally, this effect was qualified by an interaction with the Current Debate Speaker. The interaction shows that dwell time was much higher for the area of interest for the current debate speaker (e.g., when the Pro-choice debater was speaking, people tend to look at the Pro-choice debater) (Figure 28).

Table 25

Summary of Debate Gamma Multilevel Regression for Area of Interest Dwell Time (Full Debater AOIs)

Variable	*B*	*SE(B)*	*t*	Sig. (*p*)
Intercept	9.52	.05	181.61	< .001
Attitude	.01	.02	.50	.62
Area of Interest (Outside AOI)	-2.03	.04	-52.39	< .001
Area of Interest (Pro-choice)	.98	.03	28.64	< .001
Current Speaker (Pro-choice)	-.02	.02	-.99	.32
Att x Area of Interest (Outside AOI)	.01	.02	.54	.59
Att x Area of Interest (Pro-choice)	-.004	.01	-.34	.74
Att x Current Speaker (Pro-choice)	-.01	.01	-.67	.50
Area of Interest (Outside AOI) x Current Speaker (Pro-choice)	-.01	.03	-.19	.85
Area of Interest (Pro-choice) x Current Speaker (Pro-choice)	1.19	.03	35.20	< .001
Att x Area of Interest (Outside AOI) x Current Speaker (Pro-choice)	-.01	.01	-.70	.48
Att x Area of Interest (Pro-choice) x Current Speaker (Pro-choice)	.01	.01	.53	.59

Note. The AOI Type (Intertitle = 0, 0; Outside AOI = 1, 0; Visual = 0, 1) and Current Speaker (Pro-choice = 1, Pro-life = -1) variables was effect coded for this analysis. The continuous variables were centered for the interaction.

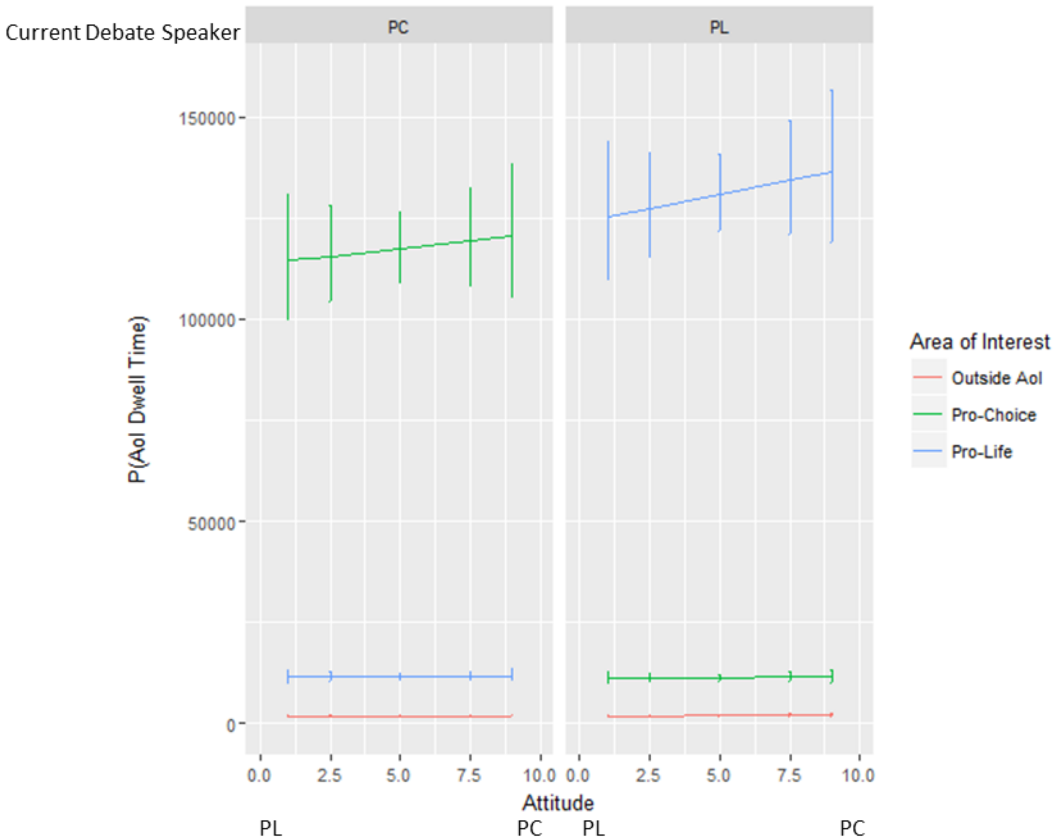

Figure 28. Debate video area of interest dwell time in milliseconds. The Y-axis shows the predicted dwell time for a participant given their attitude toward abortion (X-axis). The panels labeled at the top indicate the current debate speaker (PC = Pro-choice; PL = Pro-life). The red line is for dwell time outside of the areas of interest, the blue line is for the Pro-life speaker area of interest, and the green line is for the Pro-choice. Error bars are 1 standard error.

When the Outside AOI level of the Area of Interest variable is removed, the major change is that the best model includes SV as well. In this model, the effect of participants looking at the current debate speaker is still significant (Table 26). Additionally, there is a main effect of SV, with dwell time increasing as participants indicated being higher in SV. Lastly, as can be seen in Figure 29, the attitude by SV interaction is trending in the same direction as for the advertisements.

Table 26

Summary of Debate Gamma Multilevel Regression for Area of Interest Dwell Time (Full Debater AOIs and without "Outside AOI")

Variable	*B*	*SE(B)*	*t*	Sig. (*p*)
Intercept	10.49	.05	231.22	<.001
Attitude	.01	.02	.57	.57
SV	.10	.05	2.18	.03
Area of Interest (Pro-choice)	-.04	.02	-1.95	$.05^{+}$
Current Speaker (Pro-choice)	-.02	.02	-.95	.34
Att x SV	-.03	.02	-1.58	.12
Att x Area of Interest (Pro-choice)	-.0001	.01	-.01	.99
SV x Area of Interest (Pro-choice)	.02	.02	1.13	.26
Att x Current Speaker (Pro-choice)	-.001	.01	-.06	.95
SV x Current Speaker (Pro-choice)	-.01	.02	-.38	.70
Area of Interest (Pro-choice) x Current Speaker (Pro-choice)	1.18	.02	53.75	< .001
Att x SV x Area of Interest (Pro-choice)	-.001	.01	-.13	.89
Att x SV x Current Speaker (Pro-choice)	-.005	.01	-.58	.56
Att x Area of Interest (Pro-choice) x Current Speaker (Pro-choice)	.002	.01	.20	.84
SV x Area of Interest (Pro-choice) x Current Speaker (Pro-choice)	-.09	.02	-4.27	< .001
Att x SV x Area of Interest (Pro-choice) x Current Speaker (Pro-choice)	-.001	.01	-.10	.91

Note. The AOI Type and Current Speaker variable was effect coded for this analysis. Both predictors had the same levels: Pro-choice = 1, Pro-life = -1. The continuous variables were centered for the interaction. Following standard rounding procedure, the p-value marked with a + is reported as p = .05. Carrying this p-value out to 3 decimal places shows the value is above the standard .05 cutoff (p = .051).

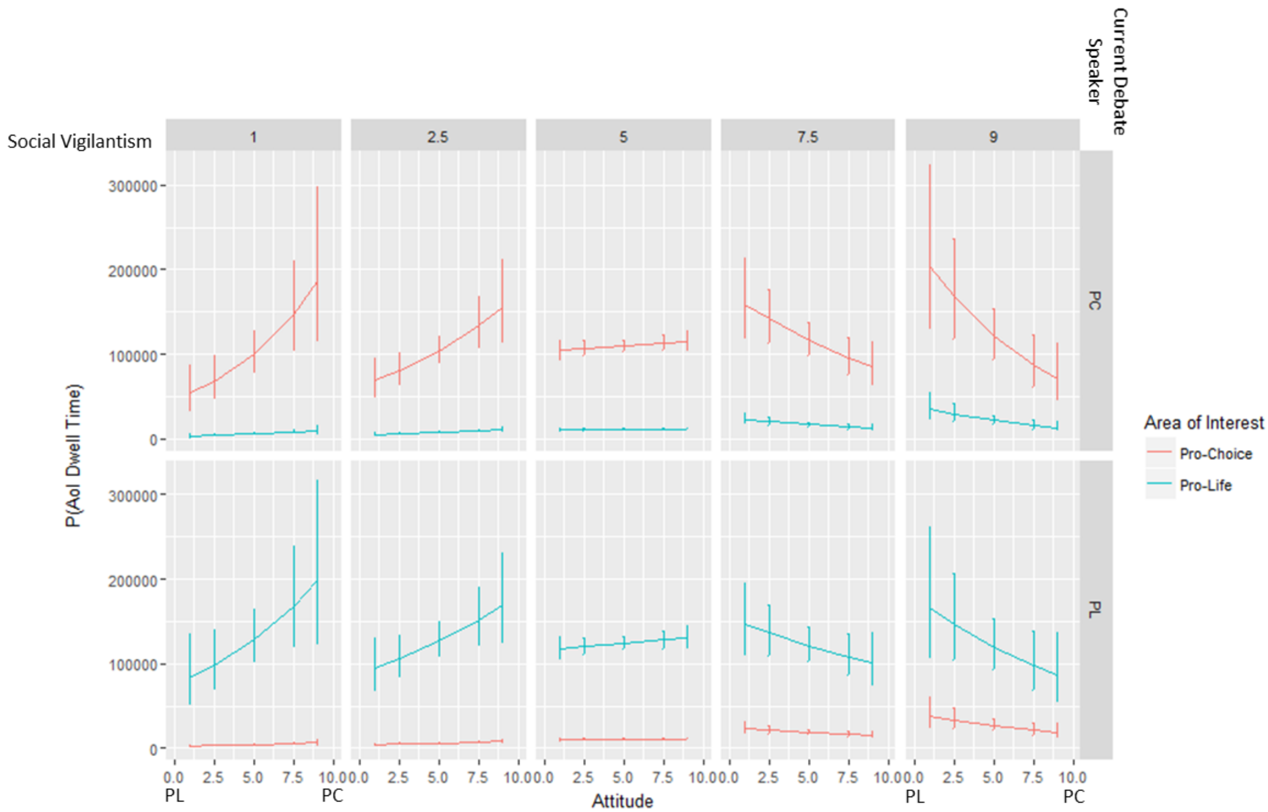

Figure 29. Debate video area of interest dwell time in milliseconds not including the Outside AOI level of the area of interest. The Y-axis shows the predicted dwell time for a participant given their attitude toward abortion (X-axis). The panels at the top show the level of Social Vigilantism (labeled on the top 1 – 9). The red line is for dwell time for the Pro-choice speaker area of interest, and the blue line is for the Pro-life. The horizontal panels with the labels on the right are for the current debate speaker (PC = Pro-choice current speaker; PL = Pro-life debater is current speaker). Error bars are 1 standard error.

Debate head and mouth area of interest results. When rerunning the full area of interest analyses for the head and mouth areas of interest the effects were essentially the same (Tables 27 & 28). The main difference between the area of interest analyses was that as the area of interest was increasingly more refined (Full → Head → Mouth), the effect sizes increased, and trending effects became significant. The attitude by SV interaction was significant for the Mouth AOI analysis, again taking on the arch pattern (Figure 30). In addition to this, there were high level interactions with attitude and SV. Attitude and SV interact with the Area of Interest, such that, the attitude by SV interaction was stronger for the Pro-life area of interest than the Pro-choice.

Table 27

Summary of Debate Gamma Multilevel Regression for Area of Interest Dwell Time (Debater **Head** AOIs and without "Outside AOI")

Variable	*B*	*SE(B)*	*t*	Sig. (*p*)
Intercept	10.32	.05	219.49	< .001
Attitude	.01	.02	.35	.73
SV	.09	.05	2.05	.04
Area of Interest (Pro-choice)	-.04	.02	-1.93	$.05^{+}$
Current Speaker (Pro-choice)	-.02	.02	-.84	.40
Att x SV	-.03	.02	-1.79	.07
Att x Area of Interest (Pro-choice)	-.004	.01	-.47	.64
SV x Area of Interest (Pro-choice)	.01	.02	.47	.64

Att x Current Speaker (Pro-choice)	.002	.01	.19	.85
SV x Current Speaker (Pro-choice)	.01	.02	.31	.76
Area of Interest (Pro-choice) x Current Speaker (Pro-choice)	1.27	.02	52.81	< .001
Att x SV x Area of Interest (Pro-choice)	.002	.01	.18	.86
Att x SV x Current Speaker (Pro-choice)	-.01	.01	-.77	.44
Att x Area of Interest (Pro-choice) x Current Speaker (Pro-choice)	.004	.01	.42	.68
SV x Area of Interest (Pro-choice) x Current Speaker (Pro-choice)	-.09	.02	-4.00	< .001
Att x SV x Area of Interest (Pro-choice) x Current Speaker (Pro-choice)	.001	.01	.12	.90

Note. The AOI Type and Current Speaker variable was effect coded for this analysis. Both predictors had the same levels: Pro-choice = 1, Pro-life = -1. The continuous variables were centered for the interaction. Following standard rounding procedure, the p-value marked with a $^{+}$ is reported as p = .05. Carrying this p-value out to 3 decimal places shows the value is above the standard .05 cutoff (p = .054).

Table 28

Summary of Debate Gamma Multilevel Regression for Area of Interest Dwell Time (Debater **Mouth** AOIs without "Outside AOI")

Variable	*B*	*SE(B)*	*t*	Sig. (*p*)
Intercept	8.84	.09	88.42	< .001
Attitude	.06	.04	1.43	.15
SV	.22	.10	2.14	.03
Area of Interest (Pro-choice)	-.02	.03	-.76	.45
Current Speaker (Pro-choice)	-.06	.03	-2.09	.04

Att x SV	-.08	.04	-1.99	.05
Att x Area of Interest (Pro-choice)	-.01	.01	-.46	.65
SV x Area of Interest (Pro-choice)	-.003	.03	-.09	.93
Att x Current Speaker (Pro-choice)	.0002	.01	.02	.99
SV x Current Speaker (Pro-choice)	-.01	.03	-.30	.77
Area of Interest (Pro-choice) x Current Speaker (Pro-choice)	1.44	.03	46.36	< .001
Att x SV x Area of Interest (Pro-choice)	.03	.01	2.48	.01
Att x SV x Current Speaker (Pro-choice)	-.02	.01	-1.54	.12
Att x Area of Interest (Pro-choice) x Current Speaker (Pro-choice)	.001	.01	.05	.96
SV x Area of Interest (Pro-choice) x Current Speaker (Pro-choice)	-.13	.03	-4.07	< .001
Att x SV x Area of Interest (Pro-choice) x Current Speaker (Pro-choice)	.01	.01	.74	.46

Note. The AOI Type and Current Speaker variable was effect coded for this analysis. Both predictors had the same levels: Pro-choice = 1, Pro-life = -1. The continuous variables were centered for the interaction.

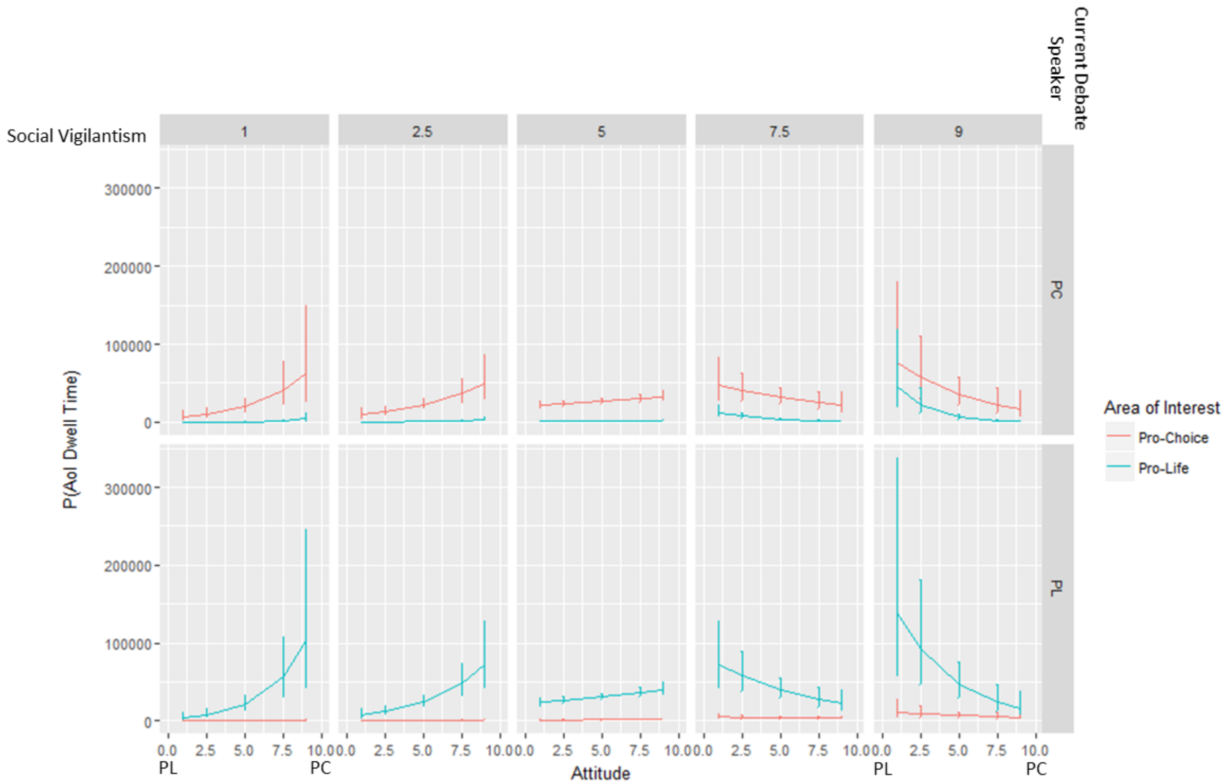

Figure 30. Debate video area of interest dwell time for the debater mouth areas of interest in milliseconds not including the Outside AOI level of the area of interest. The Y-axis shows the predicted dwell time for a participant given their attitude toward abortion (X-axis). The panels at the top show the level of Social Vigilantism (labeled on the top 1 – 9). The red line is for dwell time for the Pro-choice speaker area of interest, and the blue line is for the Pro-life. The horizontal panels with the labels on the right are for the current debate speaker (PC = Pro-choice current speaker; PL = Pro-life debater is current speaker). Error bars are 1 standard error.

Taken together, the debate area of interest analyses show that, above all else, participants were following the debate speaker, which is support for the Tyranny of Film hypothesis. However, in addition to this effect, participants' attitude and level of SV also had an effect on dwell time in the areas of interest. For participants low in SV, the more Pro-choice participants showed greater dwell times in the AOIs, whereas for participants high in SV, the more Pro-life participants had greater dwell times in the AOIs. Importantly, these effects were independent of attitude congruence. This is the familiar interaction between attitude and SV that we have seen repeatedly in our other memory and eye movement analyses.

Eye-movements and reading. The presence of text in the advertisements allows for more complex analyses testing how attitude congruence and social vigilantism influence the processes of reading. The reasons for this are that 1) text is a much more controlled stimulus than video that allows for the precise creation of regions of interest for each word, and 2) far more research has been done on eye-movements and reading (see Rayner, 1998) than on dynamic scenes, which allows for more specific predictions of individual difference effects.

The reading analyses are important, because they test specifically if the argument information in the ads was processed by each participant. Additionally, more fine-grained analyses can identify reading styles (e.g., skimming). Additionally, the intertitles are very different from the visual imagery in the ads, in that they are not information that should be influenced by the Tyranny of Film. As such, it is possible that there should be stronger effects for the reading analyses. However, one important consideration is that the intertitles did have one very important video-based characteristic, which was that they were presented for a set amount of time. As such, depending on reading speed, participants may not have had time to engage in all the reading behaviors tested for below (e.g., regressions) if the video cut to the next scene before the participant finished the intertitle.

For the eye-movement and reading analyses, the time that the text was on the screen was used to create interest periods for the analyses. Within these interest periods, a region of interest was created for each word. This level of detail in the region of interest analysis creates a clear picture of how participants were reading the text. At the most general level, it allowed for tests of whether the entire text was read (i.e., do they fixate each of the main content words of the text?). Fixation duration and dwell time on words shows the amount of processing time on the text. Finally, eye-movements sent back to previously read words, *regressive eye movements*, were calculated. Together, these measures show the level at which participants were processing the text. Were they reading the text at all, were they just skimming the text (short fixation durations, longer saccades, fewer words fixated, and fewer regressions), or were they engaging in a deep level of processing (long fixation durations, shorter saccades, more words fixated, and more regressions) (Duggan & Payne, 2009, 2011; Masson, 1982).

There are competing reasons participants might skim or engage in a deep level of processing given attitude congruence and the resistance strategies available to participants exposed to attitude-incongruent information. A participant could skim the text if 1) they agree with it and know the argument, which makes it easy to process, or 2) they disagree with the information and engage in selective exposure by only cursorily processing it. Participants may engage in a deep level of processing if 1) they agree with the information and want to expose themselves to it, or 2) they disagree with the information and want to resist it by engaging with it (e.g., high *social vigilantism* participants counter-arguing). Conversely, all participants may process the text in a similar way. The Tyranny of Film would not directly predict this for text, because it applies only to dynamic video content. However, support for a lack of differences in reading these short intertitle texts can be seen in the difficulty people have in not reading text presented to them, even when they are told to ignore the text. The most notable example of this is the Stroop Effect (Stroop, 1935), which is that when participants are told to indicate the color of ink (or font) a word is written in, they are much slower to respond when the word written is a color that does not match the color of ink (or font) (Cerf, Frady, & Koch, 2009).

Content word fixation results. To first identify if participants were reading the text, it was tested if attitude and social vigilantism influenced the probability that the content words (nouns, verbs, adjectives, and adverbs) were fixated. To comprehend a text, it is the content words that need to be fixated. Thus, if the content words were not fixated, it is likely participants were not reading the text for comprehension.

For the content word analyses, a number of predictors were tested in models. First, the main predictors used throughout the study were included (Attitude and SV). For the abortion ads, the video watched was also tested to test for attitude congruence effects. In addition to these variables, the text-specific variables of Intertitle Order (i.e., in which intertitle did the word come from) and Word Order (i.e., where was the word in the text: position 1, position 2, …, position x). These variables were tested because it is conceivable that individual difference effects may only occur in certain positions. For example, everyone may read the first intertitle of an advertisement, because they did not know what the advertisement was about yet. Once a participant has read the first intertitle, they may begin to show effects based on their attitude and its congruence with the advertisements position. Similarly, for Word Order, a participant may begin reading an intertitle to initially identify its position, and then stop reading before the end if they notice an incongruence.

For the non-controversial advertisement, what is at first clear is that, overall, participants tended to fixate the content words (Figure 31), which produced a ceiling effect. The best model showed an effect for Intertitle Order, with participants more likely to fixate content words in later intertitles (Table 29). Additionally, the interaction of Attitude, SV, and Intertitle Order was near significance. Figure 31 shows that for intertitle 1, Pro-life participants low in SV were less likely to fixate the content words and Pro-choice participants high in SV were less likely to fixate content words. This created the familiar arch pattern seen in many of the above analyses.

It is interesting that the individual difference effects were trending to be strongest for the first intertitle. Generally, the initial logic was that if Intertitle Order would have an effect, it would occur for the later intertitles once participants knew what the intertitles would communicate. An effect for intertitle 1 shows an initial avoidance of the intertitle information, which may indicate a more trait like approach effects on reading intertitles. The abortion ad results will help speak to whether this is the case.

Table 29

Summary of Non-controversial Ad Logistic Regression for Content Word Fixation

Variable	*B*	*SE(B)*	*z*	Sig. (*p*)
Intercept	4.09	.39	10.31	< .001
Attitude	-.09	.08	-1.14	.25
SV	-.21	.22	-.95	.34
Intertitle Order	1.73	.29	5.97	< .001
Att x SV	.07	.09	.82	.41
Att x Intertitle Order	-.08	.06	-1.18	.24
SV x Intertitle Order	.03	.17	.18	.86
Att x SV x Intertitle Order	.13	.07	1.94	$.05^{+}$

Note. Following standard rounding procedure, the p-value marked with a + is reported as p = .05. Carrying this p-value out to 3 decimal places shows the value is above the standard .05 cutoff (p = .053). The continuous variables were centered for the interaction.

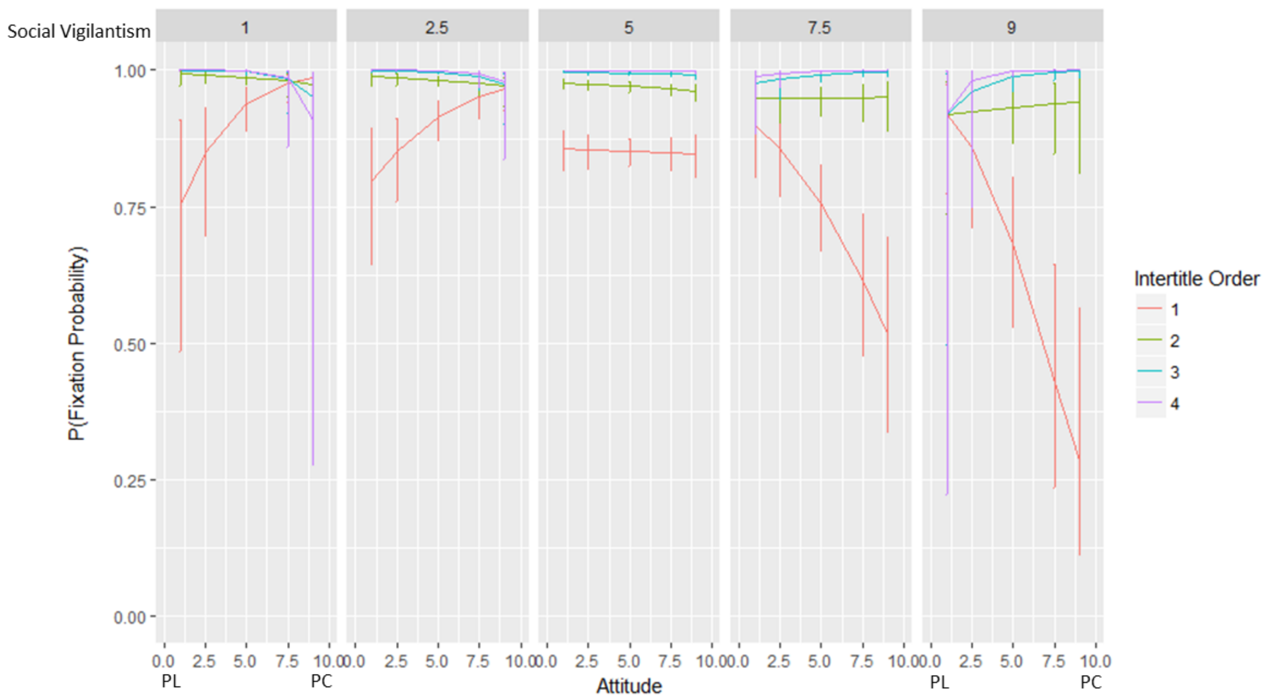

Figure 31. Non-controversial ad probability of fixating content words in the advertisement intertitles. The Y-axis shows the predicted fixation probability for content words for a participant given their attitude toward abortion (X-axis). The panels at the top show the level of Social Vigilantism (labeled on the top 1 – 9). The lines indicate the intertitle order (Intertitle 1 = red line, 2 = green, 3 = blue, 4 = purple). Error bars are 1 standard error.

The content word fixation results for the abortion advertisements had similarities to the Non-controversial ad, and the inclusion of video also produced interesting attitude congruence effects. Based on AIC values, the best model included all 5 predictors. This appears to be a case of overfitting the data, given the large number of predictors for the number of observations, and the high-level interactions make the data very difficult to interpret. In the body text below, the best strict hypothesis model is reported (Table 30). This model included Attitude, SV, and Video. Overall, there was a main effect of video, with participants less likely to fixate content words in the Pro-choice video (Figure 32). An interaction of Attitude and Video qualified this effect, such that as participants reported being more Pro-choice, they were more likely to fixate content words in the Pro-choice ad. Lastly, for descriptive purposes, the 3-way interaction of Attitude, SV, and Video was trending, and took a form very similar to the distance from debate speaker analysis (although the direction of the relationships was in the opposite direction). Descriptively, Figure 32 shows that at low levels of SV, attitude congruence is predictive of the probability of fixating content words for more Pro-life participants. However, at higher levels of SV, the attitude by SV interaction is independent of attitude congruence. Another way to describe this is that for Pro-life participants, those low in SV showed selective exposure, but those at high levels of SV fixated content words at the same rate regardless of attitude congruence. Conversely, for Pro-choice participants, there were no congruence effects, but there was an SV effect such that participants with lower reported SV levels were more likely to fixate content words than participants high in SV. Additionally, comparing the abortion and non-controversial ad results, the Pro-choice ad showed the same attitude and SV interaction as the Non-controversial ad, but the Pro-life ad did not show an effect of attitude at lower levels of SV.

Table 30

Summary of Abortion Ads Logistic Regression for Content Word Fixation

Variable	*B*	*SE(B)*	*z*	Sig. (*p*)
Intercept	.78	.09	8.46	< .001

Attitude	-.03	.03	-.95	.34
SV	-.11	.07	-1.50	.13
Video (Pro-choice)	-.17	.03	-6.43	< .001
Att x SV	-.03	.03	-1.19	.24
Att x Video (Pro-choice)	.05	.01	4.42	< .001
SV x Video (Pro-choice)	-.002	.03	-.09	.93
Att x SV x Video (Pro-choice)	-.02	.01	-1.69	.09

Note. The Video variable was effect coded for this analysis (Pro-choice = 1, Pro-life = -1). The continuous variables were centered for the interaction.

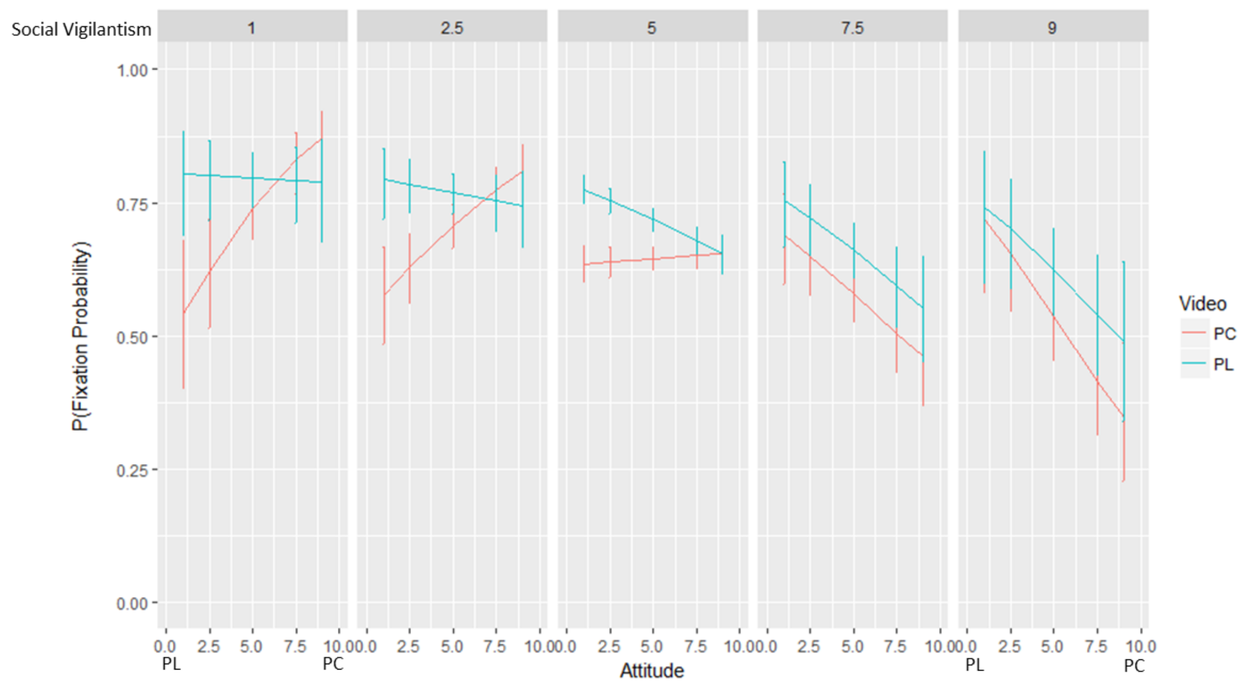

Figure 32. Abortion ads probability of fixating content words in the advertisement intertitles. The Y-axis shows the predicted fixation probability for content words for a participant given their attitude toward abortion (X-axis). The panels at the top show the level of Social Vigilantism (labeled on the top 1 – 9). The red line is for the Pro-choice ad, and the blue line is for the Pro-life ad. Error bars are 1 standard error.

Intertitle fixation duration results. While the content word fixation results show a fairly macro level effect of attitude and SV, the fixation duration analyses were designed to test for processing differences when participants were reading the intertitles. Compared to videos and scenes, there were a large number of naturally occurring top-down effects that influence fixation durations with text (Rayner, 1998). Based on this, given that there were significant fixation durations results when the full videos were analyzed, the effects could be expected to be stronger for the text. Conversely, given that the content word fixation analyses showed attitude and SV effects, it is possible that if a participant did read the full text they engaged in similar text processing. Note, following conventions in the field, the fixation duration analysis was only run for words that were fixated (Just & Carpenter, 1987).

For the non-controversial advertisement, there were no significant effects of attitude or SV. The best random effect structure had the participant intercept, and the effects of intertitle order and word order. The best fixed effect structure included attitude, SV, and intertitle order. However, the only significant effect in this model was intertitle order, with participants showing longer fixation durations for the later intertitles (Table 31). There was a trend that as participants indicated being more Pro-choice, they had longer fixation durations, but it was not significant. As shown in Figure 33 and Table 31, there was also a non-significant trend for the attitude by SV by intertitle order interaction that took the familiar arch form for the later intertitles (i.e., at low levels of SV, Pro-life viewers showed longer fixations, but at high levels of SV, Pro-choice viewers did so).

Table 31

Summary of Non-controversial Ad Gamma Regression for Intertitle Text Fixation Durations

Variable	*B*	*SE(B)*	*t*	Sig. (*p*)
Intercept	5.52	.02	255.70	< .001
Attitude	.01	.01	1.87	.06
SV	.01	.02	.53	.59
Intertitle Order	.13	.02	8.90	< .001
Att x SV	-.005	.01	-.67	.51
Att x Intertitle Order	.005	.005	.96	.34
SV x Intertitle Order	-.01	.01	-.50	.61
Att x SV x Intertitle Order	-.01	.005	-1.07	.29

Note. The continuous variables were centered for the interaction.

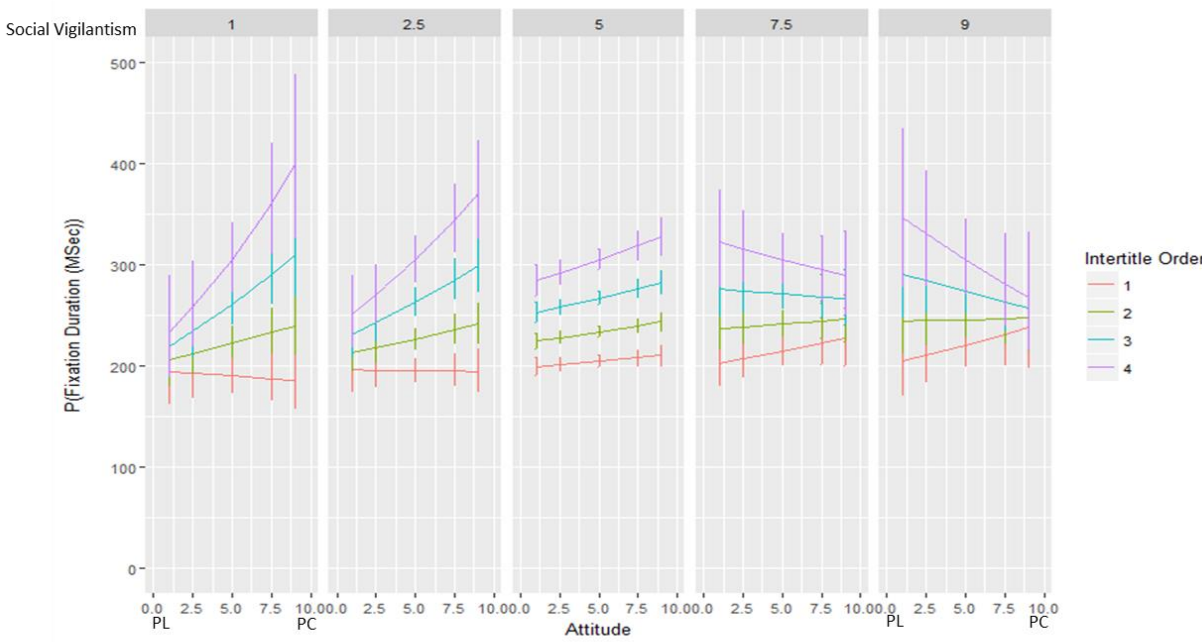

Figure 33. Non-controversial ad predicted fixation duration on intertitles. The Y-axis shows the predicted fixation duration for fixations on words in the intertitle for a participant given their attitude toward abortion (X-axis). The panels at the top show the level of Social Vigilantism (labeled on the top 1 – 9). The lines show the intertitle order (Red = intertitle 1; Green = 2; Blue = 3, and Purple = 4). Error bars are 1 standard error.

Running the model tests for the abortion ads returned results in a similar direction to the Non-controversial ad, but none of the effects were even trending. The best model for the Non-controversial ad that also included Intertitle Order did not converge, so it is not reported as a comparison. For the abortion advertisements, the best fixed effect model, here chosen because it had a similar AIC value to the model that also included Video (138,964.6 & 139,963.0 respectively) and fewer degrees of freedom, included only Attitude and SV (Table 32). It is interesting that the attitude trend was no longer present for the abortion advertisements. The two most likely explanations for this are 1) that the non-significant trend for the Non-controversial video was just that, and it should be given very little weight. Conversely, the other option 2) is that there were some attitude congruence effects that made the attitude main effect size smaller. The model that allows for attitude congruence effects (i.e., includes the Video predictor) did have a slightly better AIC value, but was not chosen as the best model because it had more degrees of freedom. However, to understand whether the loss of the attitude main effect trend was potentially due to attitude congruence effects, the attitude congruence model is presented for descriptive purposes (Table 33). In the model that included video to test for attitude congruence, there was a nearly significant effect of attitude congruence (i.e., attitude by video), such that participants trended towards having shorter fixation durations for attitude-congruent videos. Based on this, the loss of the attitude main effect trend is more likely due to variability introduced by attitude congruence making the attitude effect weaker.

Table 32

Summary of Abortion Ads Gamma Regression for Intertitle Fixation Durations

Variable	*B*	*SE(B)*	*t*	Sig. (*p*)
Intercept	5.48	.04	137.80	< .001
Attitude	.01	.01	1.30	.20
SV	-.01	.01	-.43	.67
Att x SV	-.003	.01	-.64	.52

Note. The continuous variables were centered for the interaction.

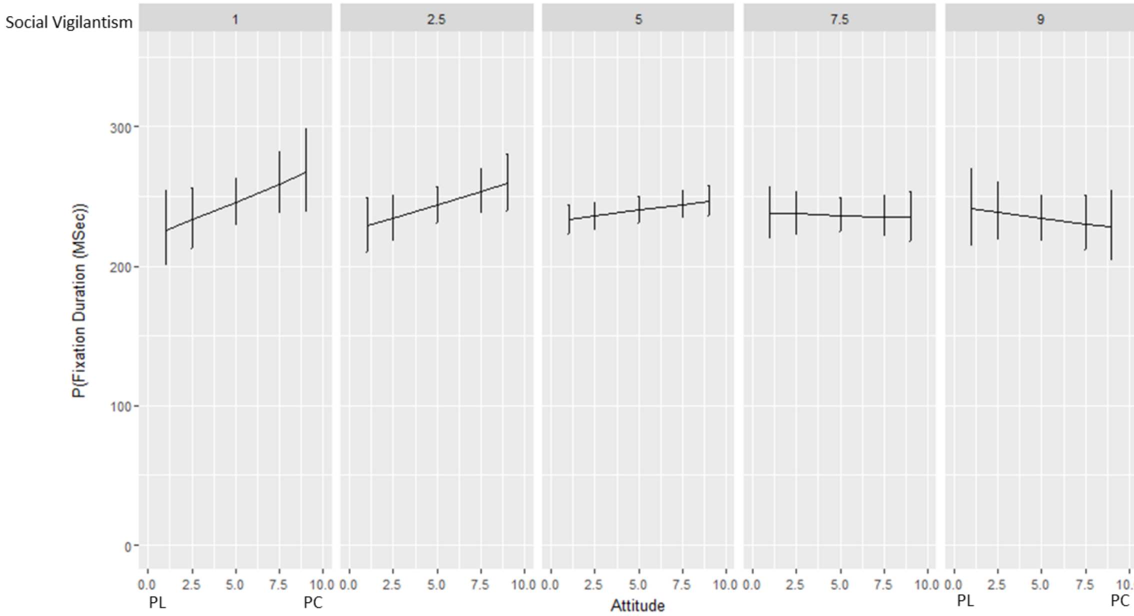

Figure 34. Abortion ads predicted fixation duration on intertitles. The Y-axis shows the predicted fixation duration for fixations on words in the intertitle for a participant given their attitude toward abortion (X-axis). The panels at the top show the level of Social Vigilantism (labeled on the top 1 – 9). Error bars are 1 standard error.

Table 33

Summary of Abortion Ads Gamma Regression for Intertitle Fixation Durations

Variable	*B*	*SE(B)*	*z*	Sig. (*p*)
Intercept	5.48	.01	405.1	< .001
Attitude	.01	.01	1.3	.19
SV	-.01	.01	-.4	.68
Video (Pro-choice)	-.05	.005	-9.9	< .001
Att x SV	-.003	.01	-.6	.54

Att x Video (Pro-choice)	-.003	.002	-1.7	.08
SV x Video (Pro-choice)	-.001	.005	-.3	.78
Att x SV x Video (Pro-choice)	-.001	.002	-.4	.69

Note. The Video variable was effect coded for this analysis (Pro-choice = 1, Pro-life = -1). The continuous variables were centered for the interaction.

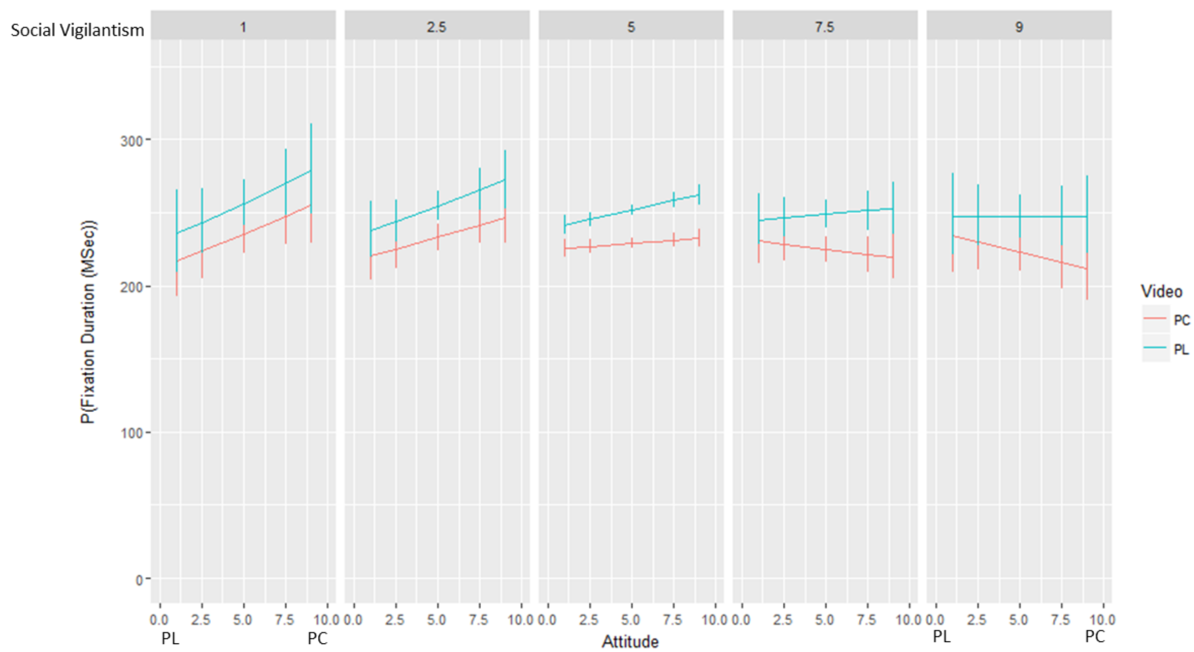

Figure 35. Abortion ads predicted fixation duration on intertitles with attitude congruence variable (Video). The Y-axis shows the predicted fixation duration for fixations on words in the intertitle for a participant given their attitude toward abortion (X-axis). The panels at the top show the level of Social Vigilantism (labeled on the top 1 – 9). The red line is for the Pro-choice ad, and the blue line is for the Pro-life. Error bars are 1 standard error.

The fixation durations on fixated words results show some stimulus effects (e.g., fixation durations varied based on the intertitle in the Non-controversial ad). The attitude by SV interaction for these analyses was much weaker than the earlier analyses. The figures still show an arch pattern, but it is very weak compared to the other analyses.

Intertitle dwell time results. While the intertitle word fixation durations tested for processing differences during reading, overall intertitle dwell time was used to test the overall amount of processing time on the intertitles. It was possible for participants to have similar fixation durations, but different dwell times. For example, when reaching the end of the intertitle a participant could regress to earlier words in the intertitle, increasing dwell time.

As discussed with the area of interest dwell time results for the entire videos above, a limitation of these analyses is that when a participant does not fixate an AOI they get a dwell time value of zero. For dwell time data, this typically results in data that 1) has a strong positive skew, and 2) a large number of zero values. As such, there are multiple assumption violations, that cannot be handled with the multilevel analyses used. The typical procedure in the field for analyzing this type of eye movement data has been to truncate the zero values, and thus analyze data only for the fixated words. As such, for the analyses below, the data has been truncated, and generalized multilevel models with gamma distributions were run on the data. Importantly, while the lack of a fixation on a word resulted in a dwell time of zero and the removal of that data point from the dwell time analysis, that data was retained in the content word fixation logistic multilevel model analysis. As such, between the two analyses, all the data was analyzed.

For the Non-controversial advertisement, the best model included the fixed effects of attitude, SV, word order, and intertitle order. There was a main effect of attitude, such that as participants indicated being more Pro-choice, their average dwell time on words in the intertitle increased. There were also larger main effects of word and intertitle order, with longer dwell times for later words and intertitles. Word and intertitle order also interacted, such that the word order effect decreased for later intertitles. Lastly, there was a significant interaction of attitude and word order. For Pro-choice participants, the increase in dwell time for words later in the intertitle was greater than for Pro-life participants (i.e., Pro-choice participants tend to spend more time on words later in the intertitle).

One important potential limitation of the dwell time analysis for the Non-controversial ad is that the last intertitle of the video was a website for the group. This is qualitatively different from the other intertitles that were presenting arguments. As such, the analysis was run a second time with the last intertitle removed from the analysis. All the effects were in the same direction, the significant effects remained significant, and the trending effects were slightly stronger, but still not significant.

Table 34

Summary of Non-controversial Ad Gamma Multilevel Regression for Fixated Word Dwell Times in Intertitles

Variable	*B*	*SE(B)*	*t*	Sig. (*p*)
Intercept	6.43	.02	398.16	< .001
Attitude	.01	.01	2.19	.03
SV	.01	.02	.44	.66
Intertitle Order	.50	.02	26.73	< .001
Word Order	.06	.01	8.20	< .001
Att x SV	-.01	.01	-1.33	.18
Att x Intertitle Order	.004	.01	.57	.57
SV x Intertitle Order	.02	.02	.79	.43

Att x Word Order	.01	.003	2.45	.01
SV x Word Order	.01	.01	.79	.43
Intertitle Order x Word Order	-.08	.01	-10.76	< .001
Att x SV x Intertitle Order	-.01	.01	-1.09	.28
Att x SV x Word Order	-.003	.003	-1.25	.21
Att x Intertitle Order x Word Order	-.001	.003	-.37	.71
SV x Intertitle Order x Word Order	.01	.01	1.45	.15
Att x SV x Intertitle Order x Word Order	-.004	.003	-1.25	.21

Note. The continuous predictors were centered.

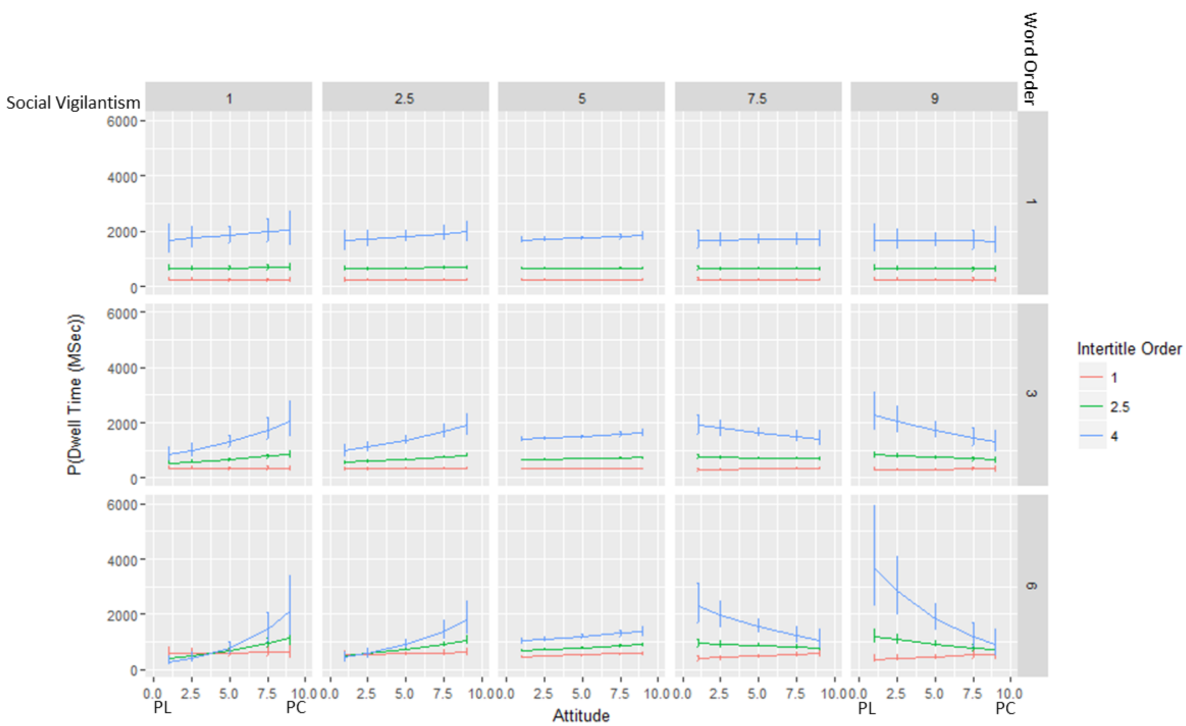

Figure 36. Non-controversial ad predicted dwell time on intertitles. The Y-axis shows the predicted dwell time on words in the intertitle for a participant given their attitude toward abortion (X-axis). The panels at the top show the level of Social Vigilantism (labeled on the top 1 – 9). The lines show the intertitle order

(Red = intertitle 1; Green = 2.5, and Blue = 4). The horizontal panels show the word order (1 = the first word of the intertitle; 3 = 3rd word; 6 = 6th word). Error bars are 1 standard error.

Interestingly, the dwell time analysis for the abortion advertisements did not show any individual difference effects as were seen for the Non-controversial ad. The best model included the predictors attitude, SV, and video (Pro-choice of Pro-life ad). The random effect structure had intertitle and word order slope effects, and the participant intercept. The only significant effect was that dwell times were shorter for the Pro-choice video (Table 35). Importantly, looking at Figure 37, it appears that one potential reason there were no other effects, but a number of non-significant trends, is that for the Pro-life video the arch pattern consistent with an attitude by SV interaction was present, while the Pro-choice video was showing almost no slope. As seen in various previous analyses, this pattern could be driven by 1) differences in the videos, although they were made to avoid such differences, or 2) there is a more complex interaction of attitude congruence and SV than was hypothesized, such that whether the Selective Exposure or SV hypothesis is supported depends on participant attitude congruence.

Table 35

Summary of Abortion Ads Gamma Multilevel Regression for Fixated Word Dwell Times in Intertitles

Variable	*B*	*SE(B)*	*t*	Sig. (*p*)
Intercept	6.81	.06	114.42	< .001
Attitude	.004	.003	1.22	.22
SV	.008	.01	1.01	.31

Video (Pro-choice)	-.11	.01	-16.24	< .001
Att x SV	-.0005	.003	-.15	.88
Att x Video (Pro-choice)	-.003	.003	-1.18	.24
SV x Video (Pro-choice)	.004	.01	.62	.53
Att x SV x Video (Pro-choice)	.002	.003	.71	.48

Note. The Video variable was effect coded for this analysis (Pro-choice = 1, Pro-life = -1). The continuous predictors were centered.

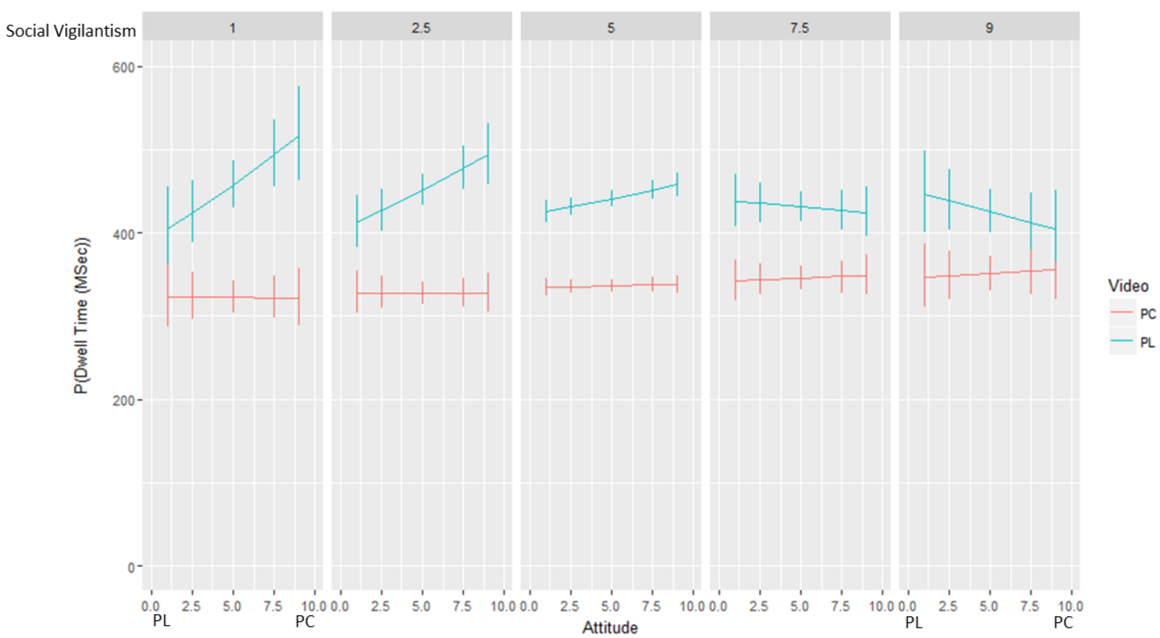

Figure 37. Abortion ads predicted dwell time on intertitles. The Y-axis shows the predicted dwell time on words in the intertitle for a participant given their attitude toward abortion (X-axis). The panels at the top show the level of Social Vigilantism (labeled on the top 1 – 9). The lines are for the abortion ads shown (Red = Pro-choice ad; Blue = Pro-life). Error bars are 1 standard error.

Intertitle regressive eye movement results. At a broad level, regressive eye movements show the amount of effortful processing during reading. If a person is skimming the text they likely will not have as many regressions (Duggan & Payne, 2009, 2011; Fitzsimmons, Weal, & Drieghe, 2014; Masson, 1982). However, when engaging in deeper level processing, they are more likely to have regressions. One potential limitation of this analysis is that the intertitles are fairly short (many are fewer than 10 words), which might make regression less likely.

To analyze the regressions, a logistic multilevel model was used to identify the probability that a regression would be made. The data used was if a regressive eye movement was at any point made from one word to a previous word in the intertitle. Importantly, the first word of each intertitle was excluded from this analysis. The reason for this is that it is impossible to make a regressive eye movement from the first word of an intertitle, because there are no words to regress to from the first word.

For the Non-controversial advertisement there were no significant effects of the individual difference predictors on regression to previous word results (Table 36). Participants were more likely to regress from content words as opposed to function words. Two potential reasons for this are that: 1) content words are more likely to be fixated, which would also increase the likelihood of a regression from them; and 2) content words are more likely to produce comprehension difficulties, since they communicate meaning in the intertitle, and these comprehension difficulties are more likely to produce a regression. There are 2 trending SV effects that did not replicate for the abortion ads, so they likely are not meaningful results. However, descriptively, as participants increased in SV, they were less likely to have regressions. This was qualified by the trending 3-way interaction of SV, Word Type (Content or

Function), and Word Order (Figure 38). First considering SV and Word Type, SV did not have a large overall effect on regression for content words, but for function words as participant SV increased the likelihood of regressing decreased. Adding in word order to the SV and Word Type interaction shows that for content words as participants indicated higher levels of SV, their likelihood of regressing was higher for words later in the intertitle. For function words, although there is a lot of error in the model, the trend was for participants low in SV to be more likely to regress from function words later in the intertitle, and at high levels of SV regressions from function words earlier in the intertitle were more likely.

Table 36

Summary of Non-controversial Ad Logistic Multilevel Regression for Regressive Eye Movements in Intertitles

Variable	*B*	*SE(B)*	*z*	Sig. (*p*)
Intercept	-.11	.09	-1.11	.27
Attitude	-.02	.04	-.59	.55
SV	-.17	.09	-1.79	.07
Word Type (Content)	.47	.09	5.02	< .001
Word Order	.06	.06	1.02	.31
Att x SV	-.01	.04	-.29	.77
Att x Word Type (Content)	.02	.04	.64	.53
SV x Word Type (Content)	.09	.09	.95	.34
Att x Word Order	.01	.02	.51	.61
SV x Word Order	-.06	.06	-1.02	.31

Word Type (Content) x Word Order	.09	.06	1.58	.12
Att x SV x Word Type (Content)	.01	.04	.32	.75
Att x SV x Word Order	.01	.02	.45	.65
Att x Word Type (Content) x Word Order	.005	.02	.19	.85
SV x Word Type (Content) x Word Order	.12	.06	1.79	.07
Att x SV x Word Type (Content) x Word Order	-.0003	.02	-.01	.99

Note. The Word Type variable was effect coded for this analysis (Content = 1, Function = -1). The continuous variables were centered for the interaction.

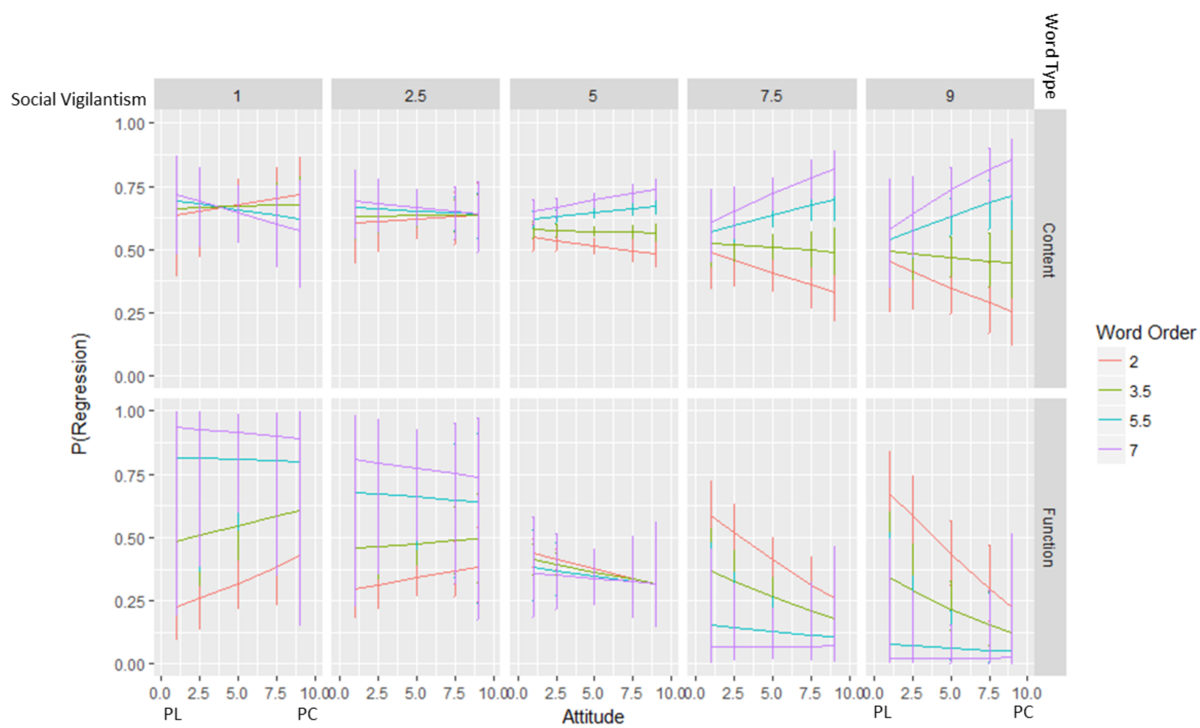

Figure 38. Non-controversial ad predicted regressive eye movements while reading intertitles. The Y-axis shows the predicted regressions for a participant given their attitude toward abortion (X-axis). The panels at the top show the level of Social Vigilantism (labeled on the top 1 – 9). The lines show the word order that a regression would be made from (Red = word 2; Green = 3.5, Blue = 5.5, and Purple = 7). The

horizontal panels show the word type (Top = Content words, Bottom = Function words). Error bars are 1 standard error.

For the abortion advertisements the best model (AIC = 8836.6) included 5 predictors: Attitude, SV, Video, Intertitle Order, and Word Order. Due to the complexity of this model, it is very likely overfitting the data, and is not presented here. The next best model (AIC = 8939.6) that did not include a 5-way interaction had the predictors Attitude, SV, Video (Pro-choice or Pro-life ad), and Word Order (Table 37). This model, similar to many previous models, shows that the stimulus had a strong effect of participant eye movement behavior. Regressions were less likely for the Pro-choice ad, mostly likely due to the shorter intertitles in the ad. Additionally, regressions were more likely for words later in the intertitle. Lastly, an interaction of Video and Word Order indicates that for the Pro-life ad, the probability of making a regression on later words was greater than for the Pro-choice ad.

Table 37

Summary of Abortion Ads Logistic Multilevel Regression for Regressive Eye Movements in Intertitles

Variable	*B*	*SE(B)*	*z*	Sig. (*p*)
Intercept	-.33	.06	-5.34	< .001
Attitude	-.003	.02	-.19	.85
SV	-.03	.04	-.84	.40
Video (Pro-choice)	-.24	.03	-8.94	< .001
Word Order	.20	.02	12.84	< .001

Att x SV	-.01	.02	-.71	.48
Att x Video (Pro-choice)	.004	.01	.35	.73
SV x Video (Pro-choice)	-.004	.03	-.15	.88
Att x Word Order	-.002	.004	-.43	.67
SV x Word Order	-.01	.01	-1.19	.23
Video (Pro-choice) x Word Order	-.04	.01	-3.77	< .001
Att x SV x Video (Pro-choice)	.003	.01	.24	.81
Att x SV x Word Order	.004	.005	.84	.39
Att x Video (Pro-choice) x Word Order	-.003	.004	-.59	.55
SV x Video (Pro-choice) x Word Order	.02	.01	1.56	.12
Att x SV x Video (Pro-choice) x Word Order	-.01	.005	-1.56	.12

Note. The Video (Pro-choice = 1, Pro-life = -1) variable was effect coded for this analysis. The continuous variables were centered for the interaction.

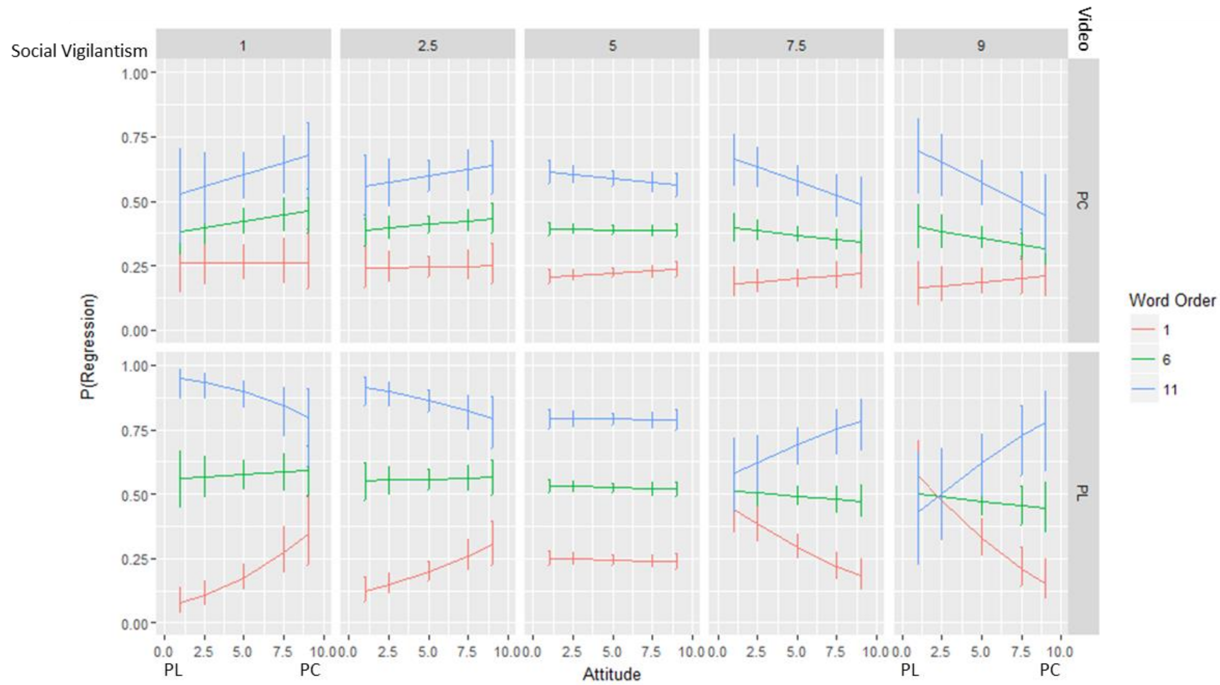

Figure 39. Abortion ads predicted regressive eye movements while reading intertitles. The Y-axis shows the predicted regressions for a participant given their attitude toward abortion (X-axis). The panels at the top show the level of Social Vigilantism (labeled on the top 1 – 9). The lines show the word order that a regression would be made from (Red = word 2; Green = 3.5, Blue = 5.5, and Purple = 7). The horizontal panels show the video shown (PC = Pro-choice, PL = Pro-life). Error bars are 1 standard error.

The regression results show strong support for basic effects of text variables on eye movements in reading, in that features of the text and video had strong effects on probability of performing a regressive saccade. For example, as would be expected, regressions were more likely for content words than function words. Additionally, these results are some of the few that consistently do not show support for top-down effects, in that the attitude and SV predictors were not significant and do not interact.

Memory results

The memory results for the Eye movement experiment did not replicate the Memory experiment results. Overall, in the Eye movement experiment there were relatively few individual difference effects on recognition memory (Table 38). The changes made to increase the length of the free recall memory responses in general did so, and, interestingly, these effects show similar trends to the attitude and SV interactions for many of the eye movement measures above. Potential reasons for the differences between the two experiments are outlined below. Importantly, however, it appears more likely that the differences in the effects were due to the changes made between the Memory and Eye movement experiment, rather than the Memory experiment effects being spurious.

The free recall memory data for all the videos were first run using the response score algorithm described above (Saunders et al., 2014) for both the verbal and visual memory. However, after running this data it turned out that the variability in response scores was driven by word count differences. For this reason, the word count data is presented below. In addition to these overall analyses, for the debate verbal free recall the debate scripts were used as a ground truth baseline in the response score analyses. As such, this memory analysis looked more closely at memory for the content presented, while using the participant responses as baselines was designed to identify any general differences in the free recall memory responses (i.e., the differences could be memory based, include evaluations of the information presented, elaborations on the information, etc.).

Table 38

Memory

Argument Recognition (SDT)					
	Non-controversial	Attitude & SV	U (Sensitivity)	2.30 *	Top-down (Indiv. Diff.)
	Abortion Ads	Attitude & SV	Arch (Sensitivity)	-1.37	Top-down (Indiv. Diff.)
	Debate	Attitude & SV	U (Sensitivity)	3.40 *	Top-down (Indiv. Diff.)
Visual Multiple Choice					
	Non-controversial	Attitude & SV	SV: Negative Slope	-2.18 *	Top-down (Indiv. Diff.)
	Abortion Ads	Attitude & SV	Arch	-1.59	Top-down (Indiv. Diff.)
	Debate	-	-	-	Stimulus Effects
Free Recall (Verbal)					
	Non-controversial	Attitude & SV	Attitude: Negative Slope	-2.93	Top-down (Indiv. Diff.)
	Abortion Ads	Attitude & SV	Arch	-1.64	Top-down (Indiv. Diff.)
	Debate	Attitude & SV	Arch	-4.80 *	Top-down (Indiv. Diff.)
Free Recall (Visual)					

Non-controversial	Attitude & SV	Arch	-2.40 *	Top-down (Indiv. Diff.)
Abortion Ads	Attitude & SV	Arch	-2.46 *	Top-down (Indiv. Diff.)
Debate	Attitude & SV	Arch	-2.44 *	Top-down (Indiv. Diff.)

Note. When an * is reported next to a *t* or *z* value, this denotes the reported effects was significant. For the Hypotheses, when the hypothesis is reported, this is the hypothesis there was support for. There are three hypotheses in the table not presented initially as a hypothesis. Stimulus Effect is support for bottom-up effects driven by the stimulus, when the stimulus does not have features (e.g., editing) that create attentional synchrony and subsequent Tyranny of Film. Top-down (Indiv. Diff.) is for individual differences effects that did not include attitude congruency. Lastly, EM → Memory is for eye movement behavior predicting memory performance.

Non-controversial ad memory results.

Argument recognition memory results. The best random effect structure for the Non-controversial ad argument recognition signal detection analysis included only the participant intercept. The fixed effect model included the “Old”/”New” variable, which is required for the signal detection analysis. Attitude and Social Vigilantism were also in the model, and this same fixed effect model was also best for the Abortion ads and the Debate analyses. There were two significant effects. First, the intercept was significant, which in the probit signal detection analysis indicates a significant bias (Table 39). The bias estimate was positive, which indicates an “Old” bias. Overall, d’ was negative, which in this experiment is likely the result of generally not showing sensitivity (d’ = 0), and the model predicting negative values for individual difference values that were not represented in the participant data. Nevertheless, there was an interaction of attitude and SV with “Old”/”New”, which shows that the interaction of attitude and SV adjusts the sensitivity (d’) prediction. This interaction takes on the “U” shape (inverse of the arch) in Figure 40. At low levels of SV, Pro-life participants had greater sensitivity to the argument recognition memory items, while at high levels of SV, Pro-choice participants were more sensitive. Interestingly, when compared to the eye movement results, this argument recognition memory item analysis interaction showed greater sensitivity for participants that would have been predicted to have lower sensitivity given their eye movement behavior. For example, low SV, Pro-life participants were less likely to fixate content words in the Non-controversial ad intertitles, which was predicted to coincide with worse memory performance. This memory analysis, conversely, is in the other direction. However, the later eye movement and memory analyses will more conclusively show the eye movement and memory relationship at the participant level.

Table 39

Summary of Non-controversial Ad Probit Multilevel Regression Signal Detection Analysis for Argument Recognition

Variable	*B*	*SE(B)*	*z*	Sig. (*p*)
Intercept (Bias)	.69	.08	8.38	< .001
"Old"/"New" (Sensitivity)	-.26	.16	-1.59	.11
Attitude	-.01	.03	-.36	.72
Social Vigilantism	-.09	.09	-1.01	.31
Old/"New" x Att	-.03	.06	-.45	.65
Old/"New" x SV	-.01	.17	-.07	.94
Att x SV	.02	.03	.53	.59
“Old”/"New" x Att x SV	.16	.07	2.30	.02

Note. The intercept of the model is the overall bias (c). Positive c values indicate an “Old” bias. Item Type shows the overall sensitivity (d’) to the memory items. Variables without “Item Type” show that variables adjustment to bias. Interactions with Item Type show adjustments to sensitivity. The variables were centered for the interactions.

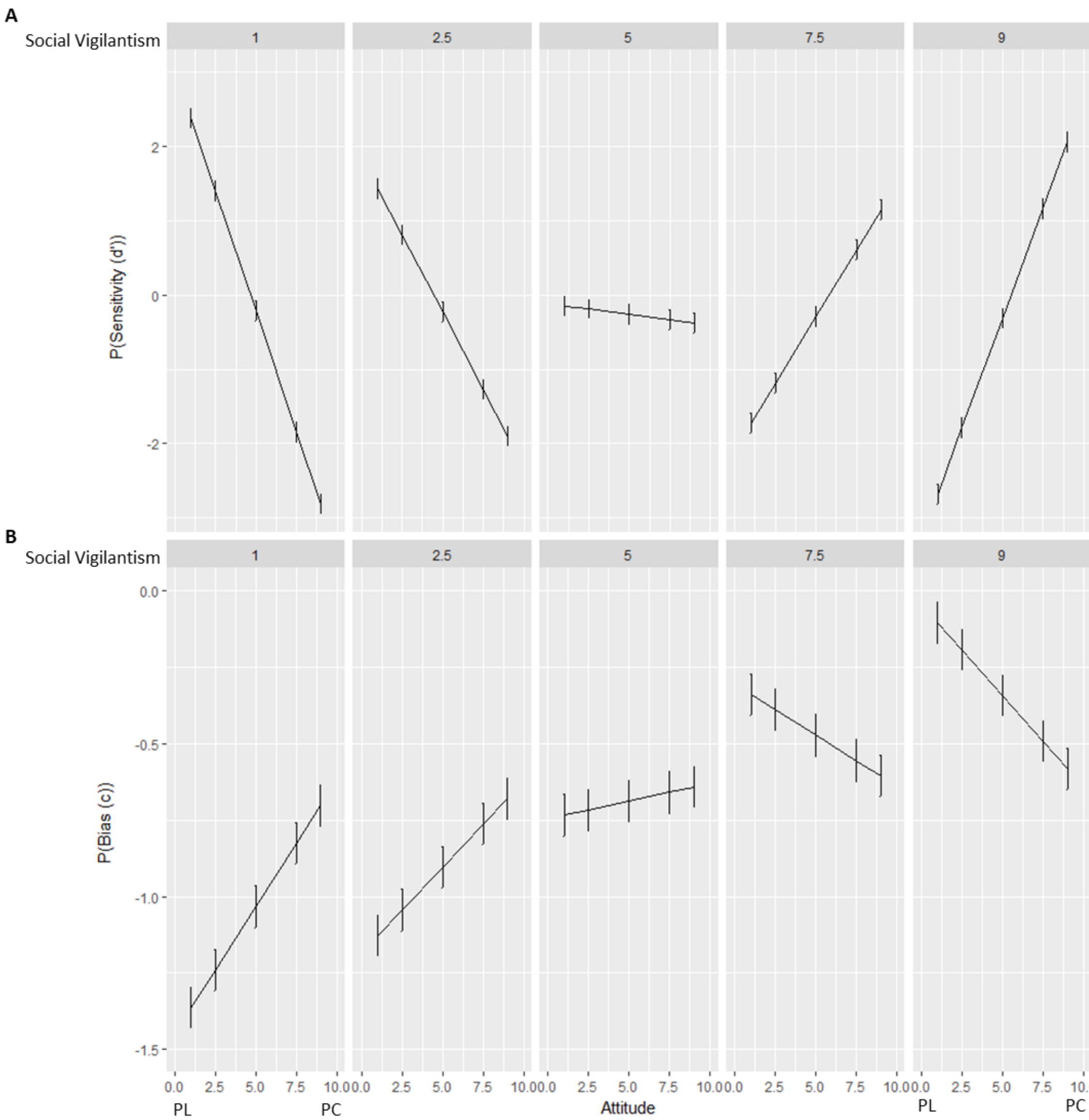

Figure 40. Non-controversial ad predicted sensitivity (d') and bias (c) for the argument recognition memory items. A) The Y-axis shows the predicted sensitivity for a participant given their attitude toward abortion (X-axis). The panels at the top show the level of Social Vigilantism (labeled on the top 1 – 9). B) The Y-axis shows the predicted bias for a participant given their attitude toward abortion (X-axis) and their level of social vigilantism (top panels). Error bars are 1 standard error.

Visual multiple choice memory results. The best random effect structure for the Non-controversial ad visual multiple choice items included the participant intercept and an item effect for the memory items. The best fixed effect model included attitude and SV (Table 40). The only significant effect was a negative relationship of SV and predicted memory accuracy, such that as participants indicated being higher in SV, their accuracy was lower.

Table 40

Summary of Non-controversial Ad Logistic Multilevel Regression Analysis for Visual Multiple Choice Item Accuracy

Variable	*B*	*SE(B)*	*z*	Sig. (*p*)
Intercept	-.53	.22	-2.39	.02
Attitude	-.02	.03	-.93	.35
Social Vigilantism	-.15	.07	-2.18	.03
Att x SV	-.02	.03	-.59	.56

Note. The continuous variables were centered for the interaction.

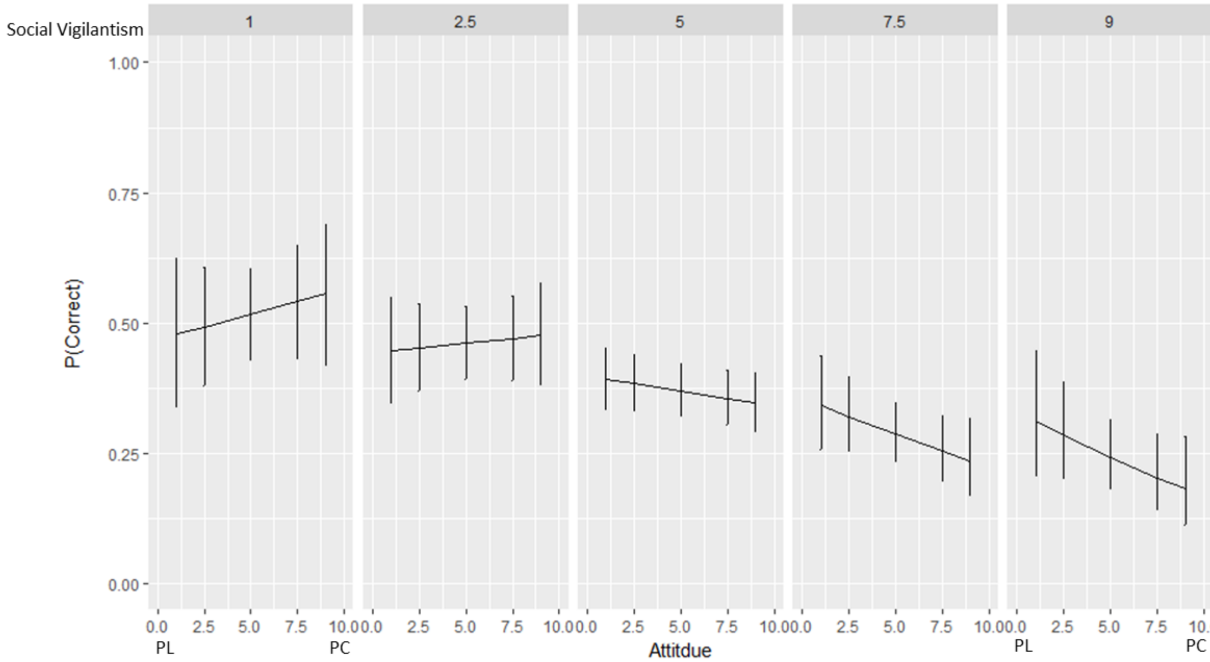

Figure 41. Non-controversial ad predicted accuracy for the visual multiple choice memory items. The Y-axis shows the predicted accuracy for a participant given their attitude toward abortion (X-axis). The panels at the top show the level of Social Vigilantism (labeled on the top 1 – 9). Error bars are 1 standard error.

Free recall memory results. The free recall memory analyses were run separately for the verbal and visual recalls, as these are different types of memory. Each participant only gave one free recall response for each type of memory, so the free recall analyses are not multilevel model (except for the abortion ads), but just generalized regression models. As discussed above, the word count data is presented, because the majority of the variability in the response scores was accounted for by word count differences.

The verbal free recall analysis used generalized model with a Poisson distribution. The predictors in the model were Attitude and SV. Overall, there was a main effect of Attitude, such that participants who indicated being more Pro-life tended to give longer free recall responses than more Pro-choice individuals (Table 41). The Attitude by SV interaction was not significant, but Figure 42 indicates that the more of the variance in the Attitude main effect may have been driven by low SV participants.

Table 41

Summary of Non-controversial Ad Poisson Regression for Verbal Free Recall Data Word Count

Variable	*B*	*SE(B)*	*z*	Sig. (*p*)
Intercept	3.30	.02	202.79	< .001
Attitude	-.02	.007	-2.93	.003
SV	-.03	.02	-1.67	.09
Att x SV	.004	.007	.56	.57

Note: The continuous variables were centered for the interaction.

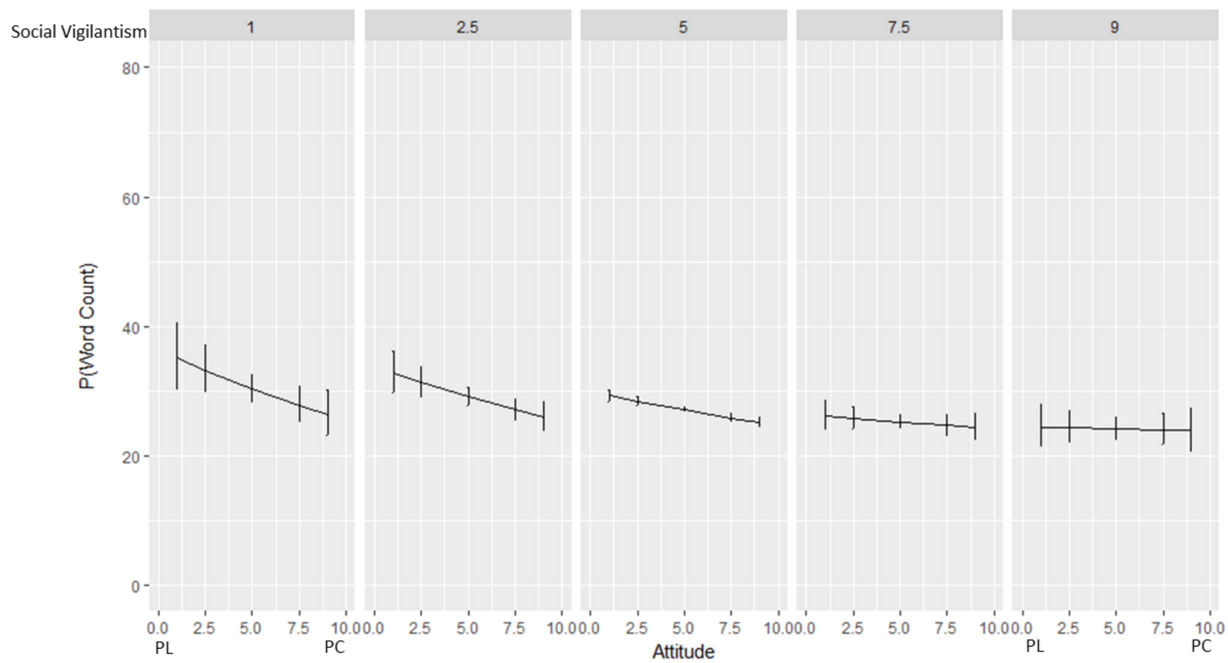

Figure 42. Non-controversial ad predicted word count for verbal free recall memory. The Y-axis shows the predicted word count for a participant given their attitude toward abortion (X-axis). The panels at the top show the level of Social Vigilantism (labeled on the top 1 – 9). Error bars are 1 standard error.

The visual free recall used the same Poisson model as the verbal, and the predictors were again Attitude and SV. For the visual recall memory there was a main effect of SV, with participants writing more the higher they were in SV. Additionally, there was a significant interaction between Attitude and SV (Table 42), which resulted in the reliable arch pattern found for many of the eye movement analyses (Figure 43).

Table 42

Summary of Non-controversial Ad Poisson Regression for Visual Free Recall Data Word Count

Variable	*B*	*SE(B)*	*z*	Sig. (*p*)
Intercept	3.76	.01	293.26	< .001
Attitude	.004	.005	.73	.46
SV	.04	.01	3.19	.001
Att x SV	-.01	.005	-2.40	.02

Note: The continuous variables were centered for the interaction.

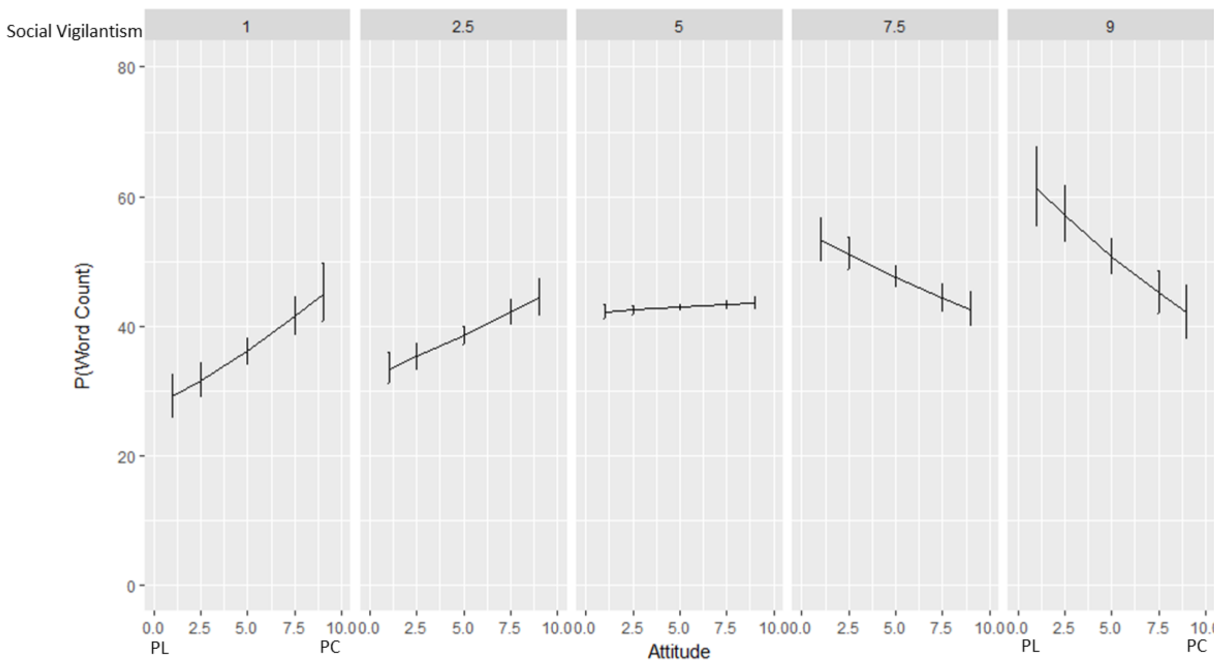

Figure 43. Non-controversial ad predicted word count for visual free recall memory. The Y-axis shows the predicted word count for a participant given their attitude toward abortion (X-axis). The panels at the top show the level of Social Vigilantism (labeled on the top 1 – 9). Error bars are 1 standard error.

Taken together, the free recall results for the Non-controversial video show support for top-down effects on memory. Importantly, as this is the Non-controversial video, there are no attitude congruence effects possible. Thus, these are general top-down effects that are not in support of any of the specific hypotheses for the study.

Abortion ads memory results.

Argument recognition memory results. The random effect structure for the abortion ad recognition memory item signal detection analysis had the participant intercept, and also item effects for the advertisement watched (Pro-choice or Pro-life) and the memory items. For the most part, effects did not replicate from the Non-controversial video. There was still an “Old” bias, and participants were sensitive overall (Table 43). There were no other significant effects, and the trends were in the opposite direction when compared to the Non-controversial ad (Figure 44).

Table 43

Summary of Abortion Ads Probit Multilevel Regression Signal Detection Analysis for Argument Recognition

Variable	*B*	*SE(B)*	*z*	Sig. (*p*)
Intercept (Bias)	.78	.09	8.61	< .001
"Old"/"New" (Sensitivity)	.39	.18	2.19	.03
Attitude	.005	.02	.29	.77
Social Vigilantism	.04	.04	.82	.41
Old/"New" x Att	-.05	.03	-1.37	.17
Old/"New" x SV	-.14	.09	-1.58	.12
Att x SV	.01	.02	.82	.42
"Old”/"New" x Att x SV	-.05	.03	-1.37	.17

Note. The intercept of the model is the overall bias (c). Positive c values indicate an "Old" bias. Item Type shows the overall sensitivity (d') to the memory items. Variables without "Item Type" show that variables adjustment to bias. Interactions with Item Type show adjustments to sensitivity. The variables were centered for the interactions. The variables were centered for the interactions.

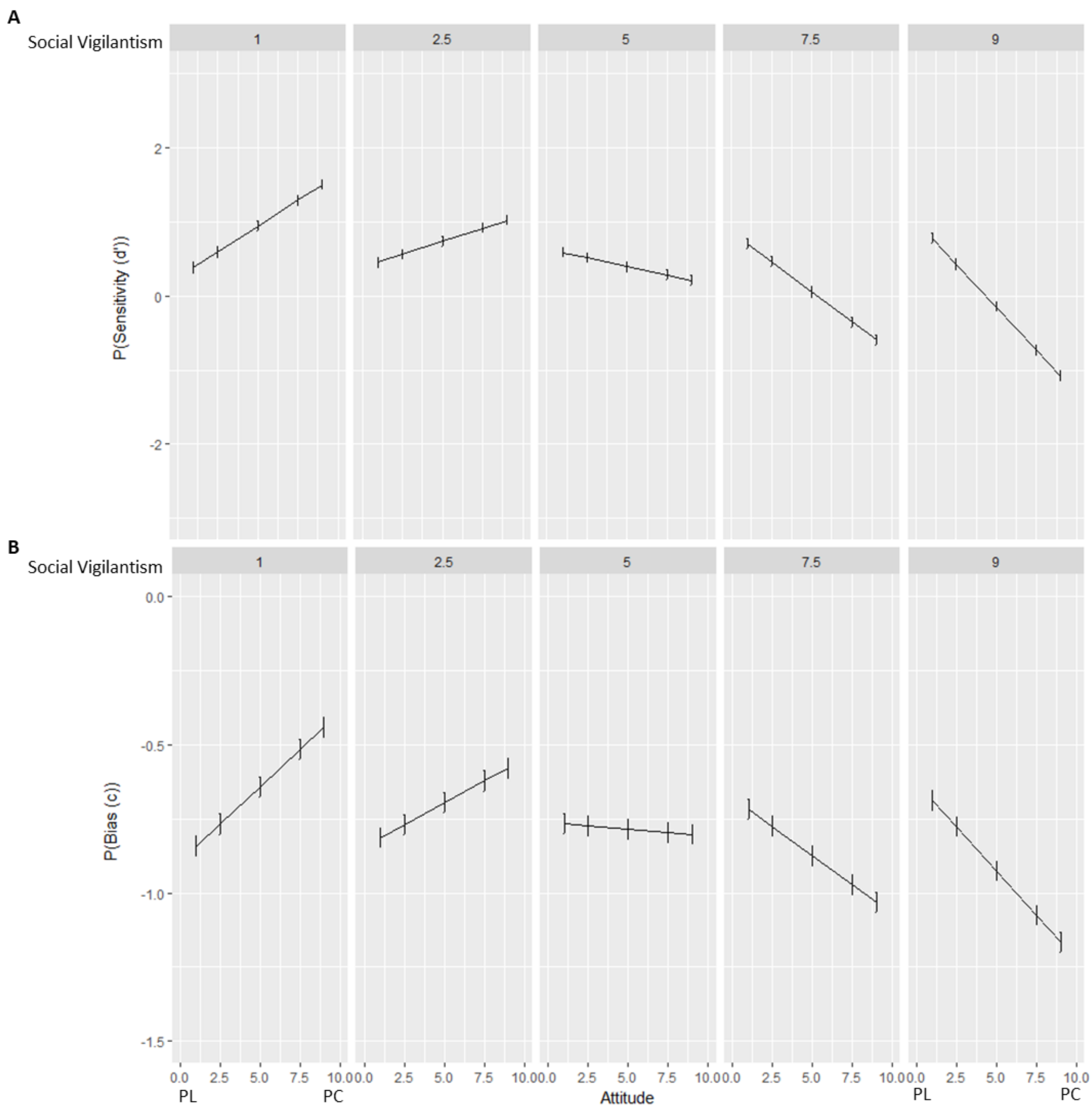

Figure 44. Abortion ads predicted sensitivity (d') and bias (c) for the argument recognition memory items. A) The Y-axis shows the predicted sensitivity for a participant given their attitude toward abortion (X-axis). The panels at the top show the level of Social Vigilantism (labeled on the top 1 – 9). B) The Y-axis shows the predicted bias for a participant given their attitude toward abortion (X-axis) and their level of social vigilantism (top panels). Error bars are 1 standard error.

Visual multiple choice memory results. Overall, there were not significant effects on memory performance for the abortion advertisements (Table 44). The random effect structure had the participant intercept and an item effect for the memory questions. Similar to the Non-controversial ad, Figure 45 shows that as participants increased in SV, their performance on the visual multiple choice items tended to decrease. Additionally, Figure 45 also shows the arch pattern, which descriptively indicates an attitude by SV interaction, which, again, descriptively matches the non-significant interaction between attitude and SV for dwell time (Figure 27).

Table 44

Summary of Abortion Ads Logistic Multilevel Regression

Analysis for Visual Multiple Choice Item Accuracy

Variable	*B*	*SE(B)*	*z*	Sig. (*p*)
Intercept	.02	.29	.08	.94
Attitude	.02	.02	.81	.42
Social Vigilantism	-.08	.06	-1.25	.21
Att x SV	-.04	.02	-1.59	.11

Note. The continuous variables were centered for the interaction.

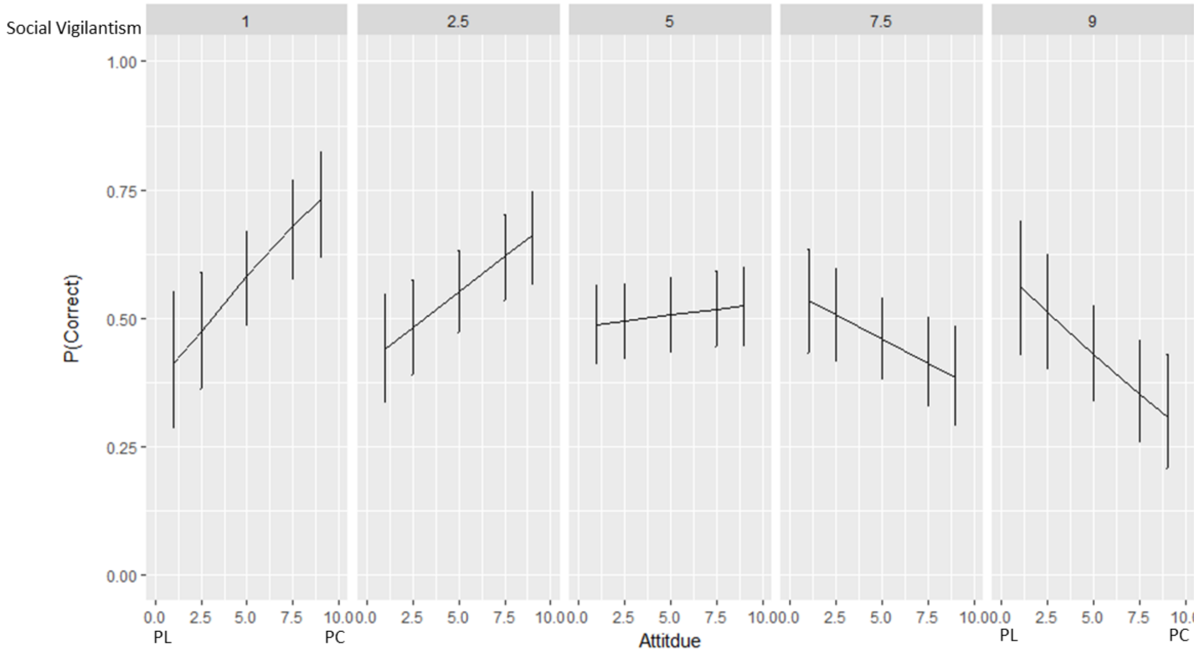

Figure 45. Abortion ads predicted accuracy for the visual multiple choice memory items. The Y-axis shows the predicted accuracy for a participant given their attitude toward abortion (X-axis). The panels at the top show the level of Social Vigilantism (labeled on the top 1 – 9). Error bars are 1 standard error.

Free recall memory results. The verbal and visual free recall data was analyzed separately, but the Pro-life and Pro-choice ads were analyzed together to test for congruence effects. Due to the strong relationship between response scores and word count discussed above, the word count analyses are reported below. Both analyses had the same random effect structure that only included the participant intercept, and the same fixed effect structure with Attitude and SV. The inclusion of Video (Pro-choice or Pro-life ad) did not improve the models, indicating there were no attitude congruence effects.

The visual free recall showed a main effect of SV in the same direction as for the Non-controversial video (Table 46, word counts increased as participant SV increased). Both the verbal and visual free recall results showed the arch interaction of Attitude and SV (Figures 46 &

47), but the relationship was only significant for the visual free recall (Tables 45 & 46). Compared to the Non-controversial free recall memory, these results are fairly consistent (Tables 41 & 42). For the visual free recall memory, while the parameter estimates vary some, the *t*-values (-2.46 [Abortion ads] & -2.40 [Non-controversial]) are very close, and given that the samples sizes were equal, this indicates that the strength of the effects is roughly equal as well. Conversely, the verbal free recalls differed between the Non-controversial and Abortion ads. While the abortion ads showed the arch patter for the Attitude and SV interaction and trended towards significance, the Non-controversial ad had a very weak, non-significant interaction that, if anything, was in the opposite direction. One potential reason for the non-significant and potentially contradictory effects for the Non-controversial verbal free recall is that participants gave relatively short responses, which could have produced a floor effect. Taking all the results together, they give more support for a general top-down effect of Attitude and SV independent of attitude congruence. Specifically, for the Abortion ads, this relationship can also be seen in the non-significant dwell time attitude by SV interaction (Figure 26).

Table 45

Summary of Abortion Ads Multilevel Poisson Regression for Verbal Free Recall Data Word Count

Variable	*B*	*SE(B)*	*z*	Sig. (*p*)
Intercept	3.34	.04	75.32	< .001
Attitude	-.001	.02	-.05	.96
SV	.06	.05	1.39	.17
Att x SV	-.03	.02	-1.64	.10

Note: The continuous variables were centered for the interaction.

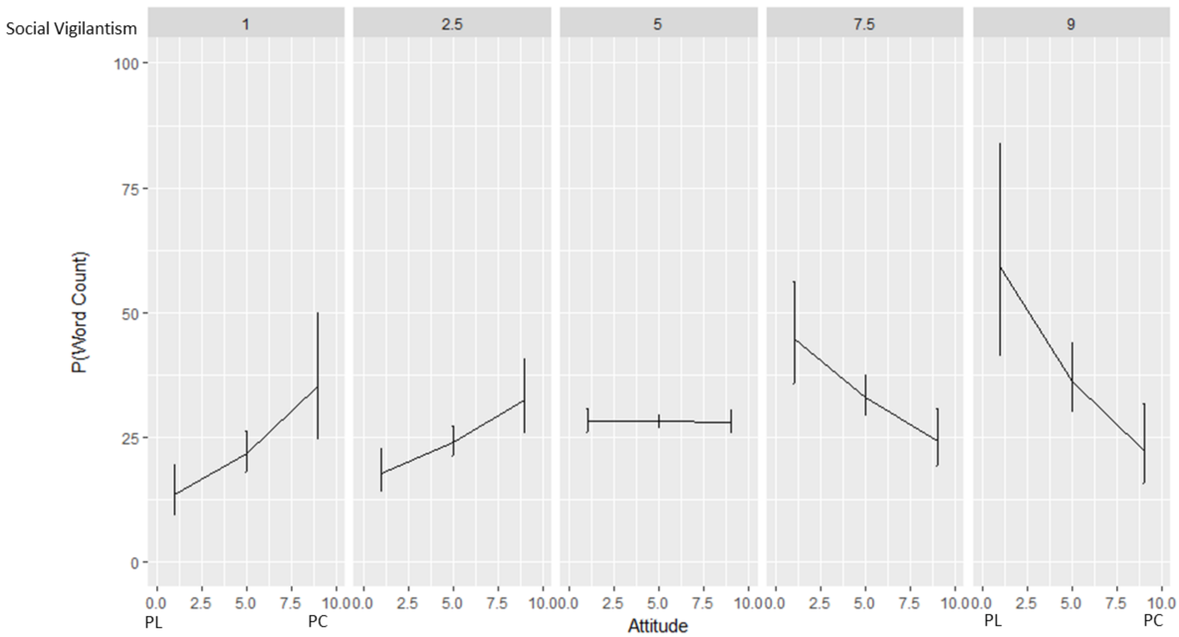

Figure 46. Abortion ads predicted word count for verbal free recall memory. The Y-axis shows the predicted word count for a participant given their attitude toward abortion (X-axis). The panels at the top show the level of Social Vigilantism (labeled on the top 1 – 9). Error bars are 1 standard error.

Table 46

Summary of Abortion Ads Multilevel Poisson Regression for Visual Free Recall Data Word Count

Variable	*B*	*SE(B)*	*z*	Sig. (*p*)
Intercept	3.52	.04	92.78	< .001
Attitude	.01	.02	.88	.38
SV	.08	.04	2.11	.03

Att x SV	-.04	.02	-2.46	.01

Note: The continuous variables were centered for the interaction.

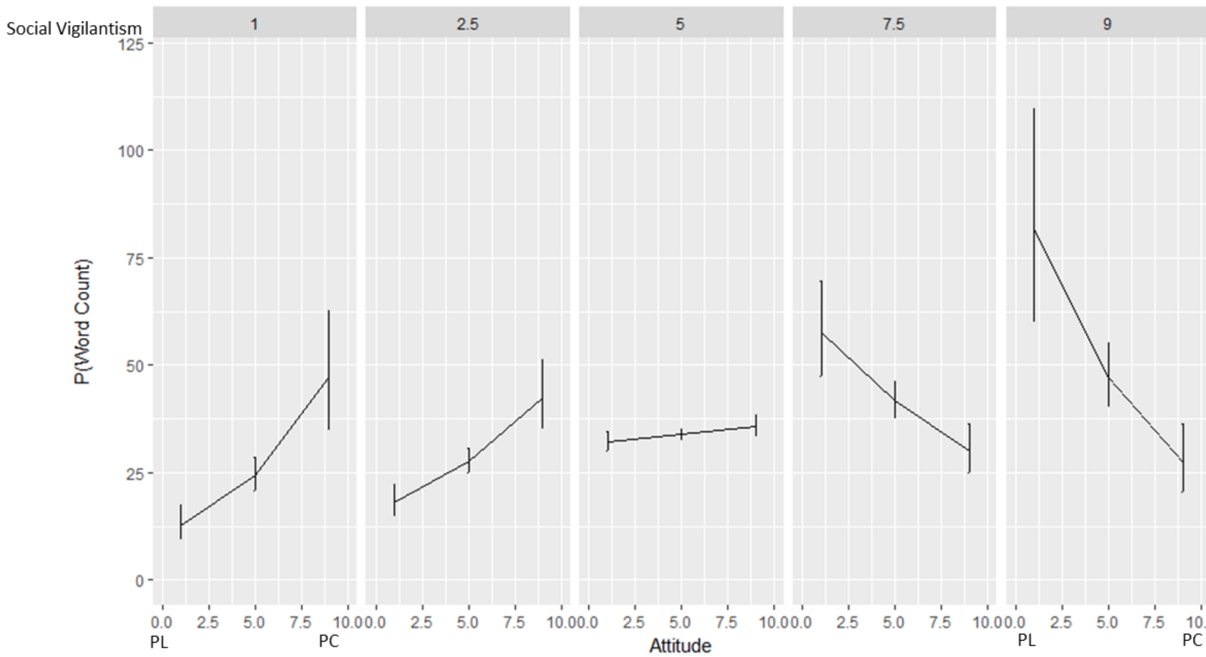

Figure 47. Abortion ads predicted word count for visual free recall memory. The Y-axis shows the predicted word count for a participant given their attitude toward abortion (X-axis). The panels at the top show the level of Social Vigilantism (labeled on the top 1 – 9). Error bars are 1 standard error.

Debate memory results.

Argument recognition memory results. The random effect structure for the debate argument recognition memory item analyses was different than for the advertisement analyses above. The participant intercept was included. Additionally, there was a slope effect for "Old"/"New" items, and an item effect for each question.

Compared to the advertisement analyses, the debate model is more similar to that of the Non-controversial ad. There was an “Old” bias again, and overall participants were sensitive to the memory items. Additionally, there was an interaction of Attitude and SV with “Old”/”New” memory items, showing an adjustment to sensitivity (d’) based on reported level of attitude and SV. The relationship again took on the “U” shape, such that at low levels of SV, more Pro-life participants were more sensitive, and at high levels of SV, more Pro-choice participants were more sensitive.

Table 47

Summary of Debate Probit Multilevel Regression Signal Detection Analysis for Argument Recognition

Variable	*B*	*SE(B)*	*z*	Sig. (*p*)
Intercept (Bias)	.29	.07	4.24	< .001
"Old"/"New" (Sensitivity)	.37	.13	2.86	.004
Attitude	-.01	.01	-.75	.45
Social Vigilantism	.001	.03	.02	.99
Old/"New" x Att	.02	.02	.70	.48
Old/"New" x SV	-.06	.06	-1.12	.26
Att x SV	-.002	.01	-.16	.87
"Old”/"New" x Att x SV	.07	.02	3.40	< .001

Note. The intercept of the model is the overall bias (c). Positive c values indicate an “Old” bias. Item Type shows the overall sensitivity (d’) to the memory items. Variables without “Item

Type" show that variables adjustment to bias. Interactions with Item Type show adjustments to sensitivity. The variables were centered for the interactions.

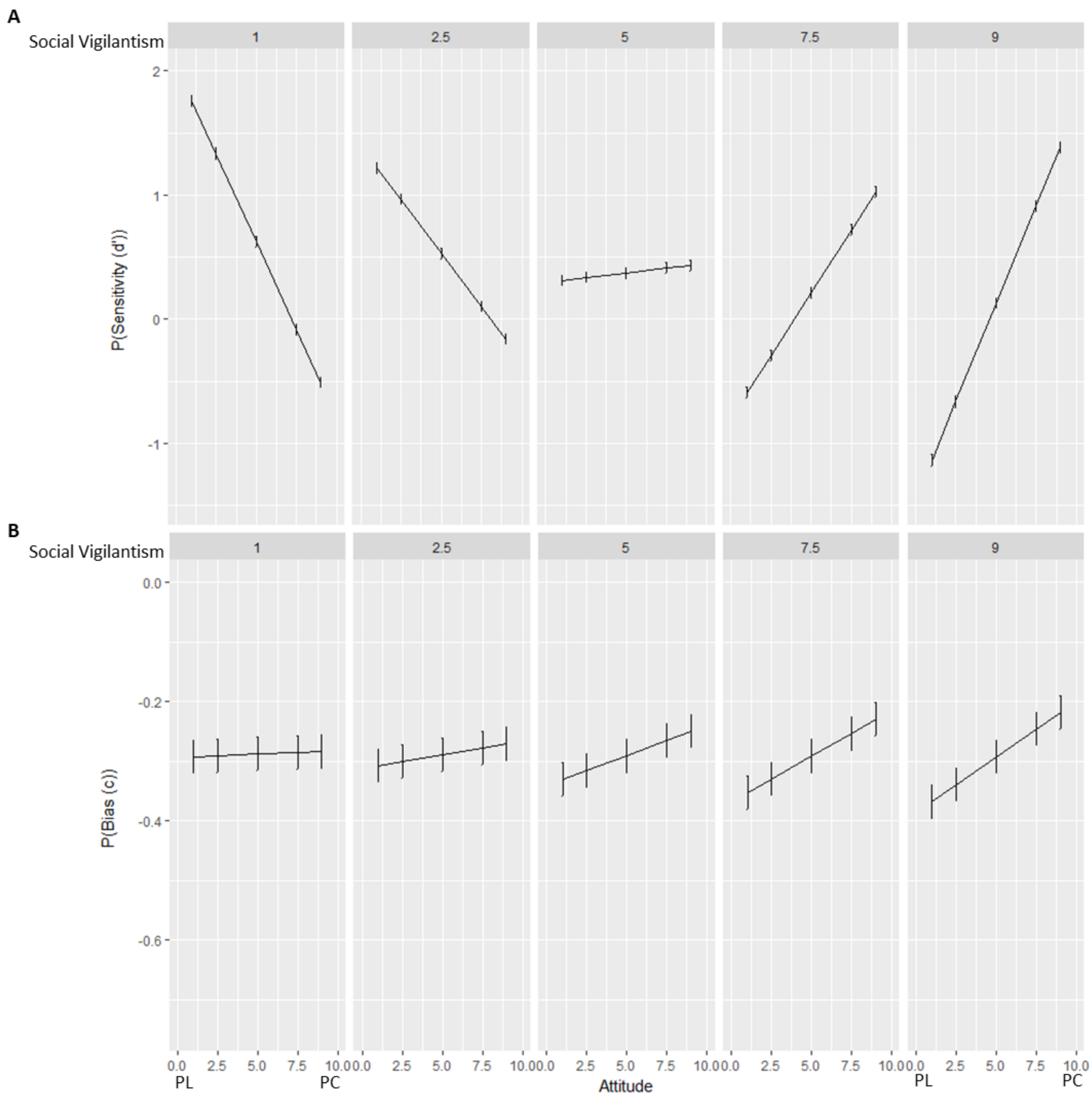

Figure 48. Debate video predicted sensitivity (d') and bias (c) for the argument recognition memory items. A) The Y-axis shows the predicted sensitivity for a participant given their attitude toward abortion (X-axis). The panels at the top show the level of Social Vigilantism (labeled on the top 1 – 9). B) The Y-

axis shows the predicted bias for a participant given their attitude toward abortion (X-axis) and their level of social vigilantism (top panels). Error bars are 1 standard error.

Visual multiple choice memory results. The visual multiple choice results for the debate video were mostly consistent with the advertisement results. The random effect structure included the participant intercept and the memory items. While the best fixed effect model had attitude and social vigilantism, there were no significant main effects or interactions (Table 48). Similar to above, there were no attitude congruence effects.

Table 48

Summary of Debate Logistic Multilevel Regression Analysis for Visual Multiple Choice Item Accuracy

Variable	*B*	*SE(B)*	*z*	Sig. (*p*)
Intercept	.70	.31	2.31	.02
Attitude	-.03	.03	-1.04	.29
Social Vigilantism	-.004	.08	-.05	.96
Att x SV	-.02	.03	-.71	.48

Note. The continuous variables were centered for the interaction.

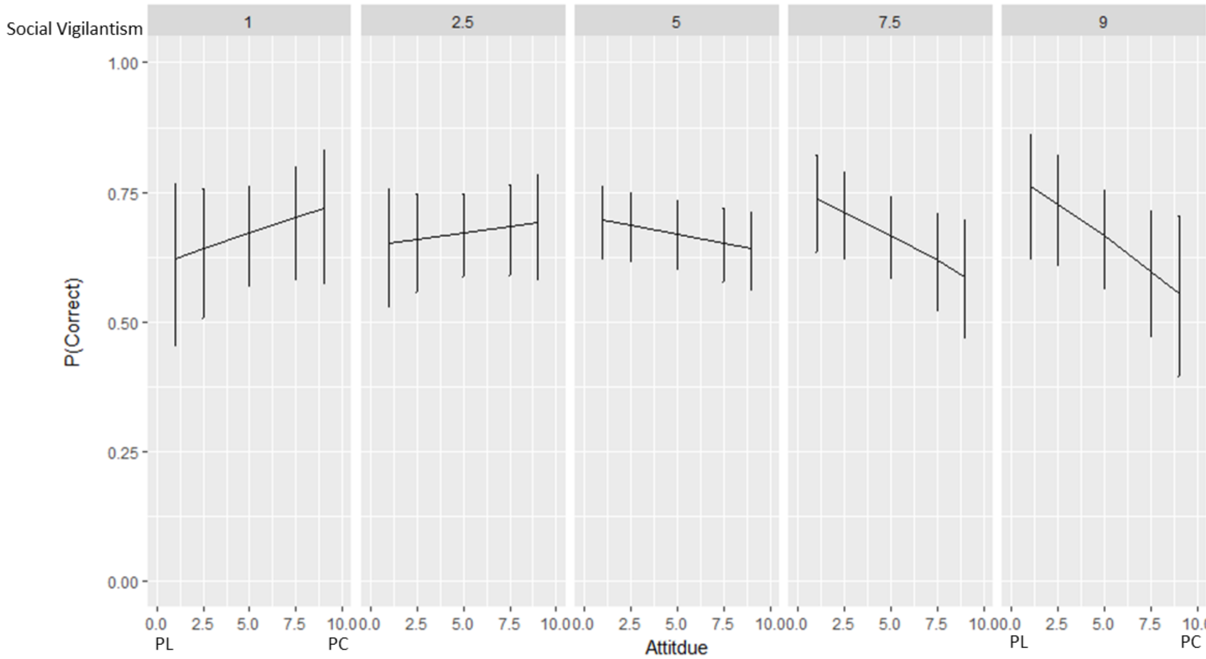

Figure 49. Debate video predicted accuracy for the visual multiple choice memory items. The Y-axis shows the predicted accuracy for a participant given their attitude toward abortion (X-axis). The panels at the top show the level of Social Vigilantism (labeled on the top 1 – 9). Error bars are 1 standard error.

Free recall memory results. There were two types of free recall analyses run for the debate. First, the method used for the ads of creating baselines and measuring word counts was run. For the verbal free recall in the debate, it was also possible to use the scripts used by the debaters as a ground truth. As such, the response score method was run a second time for the debate, using the scripts as the baseline. For this analysis, the scripts were broken up into their turns. As such, model comparisons included debate speaker, and argument turn as predictors.

The verbal and visual free recall word count analyses used Poisson regression and had Attitude and SV as predictor variables. Comparing the debate free recall results to the advertisements above, at a gross level the effects are very similar. There was an attitude main effect for the verbal free recall, with participants writing more as they reported being more Pro-choice (Table 49). Note, this relationship is in the opposite direction of the attitude effect for the Non-controversial verbal recall. Nevertheless, it is interesting that the verbal free recalls showed attitude effects, but these effects were not present for the visual information. It indicates that for certain attitude effects, the information presented may have an effect, but attitude congruence does not appear to be a factor. Conversely, the SV main effect seen for the visual information in the ads was also found for the debate (Table 50, word count increases as SV increases). So, while attitude had a small effect of verbal recall, SV had a reliable effect on visual free recall.

In addition to the main effects, for both the verbal and visual memory there was a significant Attitude by SV interaction (Tables 49 & 50), which created the arch pattern in the figures (Figures 50 & 51). Interestingly, for the Debate video the Attitude by SV intersection was stronger for the verbal recall than the visual. The opposite was true for the advertisement analyses. One likely reason for this is that in the Debate there was relatively little visual information compared to the ads, and there was much more visual information. Thus, it appears that the more information there was to recall, the stronger the Attitude by SV interaction. Also, of importance is the comparison of these memory results with the eye movement results for the Debate. Overall, the Arch patterns for the free recall data are descriptively similar to the Arch patterns found for dwell times shown in Figures 29 and 30, and the fixation duration analysis in Figure 18.

Taking all the free recall word count results together, the overwhelming trend in the data was the Attitude by SV interaction that creates an arch pattern in the figures. There was only one exception to this with the Non-controversial ad verbal free recall. Thus, the free recall word count results give strong support to general top-down effects on memory, that replicate in form many of the trends in the eye movement data. The eye movement and memory analyses below will test the strength of this currently descriptive eye movement and subsequent memory relationship. In addition to the interaction, the consistent SV main effect for visual free recall, but not verbal, shows the construct of SV may be picking up on some unknown variance in behavior. Similarly, the attitude effects for verbal free recall, although not as strong as the SV effects for visual, may show some level of processing differences based on the type of information presented. However, given that neither of these main effects were predicted, future work will need to replicate these results and develop specific hypotheses to identify why the measures used may predict general free recall behavior. It is also very important and interesting that while there are general top-down effects for the free recall memory, there are not in support of any of the hypotheses, because there were no attitude congruence effects.

Table 49

Summary of Debate Poisson Regression for Verbal Free Recall Data Word Count

Variable	*B*	*SE(B)*	*z*	Sig. (*p*)
Intercept	4.51	.009	515.43	< .001
Attitude	.009	.003	2.53	.01
SV	.004	.009	.40	.69
Att x SV	-.02	.004	-4.80	< .001

Note: The continuous variables were centered for the interaction.

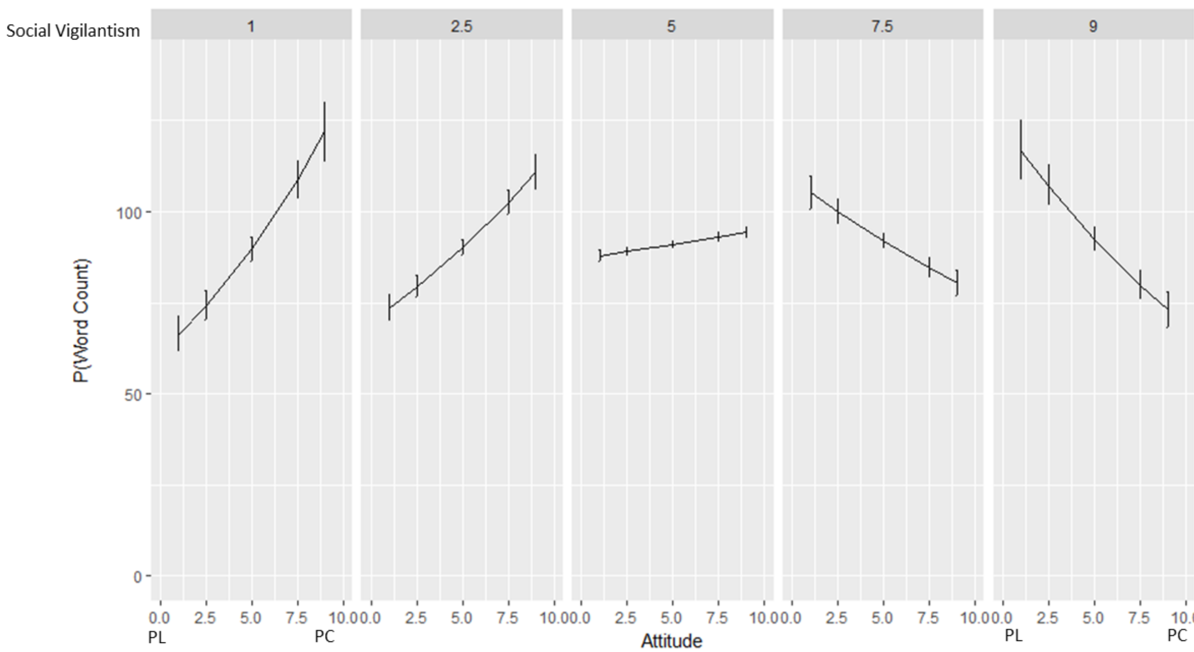

Figure 50. Debate video predicted word count for verbal free recall memory. The Y-axis shows the predicted word count for a participant given their attitude toward abortion (X-axis). The panels at the top show the level of Social Vigilantism (labeled on the top 1 – 9). Error bars are 1 standard error.

Table 50

Summary of Debate Poisson Regression for Visual Free Recall Data Word Count

Variable	*B*	*SE(B)*	*z*	Sig. (*p*)
Intercept	4.05	.01	367.25	< .001
Attitude	-.003	.004	-.59	.55
SV	.06	.01	4.98	< .001
Att x SV	-.01	.004	-2.44	.01

Note: The continuous variables were centered for the interaction.

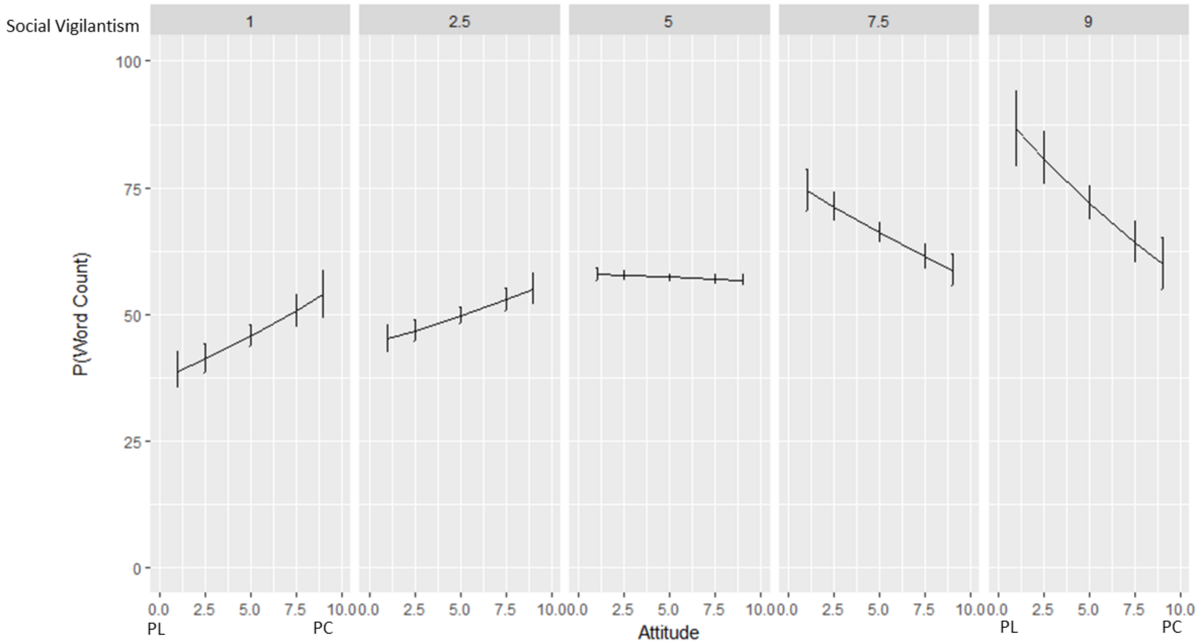

Figure 51. Debate video predicted word count for visual free recall memory. The Y-axis shows the predicted word count for a participant given their attitude toward abortion (X-axis). The panels at the top show the level of Social Vigilantism (labeled on the top 1 – 9). Error bars are 1 standard error.

The debate script scoring is important, because it is a ground truth test of whether participants recalled information that was presented in the debate as it was presented. The first consideration when using the debate scripts as the baseline for the free recall response scoring was if the scripts were rich enough to use as a baseline. Compared to using the free recall responses from participants as the baseline, the scripts are fairly sparse. However, looking at the descriptive statistics for both shows that script baseline produced response scores of a similar magnitude and variability as using the participant baselines (Script scoring: Response score *M* = 14.07, *SD* = 6.25; Pro-life participant baseline: Response score *M* = 13.53, *SD* = 4.48; Pro-choice participant baseline: Response score *M* = 13.33, *SD* = 4.37).

The best random effect structure included word count as a random slope, along with the participant intercept and which baseline data (Pro-life or Pro-choice). Putting word count in the random effects structure treats it as a covariate; thus, any effects in the model are due solely to the response score differences not driven by word count. The best fixed effect structure included attitude and SV, but there were no significant effects (Table 51). The attitude effect was trending, such that as participants indicated being more Pro-choice, their response scores were trending towards being lower.

Table 51

Summary of Debate Multilevel Regression for Verbal Free Recall Data Response Scores (Script Baselines)

Variable	*B*	*SE(B)*	*t*
Intercept	15.53	1.48	10.46
Attitude	-.12	.09	-1.33
SV	-.09	.26	-.37
Att x SV	.03	.10	.27

Note. The continuous variables were centered for the interaction. No p-values are reported, because the developer of the statistical package does not provide them for the mathematical reasons. The t-values are used to interpret the effects.

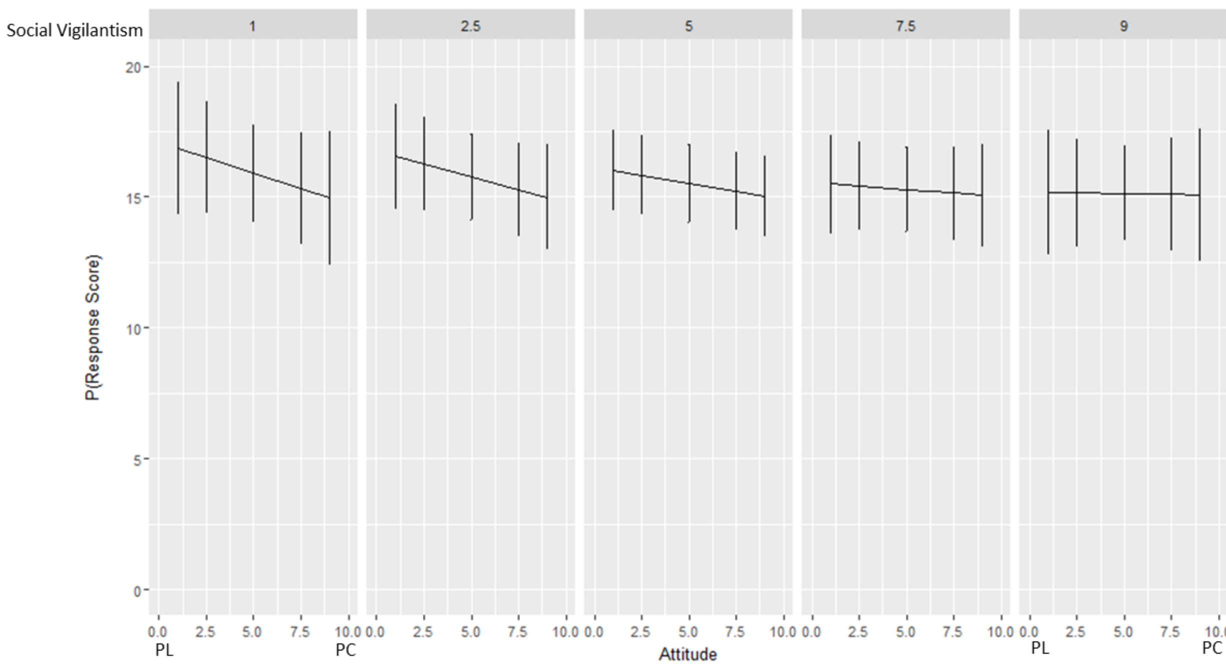

Figure 52. Debate video predicted response score for free recall memory. The Y-axis shows the predicted response score for a participant given their attitude toward abortion (X-axis). The panels at the top show the level of Social Vigilantism (labeled on the top 1 – 9). Error bars are 1 standard error.

Altogether, the memory results show a series of interesting top-down effects for all of the videos. The overall trend was for the attitude by SV interaction seen in many of the eye movement measures, particularly the dwell times. This interaction took the form of the arch for the majority memory results, indicating better memory for Pro-choice participants at low levels of SV and Pro-life participants at high levels of SV. The one contradiction to this is the argument recognition memory for the Non-controversial and debate videos, which both had significant attitude by SV interaction in the opposite direction. These are very different videos, so it is clear why sensitivity for the arguments in them would follow the same pattern but differ from the abortion ads.

Given that the eye movement and memory results showed many of the same patterns (e.g., the Arch), the eye movement and memory results below should show a reliable relationship, which they do. The additional question is if participant individual differences have an effect on memory performance beyond the attentional effects?

Eye-movements and memory

While the independent memory and eye-movement analyses offer important tests of how attitude congruence and social vigilantism influence how people attend to political videos, the relationship between eye-movements and memory allows for the most direct test of how a person's top-down processes may influence attention and their subsequent memory in dynamic scenes. Given that the independent eye movement and memory analyses showed similar effects, generally it is expected that there should be a relationship between eye movements and memory. Specifically, at what level of information processing do top-down processes have an impact—early in attentional selection during encoding, or after memories have been encoded for the information?

If the memory effects occur at the encoding stage, it is expected that there will be a main effect of eye movement measure variability on memory performance variability. For example, if participants do not read the intertitles, their memory for the intertitles should be worse than for participants who did read the intertitles. If memory differences occur after encoding, the memory effects would be independent of the eye movement behavior. In the below analyses this would be seen as no effect of the eye movement variable, but effects for the individual difference measures. Additionally, it is possible that memory effects occur both at encoding and after encoding, which would be seen as eye movement behavior predicting memory performance, and individual differences also have an effect.

Table 52

Eye movements and Memory

Visual Multiple Choice & AOI					
	Non-controversial	-	-	-	-
	Abortion Ads	AoI Fixated	Positive Slope	2.43 *	EM -> Memory
	Debate	AoI Fixated	Positive Slope	2.98 *	EM -> Memory
Argument Recognition (SDT) & AoI					
	Non-controversial	Proportion Words Fixated	Positive Slope (Sensitivity)	0.99	EM -> Memory
	Abortion Ads	Proportion Words Fixated	Positive Slope (Sensitivity)	1.99 *	EM -> Memory
	Debate	Proportion Speaker Dwell Time	Positive Slope (Sensitivity)	2.11 *	EM -> Memory
			Negative Slope (Bias)	3.90 *	
Recall and Gaze Deviation					

	Non-controversial	Attitude, SV, & Gaze Deviation	Attitude, SV, & Gaze Deviation Interaction	2.49 *	EM -> Memory
	Abortion Ads	Attitude, SV, & Gaze Deviation	Attitude, SV, & Gaze Deviation Interaction	2.19 *	EM -> Memory
	Debate	Gaze Deviation	Positive Slope	2.93 *	EM -> Memory
Recall (Script Scoring) and AoI Dwell Time					
	Debate (Current Speaker)	Dwell Time	Positive Slope	2.08 *	EM -> Memory
	Debate (Non-speaker)	Dwell Time	Negative Slope	-2.47 *	EM -> Memory

Note. When an * is reported next to a *t* or *z* value, this denotes the reported effects was significant. For the Hypotheses, when the hypothesis is reported, this is the hypothesis there was support for. There are three hypotheses in the table not presented initially as a hypothesis. Stimulus Effect is support for bottom-up effects driven by the stimulus, when the stimulus does not have features (e.g., editing) that create attentional synchrony and subsequent Tyranny of Film. Top-down (Indiv. Diff.) is for individual differences effects that did not include attitude congruency. Lastly, EM → Memory is for eye movement behavior predicting memory performance. If there were no significant effects to report, the cells for that analysis in the table are reported as "-". For the eye-movement and memory analyses, there was not a meaningful null hypothesis. Thus, if the null was not rejected, the hypothesis is marked with a "-".

Visual multiple choice and area of interest. For the eye movement and visual multiple choice analysis, an area of interest was created for each of the visual multiple choice memory items. Two eye movement metrics were tested for this analysis. The first eye movement metric used was if the area of interest was fixated (Yes or No). Note, for the debate, this analysis was not run, because it was very rare that an area of interest was not fixated. The second metric was dwell time on the area of interest. The outcome variable was whether the participant got the memory item related to that region of interest correct. Since this is a dichotomous outcome variable, the analysis used was a logistic regression.

It is predicted that participants need to fixate an item to have above-chance memory performance. An additional theoretical question of interest is if attitude congruence influences memory performance on top of attentional effects on memory. Participants could be fixating the memory items at the same rate, but still show memory differences, which would indicate that memory differences are being driven by how fixated information is later processed. Conversely, attitude congruence could be influencing eye-movements with the driver of memory differences being whether the target memory items are fixated.

Visual multiple choice and area of interest results. Taken together, the results show a general relationship between eye movements and memory, but it varies based on the video. There were no additional individual differences effects on top of the attention-based memory effects.

The Non-controversial ad was the only video that did not show any effects of fixations (Area of Interest fixated: B = .04, SE = .18, z = .25, p = .81) or dwell time (Dwell time in seconds: B = -.08, SE = .13, z = -.57, p = .57) on memory performance. One potential reason for this, is that it had the lowest memory performance for visual multiple choice items (*M* = .38, *SD* = .49). As such, the near floor effect did not leave much variability to be explained by the eye movement behavior.

For the abortion advertisements, the best model included only whether the area of interest was fixated. Overall, participants were more likely to fixate memory items (Probability = .76) than to not fixate them (Probability = .24).

The analysis was run twice. It was first run with all of the memory items, and then it was run for only the memory items that were the focal point of the advertisement (i.e., the location the filmmaker intended viewers to look). This cleaning removed 1 memory item from each the Pro-choice and Pro-life ads. This cleaning was done instead of including this as a factor in a model test, because there was only one non-focal memory item for each video. Both analysis returned similar results, but the effects were stronger for the analysis with the non-focal memory item removed. Participants did show an effect of attention on memory, such that when an area of interest was fixated, participants were more likely to get the memory item associated with that area of interest correct (Table 53; Figure 53).

Table 53

Summary of Abortion Ads Logistic Multilevel Regression for Fixations of Visual Multiple Choice Memory Items and Item Accuracy

Variable	*B*	*SE(B)*	*z*	Sig. (*p*)
Intercept	-.19	.34	-.55	.58

AOI Fixated (Yes)	.35	.14	2.43	.02

Note. Fixation of AOI was effect coded (1 = Yes, -1 = No)

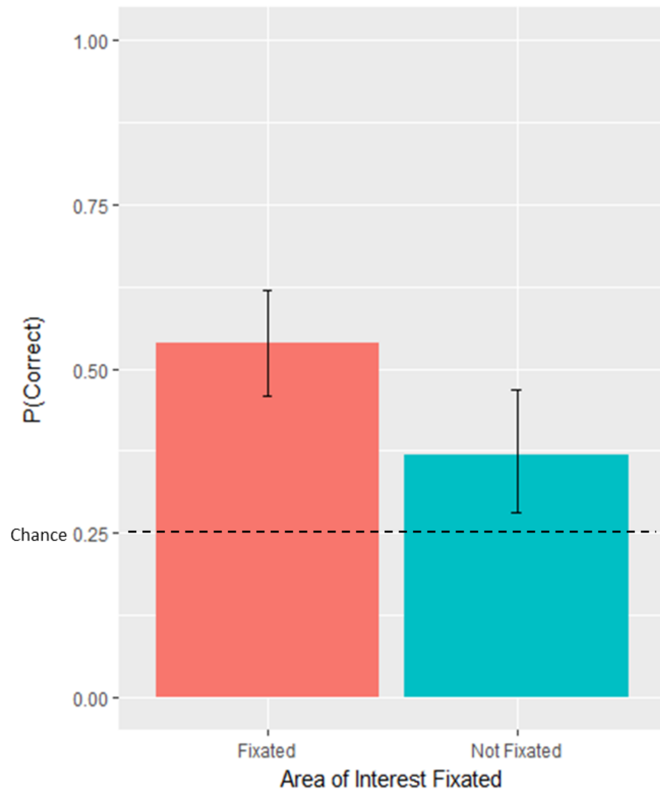

Figure 53. Abortion ads predicted accuracy for visual multiple choice memory items by whether the memory item was fixated. The Y-axis shows the predicted accuracy for fixated items (Red) and items that were not fixated (Blue). Error bars are 1 standard error.

Interestingly, for the dwell time analysis, there was no effect on memory accuracy (Dwell time in seconds: $B = .04$, $SE = .16$, $z = .27$, $p = .79$). This may indicate that the initial processing done when a memory item is fixated is all that is necessary to encode that information for later retrieval. However, as discussed below for the debate videos, we found effects of dwell time, thus this inference is probably incorrect. Thus, a more likely reason for this lack of effect of dwell time may have been that the memory items were only on the screen for a short period of time (2 – 4 seconds), which resulted in relatively short dwell times (*M* = 1049 ms, *SD* = 841 ms).

The eye movement and visual multiple choice memory analysis for the debate also showed an effect in the predicted direction, but it was for dwell time on the memory items areas of interest (Table 54). The distribution of dwell times (Figure 54a) shows a large amount of variability in dwell times and was bimodal. Both characteristics would be expected based on a number of factors. First, the eye movement results that showed participants mainly fixated the current debate speaker, and rarely fixated away from the debaters. Based on this, it would make sense that dwell times on the memory items that were not associated with one of the debate speakers would have lower dwell times that would create a lower mode. The distribution for only these non-debater items shows this is the case (Figure 54b). Second, given the location and size of the memory items used in the analysis, it makes sense that there was not a clear normal distribution overall, and that the distribution platykurtic (Kurtosis = -1.15). That is to say, some areas of interest were more likely to have high dwell times (e.g., the debaters' head), others were more likely to have relatively moderate dwell times (e.g., the debaters' body), and others relatively low (e.g., a debaters' jewelry). Dwell times for all of these areas of interest are making up the platykurtic second mode. Note, to control for this variability in the dwell times between the memory questions, the analysis below included memory question as a random effect.

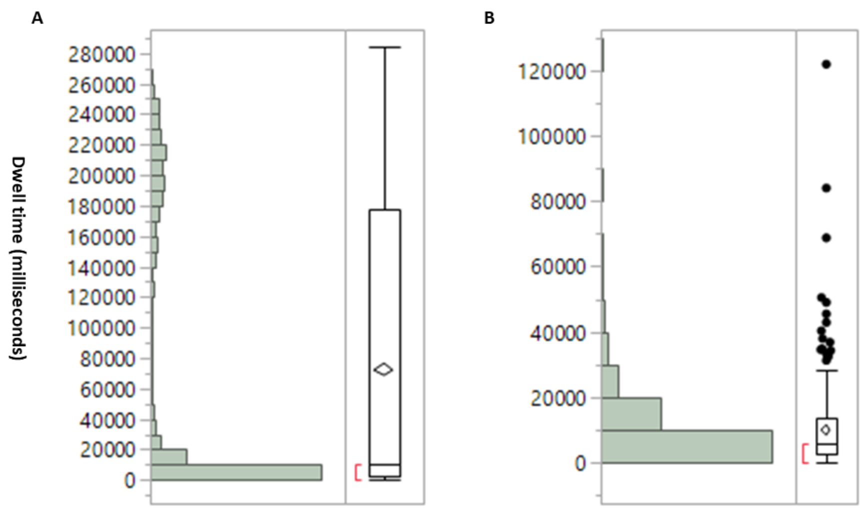

Figure 54. Debate video distributions of participant dwell times (Milliseconds) in visual multiple choice memory item areas of interest. Figure A shows all participant dwell times. Figure b shows the distribution for areas of interest that were not debater.

The best model only included the eye movement metric (dwell time) as a fixed effect. As participants had greater dwell times on memory items, they were more likely to get questions about that memory item current (i.e., if they looked at a debater's hair, they were more likely to get a question about their hair color correct) (Figure 55). The individual difference predictors did not influence this model. As such, the memory effects appear to have been driven by attention differences between participants.

Table 54

Summary of Debate Logistic Multilevel Regression for Dwell Time on Visual Multiple Choice Memory Items and Item Accuracy

Variable	*B*	*SE(B)*	*z*	Sig. (*p*)
Intercept	.71	.24	2.94	.003
Dwell Time (Seconds)	.005	.002	2.98	.003

Note. Dwell time is in seconds.

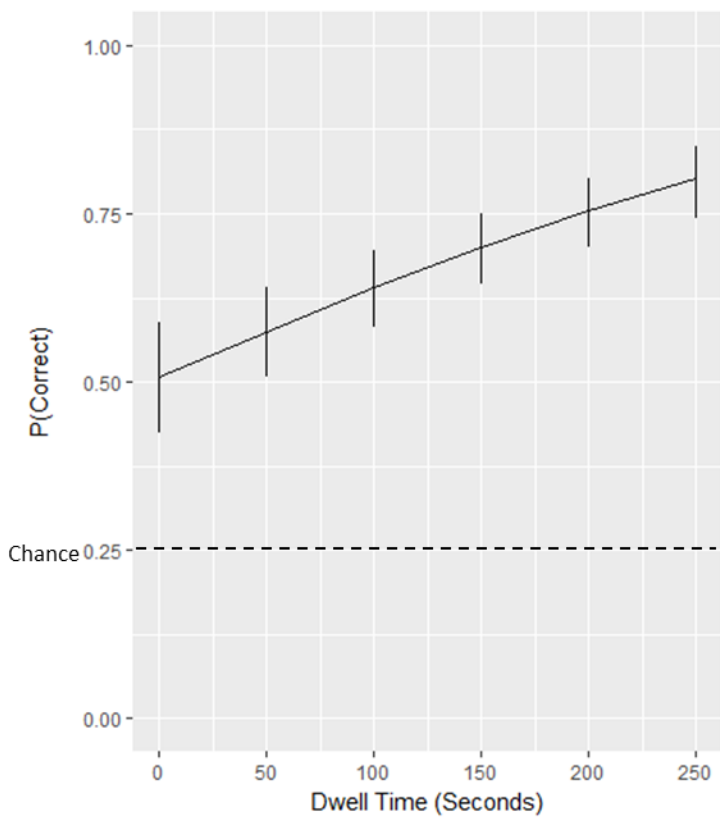

Figure 55. Debate video predicted accuracy for visual multiple choice memory items by dwell time on the item. The Y-axis shows the predicted accuracy for the amount of dwell time on the item in seconds (X-axis). Error bars are 1 standard error.

The eye movement and visual multiple choice item accuracy analyses together show the expected relationship that fixating and dwelling longer on the memory items improves memory for those items. Additionally, it is important that the individual difference predictors did not account for variability on top of the eye movement behavior. This indicates the visual multiple choice memory effects were driven by attentional differences. Thus, while individual differences produced differences in attention, and in memory, it appears that the effects on memory were mediated by the effects on attention during encoding, and not on higher level cognitive processes involved later during storage or retrieval.

Argument recognition and region of interest (advertisements). A similar analysis to the visual multiple choice and region of interest analysis was done for the advertisement argument recognition memory. Given that it was found that participants fixated content words at different rates depending on attitude congruence and social vigilantism, the analysis run used the number of content words fixated in the text as a predictor of Argument Recognition memory performance. It was predicted that participants who fixated more words of the text would have better memory for the arguments presented (Duggan & Payne, 2009, 2011; Masson, 1982). However, individual differences could influence this relationship. For example, people may process attitude-congruent information more efficiently, which could result in better memory even though not all the content words were fixated. Conversely, participants may be more likely to false alarm for attitude-congruent memory information. There is evidence of this in the Debate in the Memory experiment, indicating that content word fixations may have little influence on memory performance when information is attitude-incongruent. For attitude-incongruent information, the Memory experiment results indicate high SV participants may have better memory. This could have been a result of attentional selection differences in high SV participants (e.g., more fixations on content words, longer dwell times, longer fixation durations, more regressions). Conversely, they could have engaged in greater depth of processing after reading the text (e.g., counter-arguing).

The predictor used for content word fixations in the models tested was the proportion of content words fixated for each intertitle (i.e., argument memory item). The proportion of content words fixated was used to control for the influence of each intertitle having a different number of content words. Not using the proportion would have resulted in intertitles with more content words having more influence on the analysis. The analysis used the signal detection probit model used for the argument recognition memory analyses above. The procedure was to first enter the proportion of content words fixated, and then the individual difference effects. For both the Non-controversial and Abortion ad analyses below, the individual difference measures did not improve the models, suggesting that top-down effects on memory did not occur after the encoding stage.

While figures below show proportions of content word fixations ranging from 0-1, typically participants fixated the majority of the contents words for each intertitle (Figures 56a & 56b). This was first mentioned in the content word fixation analyses above, overall participants tended to read the intertitles, which requires that content words are fixated. Two reasons this is important are 1) that the predictions of the models reported are best for the actual values present at in experiment (i.e., proportions of .5 and above), and 2) that negative d’ values predicted by the model for the Non-controversial video are likely partially due to the model trying to predict performance where there was a paucity of data. As such, the predicted negative d’ values should probably be interpreted as d’ = 0 (i.e., no sensitivity). Notice, for the abortion ads that had a more proportions below .5, the model d’ predictions are much more in line with what would be predicted (i.e., when the proportion of content words fixated equals 0, d’ is predicted to be 0). This also explains why the slope effect for the abortion ads analysis below is significant, even though it is not as high as for the Non-controversial ad.

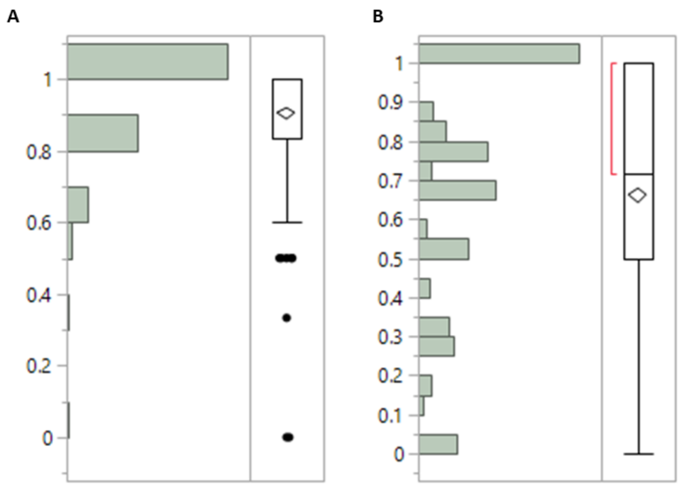

Figure 56. Distribution of the proportion of content words fixated. Figure A is for the non-controversial ad. Figure B is for the abortion ads.

Non-controversial ad intertitle content word fixations and argument memory. The best model included whether the memory item was an “Old” or ”New” argument (included for the signal detection analysis), and the proportion of content words fixated (Random effect = participant intercept). As with the memory-only analysis, there was an “Old” bias (Table 55), and extremely low, in fact negative, sensitivity (d’ = -0.27). There was not a significant effect of proportion of fixations on sensitivity or bias for the memory items. One likely reason for this is that participants overall were not sensitive to these memory items. Another potential reason for this is that for the Non-controversial ad there was a ceiling effect for content word fixations (i.e., most participants fixated all the content words) (Figure 57). Due to this lack of variability in content word fixations, the proportion of content word fixations may not have been able to account for variability in memory performance. Thus, it is more likely that the memory effects for the arguments in the Non-controversial ads are a result of processing differences that occurred after the intertitles were attended to (e.g., depth of processing differences (Craik, 2002;

Craik & Lockhart, 1972; Craik & Tulving, 1975)). However, given the weak trend in the data that participants had better sensitivity for items for which they fixated more of the content words, it is also possible there were attentional selection effects on memory performance. In fact, comparing these results to the abortion ad results below, this second option seems more likely.

Table 55

Summary of Non-controversial Ad Probit Multilevel Regression Signal Detection Analysis for Content Words Fixated and Argument Recognition

Variable	*B*	*SE(B)*	*z*	Sig. (*p*)
Intercept (Bias)	.66	.08	7.95	< .001
"Old"/"New" (Sensitivity)	-.27	.16	-1.63	.10
Proportion of Fixations (Content Words)	-.37	.59	-.62	.53
"Old/"New" x Proportion of Fixations	1.16	1.18	.99	.32

Note. The intercept of the model is the overall bias (c). Positive c values indicate an "Old" bias. Item Type shows the overall sensitivity (d') to the memory items. Variables without "Item Type" show that variables adjustment to bias. Interactions with Item Type show adjustments to sensitivity. The variables were centered for the interactions.

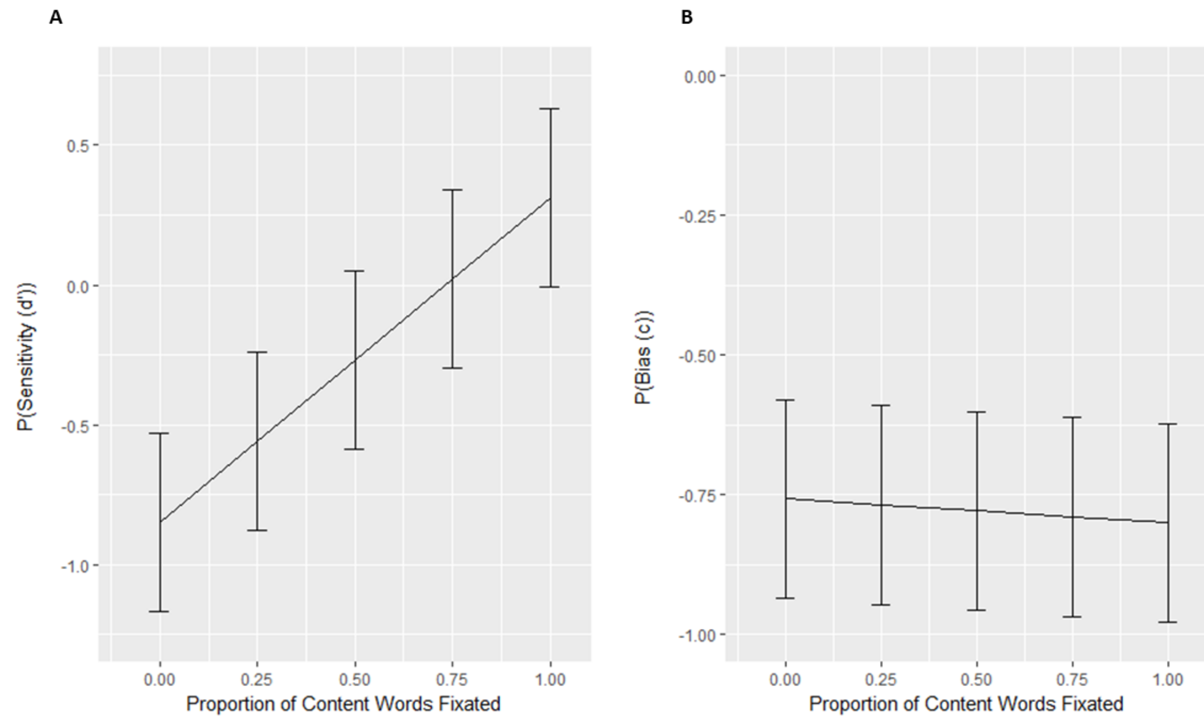

Figure 57. Non-controversial ad predicted sensitivity (d') and bias (c) for the argument recognition memory items based on content word fixations. A) The Y-axis shows the predicted sensitivity for a participant given the proportion of content words fixated (X-axis). B) The Y-axis shows the predicted bias for a participant given the proportion of content words fixated. Error bars are 1 standard error.

Abortion ads intertitle content word fixations and argument memory. The fixed effect structure for the abortion ad analysis was the same as for the Non-controversial ("Old"/"New", and proportion of fixations). The random effects included the participant intercept and an item effect for the memory question answered. As with the memory-only analysis for this data, there was an "Old" bias, and generally participants were slightly, but significantly more sensitive than chance to the memory items (Table 56). Additionally, there was an interaction of "Old"/"New" (i.e., sensitivity) and proportion of fixations, such that participants who fixated a higher proportion of the content words were more sensitive to the argument memory items. Importantly, adding the individual difference measures into the model did not improve it. This indicates that it is more likely the memory difference effects on memory for the abortion ads were driven by the individual difference effects on attentional selection rather than depth of processing.

Table 56

Summary of Abortion Ads Probit Multilevel Regression Signal Detection Analysis for Content Words Fixated and Argument Recognition

Variable	*B*	*SE(B)*	*z*	Sig. (*p*)
Intercept (Bias)	.79	.09	8.77	< .001
"Old"/"New" (Sensitivity)	.41	.18	2.31	.02
Proportion of Fixations (Content Words)	.04	.14	.31	.76
"Old/"New" x Proportion of Fixations	.55	.28	1.99	.05

Note. The intercept of the model is the overall bias (c). Positive c values indicate an "Old" bias. Item Type shows the overall sensitivity (d') to the memory items. Variables without "Item Type" show that variables adjustment to bias. Interactions with Item Type show adjustments to sensitivity. The variables were centered for the interactions.

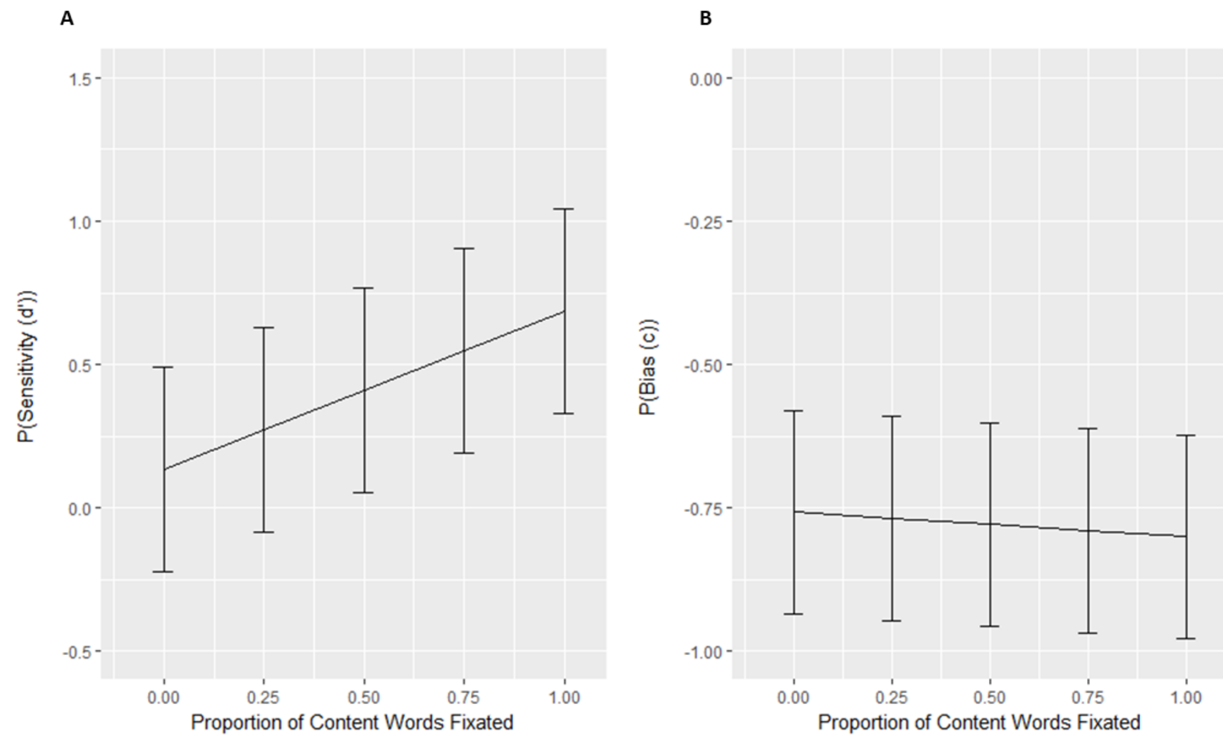

Figure 58. Abortion ads predicted sensitivity (d') and bias (c) for the argument recognition memory items based on content word fixations. A) The Y-axis shows the predicted sensitivity for a participant given the proportion of content words fixated (X-axis). B) The Y-axis shows the predicted bias for a participant given the proportion of content words fixated. Error bars are 1 standard error.

Argument recognition and region of interest (debate). The memory analysis for the debate argument recognition memory items in the Eye movement experiment showed an interaction of attitude and SV on sensitivity to the memory items, and no individual differences effects on bias. The current analysis tested if fixating the speaker improved memory for the arguments they were presenting. A region of interest analysis with interest periods for each argument used in the memory task was run. Proportion of dwell time on the debater while they presented the argument was the eye movement predictor in addition to the individual difference predictors. In the analysis without the individual difference predictors, it was predicted that a greater proportion of time spent watching the debater while they presented the argument should improve memory for that item. Memory for speech has been shown to be better when fixating a speaker's face (Lansing & McConkie, 2003; Rudmann, McCarley, & Kramer, 2003). However, since the arguments were spoken, it was possible for a participant to look somewhere else based on attitude congruence and social vigilantism, and still process the information.

The distribution of proportion of dwell time on the current debate speaker (Figure 59) showed that there was a large amount of variability ranging from almost 0 (*Min* = .005) to close to 1 (*Max* = .97). As such, the model had data from the nearly the full range of possible of the predictor variable, which generally reduced the amount of error in the model.

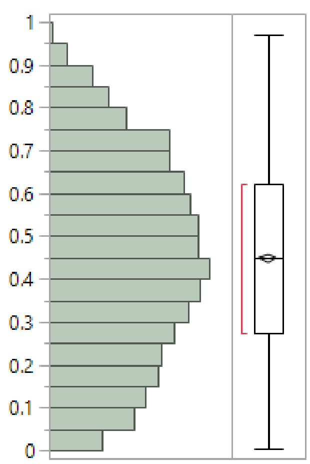

Figure 59. Distribution of proportion of dwell time on the current debate speaker. Proportion calculated by dividing debaters entire time speaking by participants dwell time the debater while speaking.

Argument recognition and region of interest results. Similar to the advertisement eye movement and argument recognition memory analyses, the best model included item type ("Old"/"New") and proportion of dwell time on the debate speaker (Table 57). Proportion dwell time influenced both sensitivity (d') and bias (c). When the proportion dwell time equaled 0, the model predicted essentially no sensitivity or bias, which is what would be expected (i.e., chance performance, with no bias). As the proportion dwell time on the debate speaker presenting the argument increased, sensitivity for the memory item also increased. Interestingly, a higher proportion of the overall dwell time also resulted in a stronger "Old" bias. Importantly, since the individual difference predictors were not in the best model, these results are again likely evidence that the attentional selection effects found for the eye movements are driving the memory effects.

Table 57

Summary of Debate Probit Multilevel Regression Signal Detection Analysis for Dwell Time on Debater and Argument Recognition

Variable	*B*	*SE(B)*	*z*	Sig. (*p*)
Intercept (Bias)	.30	.07	4.59	< .001
"Old"/"New" (Sensitivity)	.39	.13	3.08	.002
Proportion of Dwell Time (On debate speaker)	.51	.13	3.90	< .001
"Old/"New" x Proportion of Dwell Time	.52	.25	2.11	.03

Note. The intercept of the model is the overall bias (c). Positive c values indicate an "Old" bias. Item Type shows the overall sensitivity (d') to the memory items. Variables without "Item Type" show that variables adjustment to bias. Interactions with Item Type show adjustments to sensitivity. The variables were centered for the interactions.

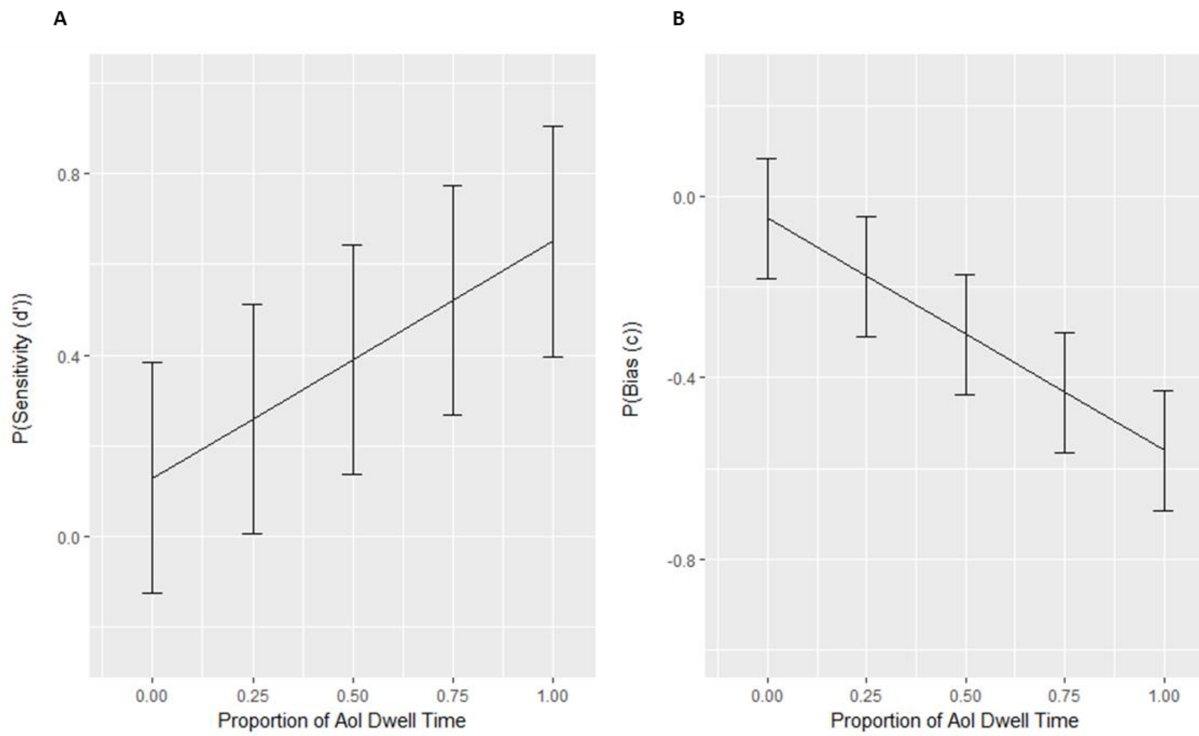

Figure 60. Debate video predicted sensitivity (d') and bias (c) for the argument recognition memory items based on dwell time on the debate speaker during their turns. A) The Y-axis shows the predicted sensitivity for a participant given the proportion of dwell time on the debate speaker during their turns (X-axis). B) The Y-axis shows the predicted bias for a participant given the proportion of dwell time on the debate speaker during their turns. Error bars are 1 standard error.

General eye-movement and memory effects. As an exploratory analysis, the relationship between deviation from gaze center and free recall response scores was tested. At a broad level it would be expected that participants who show more clustering of gaze would also show more similarity in their free recalls. To test if this was the case, gaze deviation was used as a predictor in a model with the outcome variable of free recall word count. Word count was used because the analyses that only included memory showed the free recall effects were driven by differences in participant word count.

Given the eye movement results showed there was a difference between deviation from screen center for the visual information and intertitles in the videos, the analysis for the visual information free recall used only the eye movement data from the visual portion of the clip, and the intertitle free recall used only the data from intertitle viewing. To avoid the number of fixations a person made influencing the analysis, deviation from screen center predictor was aggregated to return a mean deviation value for each participant. Due to this, the data was no longer repeated measures, which meant a generalized regression (not multilevel) was run for the non-controversial and debate analyses. There were 2 abortion advertisements, so a multilevel analysis was run to control for differences between the videos.

The distributions for deviation from screen center for the ads are fairly normally distributed with a small positive skew (Figures 61a & 61b). The distributions for the Non-controversial and Abortion ads have a similar range from close to 2.5 degrees of visual angle up to approximately 8 degrees of visual angle.

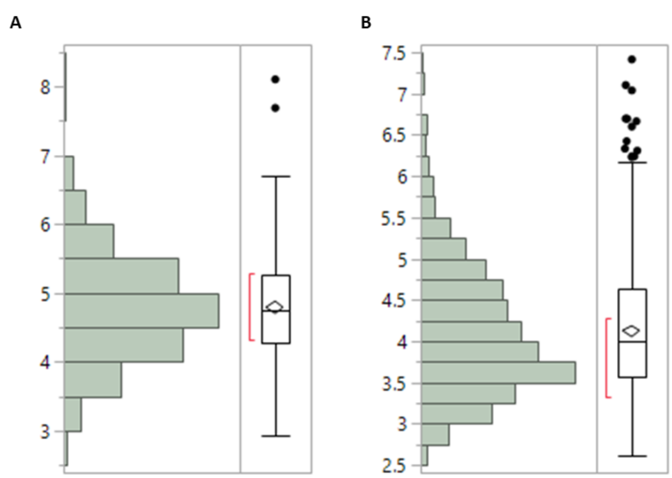

Figure 61. Distribution of deviation from screen center. Figure A is for the non-controversial ad. Figure B is for the abortion ads.

Non-controversial ad gaze deviation and free recall memory. The best models were different for the visual and intertitle free recall outcome variables. For the visual free recall, the best model included the predictors deviation from screen center, attitude, and SV. In this analysis (Table 58, Figure 62), the attitude and SV effects were consistent with the memory-only analysis presented above (Table 42, Figure 43). The deviation from screen center main effect was not quite statistically significant, but it significantly interacted with the attitude and SV predictors. This interaction was driven mostly by the participants who identified as more Pro-life. At low levels of SV, the more Pro-life participants whose gaze deviated more from screen center had longer free recall responses. At high levels of SV this relationship flipped, with the longer recall responses for participants with less gaze deviation from screen center.

These results are interesting, because it is the first evidence of variability in memory performance that is not significantly accounted for by eye movement behavior. As this is the Non-controversial ad, thus there are no attitude congruence variables, this is more evidence for top-down effects driven by personality effects picked up by the individual difference measures.

Table 58

Summary of Non-controversial Ad Poisson Multilevel Regression Analysis for Deviation from Screen Center and *Visual* Free Recall Word Count

Variable	*B*	*SE(B)*	*z*	Sig. (*p*)
Intercept	3.76	.01	286.33	< .001
Deviation from Screen Center (Degrees of Visual Angle)	-.03	.02	-1.66	.09
Attitude	.002	.01	.32	.75
SV	.03	.01	2.01	.05

Deviation x Att	.02	.01	2.97	.003
Deviation x SV	-.03	.02	-1.47	.14
Att x SV	-.01	.01	-2.14	.03
Deviation x Att x SV	.02	.01	2.49	.01

Note. The continuous variables were centered for the interaction.

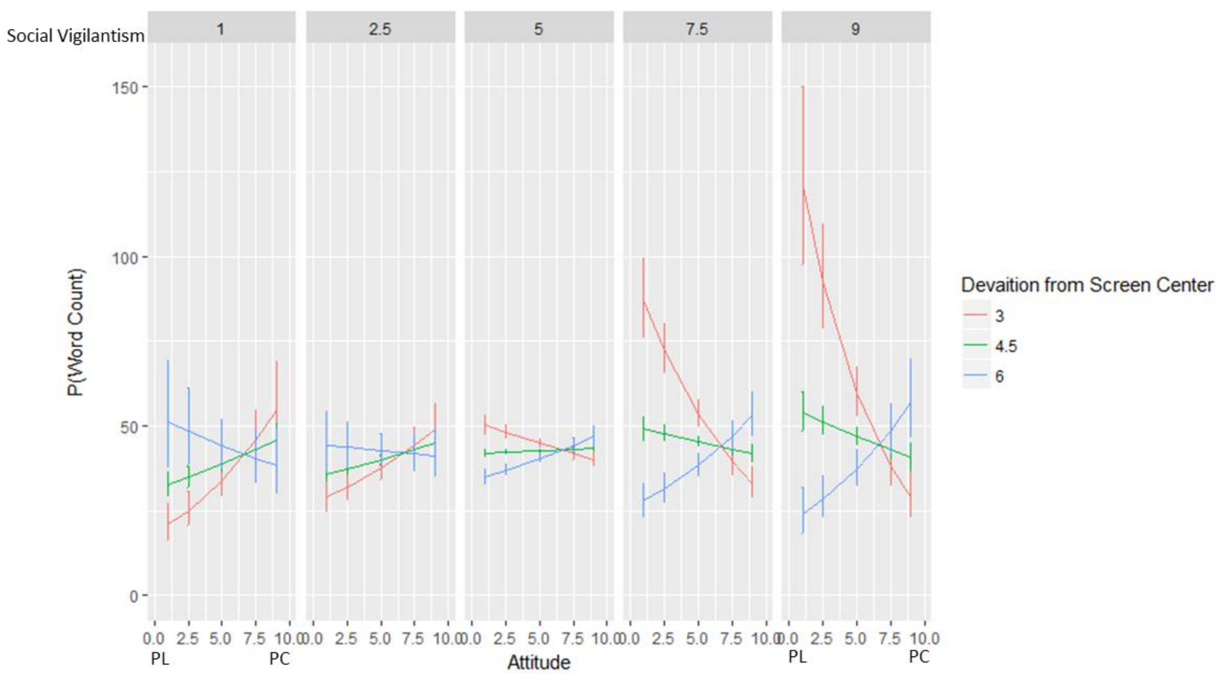

Figure 62. Non-controversial ad predicted word count for visual free recall memory given deviation of gaze from screen center. The Y-axis shows the predicted word count for a participant given their attitude toward abortion (X-axis). The panels at the top show the level of Social Vigilantism (labeled on the top 1 – 9). The lines show the deviation from screen center (Red = 3 degrees of visual angle, Green = 4.5, Blue = 6). Error bars are 1 standard error.

When testing the gaze deviation and recall memory for verbal intertitle information, the effects were similar to those for the content word fixation and argument memory analyses above. The only predictor in the best model was deviation from screen center, and as participants deviation increased their free recall word counts for the intertitles were higher (Table 59). Since greater gaze deviation is likely evidence that a participant was carefully reading the intertitles, this result fits what one would expect (i.e., the more carefully a person reads a text, the more they will be able to recall from the text).

Table 59

Summary of Non-controversial Ad Poisson Multilevel Regression Analysis for Deviation from Screen Center and *Intertitle* Free Recall Word Count

Variable	*B*	*SE(B)*	*z*	Sig. (*p*)
Intercept	3.29	.02	203.13	< .001
Deviation from Screen Center (Degrees of Visual Angle)	.05	.02	2.08	.04

Note. Deviation from screen center is in degrees of visual angle.

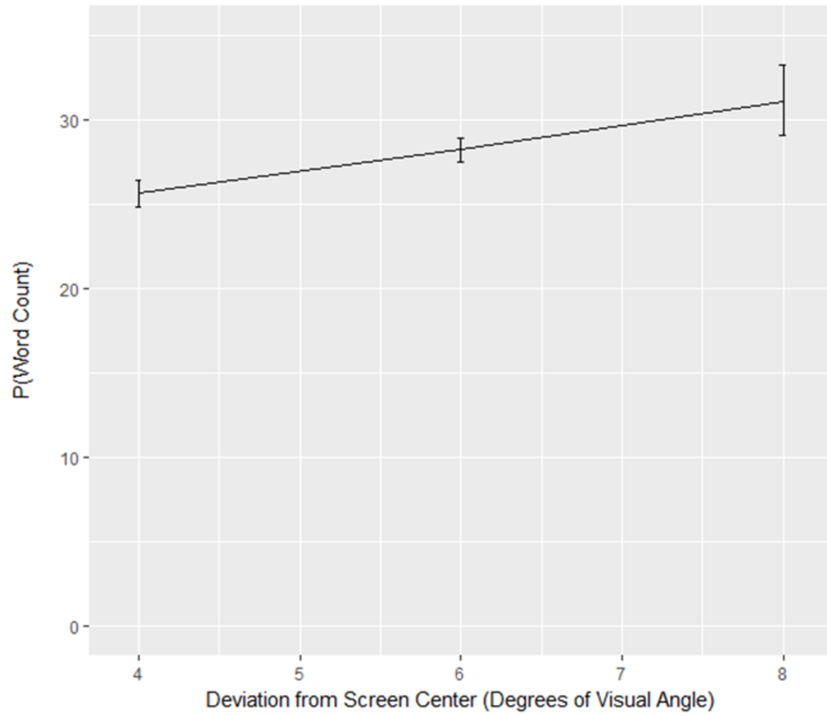

Figure 63. Non-controversial ad predicted word count for verbal free recall memory given deviation of gaze from screen center. The Y-axis shows the predicted word count for a participant given their average deviation from screen center while reading the intertitles (X-axis). Error bars are 1 standard error.

Abortion ads gaze deviation and free recall memory. For the visual free recall, the best model included the deviation from screen center eye movement measure, the attitude and SV individual difference variables, the video (Pro-choice or Pro-life ad), and the interactions of these predictors. The random effect structure only included the participant intercept. The individual difference effects (Table 60, Figure 64) were in the same direction as the memory only analysis above (Table 46, Figure 47). Of interest in this analysis is the effect of the eye movement behavior (screen center deviation) on the memory responses. The main effect of deviation was not significant, but the trend was that as deviation increased, visual free recall word counts decreased. There was a significant interaction of deviation and attitude, such that for more Pro-life participants word counts were comparatively higher when gaze deviation was lower, and for Pro-choice word counts were higher when gaze deviation was higher. This interaction was qualified by 2 higher order interactions, ultimately with the 4-way interaction that included all the predictor variables. Figure 64 shows that the video watched was an important predictor with effects being driven by the Pro-choice video. For the Pro-choice video, at low levels of SV, Pro-choice participants tended to have longer free recalls when their gaze deviation was low. Comparatively, as participants indicated being higher in SV, this relationship flipped, such that more Pro-life participants were more likely to have longer free recalls when their gaze deviation was low. Interestingly, these effects were not present for the Pro-life ad, even though for the free recall memory analysis above (Figure 47, Table 46) the video predictor did not influence free recall memory (i.e., the effect was similar for the Pro-choice and Pro-life ads).

Using gaze deviation as a proxy variable for the similarity of participant gaze (i.e., less deviation corresponds to more similarity), these results indicate at a broad level that viewer similarity does not necessarily correspond to similar free recall memory responses. However, at specific levels of the individual difference predicter variables, there may be relationships. Specifically, low SV, Pro-choice participants, and high SV, Pro-life participants show relationships between gaze deviation and free recall word count.

Table 60

Summary of Abortion Ads Poisson Multilevel Regression Analysis for Deviation from Screen Center and *Visual* Free Recall Word Count

Variable	*B*	*SE(B)*	*z*	Sig. (*p*)
Intercept	3.52	.04	91.76	< .001

Deviation from Screen Center (Degrees of Visual Angle)	-.05	.02	-1.74	.08
Attitude	.02	.02	1.55	.12
SV	.08	.04	2.09	.04
Video (Pro-choice)	.03	.01	1.79	.07
Deviation x Att	.04	.01	3.49	< .001
Deviation x SV	.03	.03	.92	.36
Att x SV	-.05	.02	-3.06	.002
Deviation x Video	-.01	.02	-.58	.56
Att x Video	-.01	.01	-1.40	.16
SV x Video	-.03	.02	-1.84	.07
Deviation x Att x SV	.02	.01	2.15	.03
Deviation x Att x Video	-.03	.01	-4.54	< .001
Deviation x SV x Video	-.03	.02	-1.24	.22
Att x SV x Video	-.02	.01	-2.71	.007
Deviation x Att x SV x Video	.02	.01	2.19	.03

Note. The Video variable was effect coded for this analysis (Pro-choice = 1, Pro-life = -1). The continuous predictors were centered.

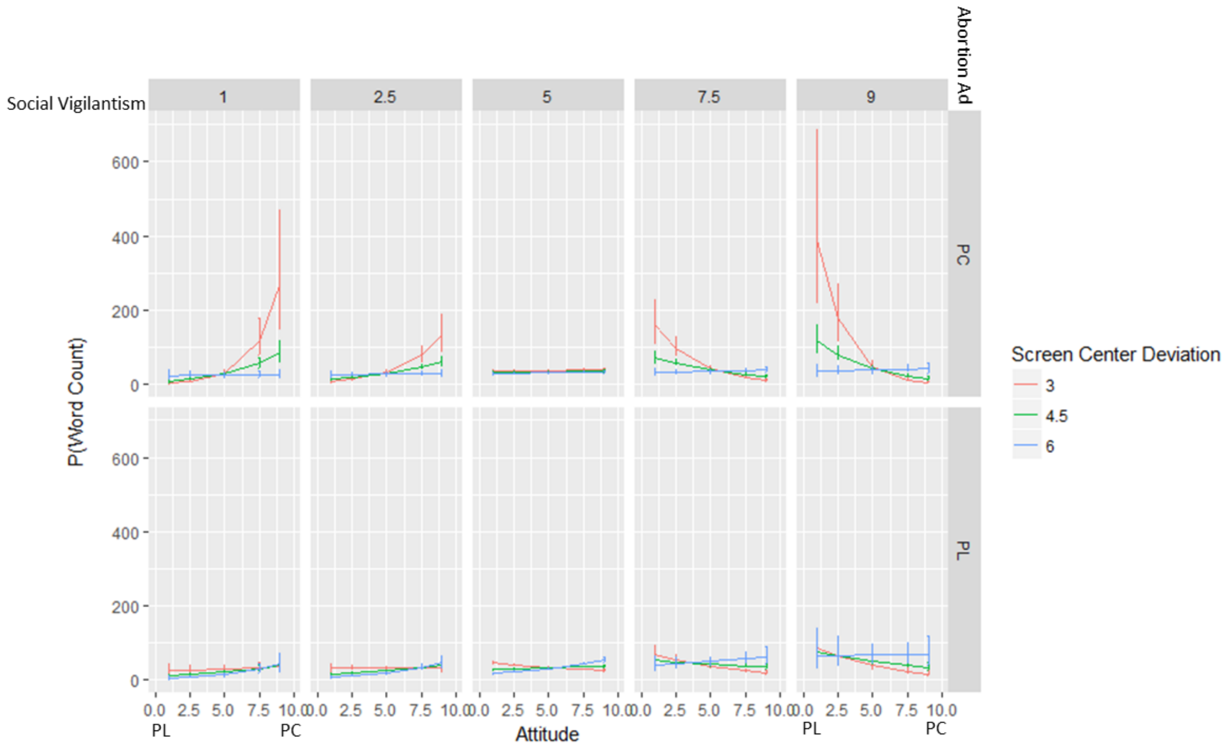

Figure 64. Abortion ads predicted word count for visual free recall memory given deviation of gaze from screen center. The Y-axis shows the predicted word count for a participant given their attitude toward abortion (X-axis). The panels at the top show the level of Social Vigilantism (labeled on the top 1 – 9). The lines show the deviation from screen center (Red = 3 degrees of visual angle, Green = 4.5, Blue = 6). The horizontal panels show that abortion ads (PC = Pro-choice ad, PL = Pro-life). Error bars are 1 standard error.

For the verbal free recall, the best model included the deviation from screen center eye movement measure, attitude, and the video (Pro-choice of Pro-life ad). Again, the random effect structure had only the participant intercept. Similar to the visual free recall analysis just above, there was a trend that increased deviation predicted shorted free recall (Table 61), and the effects were driven by the Pro-choice video. For the Pro-choice video, less deviation predicted longer free recalls (Figure 65). Additionally, the 3-way interaction was very nearly significant, such that for the Pro-choice video, Pro-life participants were driving the gaze deviation effect (as deviation increased, free recall length decreased).

Table 61

Summary of Abortion Ads Poisson Multilevel Regression Analysis for Deviation from Screen Center and Intertitle Free Recall Word Count

Variable	*B*	*SE(B)*	*z*	Sig. (*p*)
Intercept	3.35	.04	74.75	< .001
Deviation from Screen Center (Degrees of Visual Angle)	-.07	.04	-1.95	.051
Attitude	-.01	.02	-.44	.66
Video (Pro-choice)	.01	.01	.58	.56
Deviation x Att	.02	.01	1.28	.20
Deviation x Video	-.09	.02	-3.63	< .001
Att x Video	.01	.004	1.36	.18
Deviation x Att x Video	.02	.01	1.95	.052

Note. The Video variable was effect coded for this analysis (Pro-choice = 1, Pro-life = -1). The continuous predictors were centered.

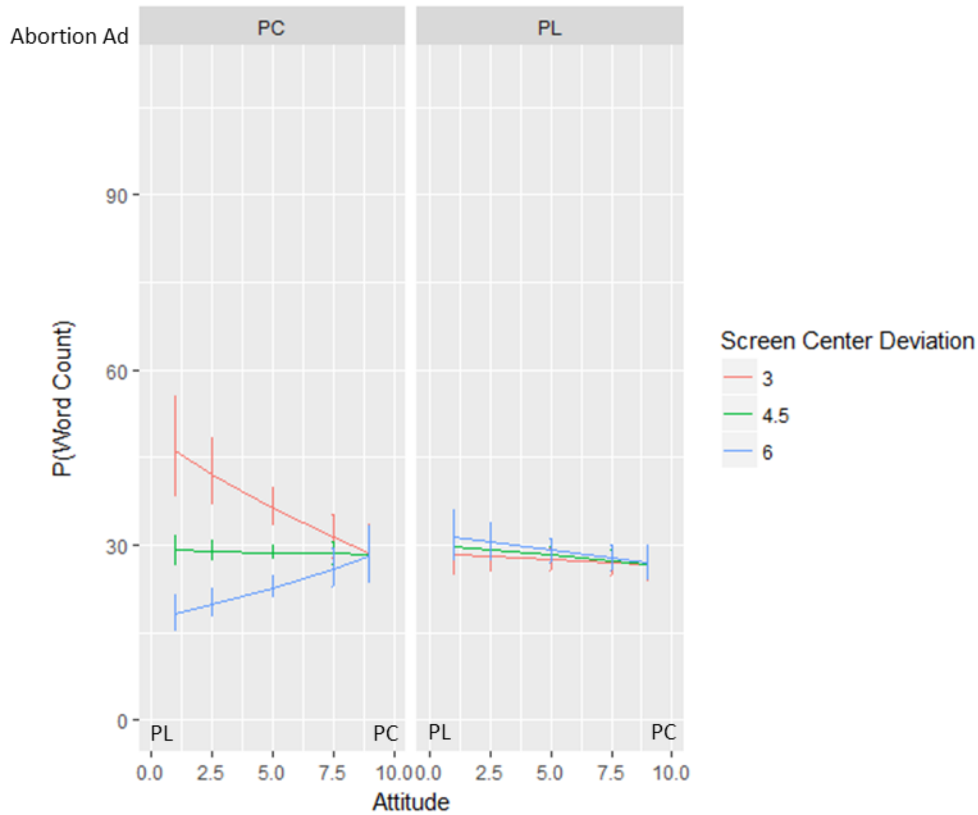

Figure 65. Abortion ads predicted word count for verbal free recall memory given deviation of gaze from screen center. The Y-axis shows the predicted word count for a participant given their attitude toward abortion (X-axis). The panels at the top show that abortion ads (PC = Pro-choice ad, PL = Pro-life). The lines show the deviation from screen center (Red = 3 degrees of visual angle, Green = 4.5, Blue = 6). Error bars are 1 standard error.

Debate gaze deviation from current speaker and free recall script scoring response score. For the debate, since it was possible to score the debate free recall using the scripts as a baseline, the response scores for these were used as the outcome variable for this eye movement and memory analysis. The eye movement metric was the deviation from the current debate speaker. The distribution for deviation from the current debate speaker was positively skewed, with the median at 3.9 degrees of visual angle and the max at 17.86 (Figure 66).

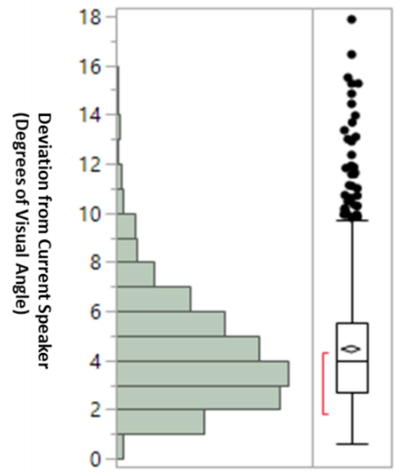

Figure 66. Distribution of gaze deviation (Degrees of Visual Angle) from the current debate speaker.

While this was an exploratory analysis, the general prediction would be that the less deviation a participant has from a debate speaker, the better their memory for their arguments. This is what the debate argument recognition memory and area of interest analysis showed. However, interestingly, the results of the current analysis were in the opposite direction.

The best model included the predictor deviation from the current debate speaker, and the random effect structure included the participant intercept and slope effects for the debate speaker (Pro-choice or Pro-life) and which turn the debater was on (1^{st} argument, 2^{nd} argument, 3^{rd}, or 4^{th}). It turned out that participants who have a greater overall gaze deviation from the current debate speaker are predicted to have free recall responses that better match the script used (Table 62, Figure 67).

Table 62

Summary of Debate Multilevel Regression for Deviation from Current Debate Speaker and Free Recall Response Score (Script Scoring)

Variable	*B*	*SE(B)*	*t*
Intercept	7.35	.27	26.96
Deviation from Current Speaker (Degrees of Visual Angle)	.19	.07	2.93

Note. Script scoring refers to the response score being calculated by comparing participant free recalls to the debate script used. No p-values are reported, because the developer of the statistical package does not provide them for mathematical reasons. The t-values are used to interpret the effects.

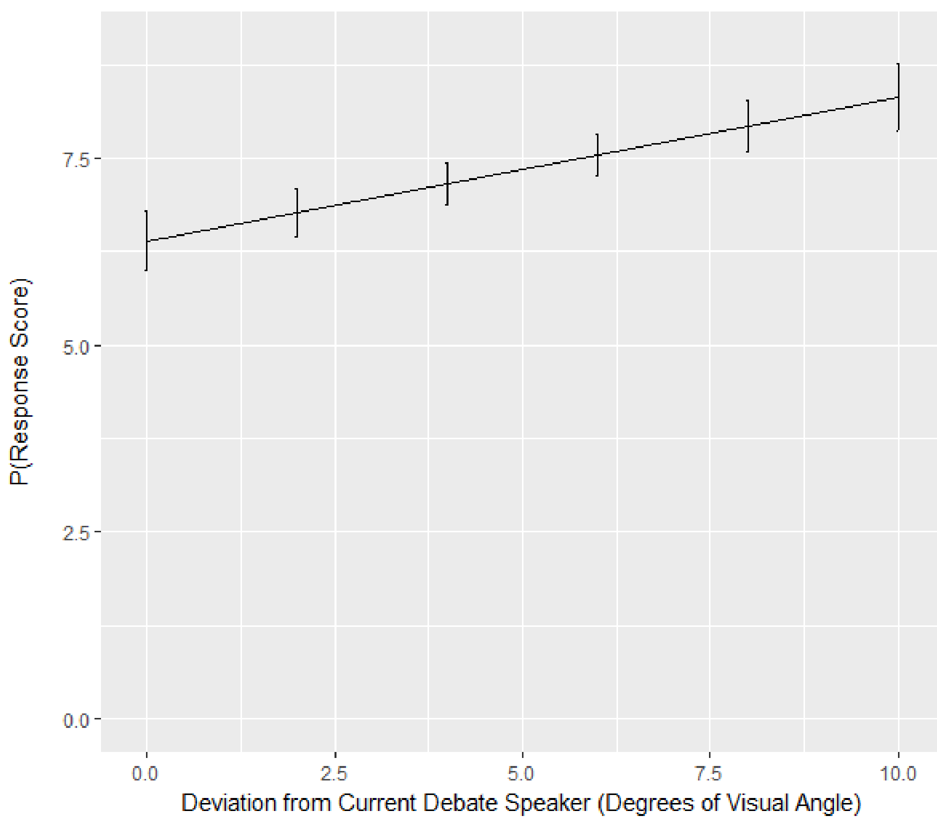

Figure 67. Debate video predicted response score for verbal free recall memory given deviation of gaze from the current debate speaker. The Y-axis shows the predicted response score for a participant given

their average deviation in degrees of visual angle from the current debate speaker (X-axis). Error bars are 1 standard error.

Debate dwell time on speakers and free recall memory. The gaze deviation and free recall result seems counterintuitive. Why would looking away from the current speaker improve memory, especially when other analyses (debate speaker dwell time and argument recognition memory) have shown the opposite? To further test this result, 2 additional eye movement and debate argument free recall analyses were run. A corollary analysis to the deviation from the debate speaker and free recall memory is an area of interest analysis for the debate speakers. The area of interest used was the debaters head, and for the free recall memory the response scores based on the debate scripts were used again.

The first analysis used dwell time on the current debate speaker head as a predictor of response score. The individual difference measures (attitude and SV) were also included in the model tests. Based on the gaze deviation results it would, counterintuitively, be predicted the increased dwell time would decrease free recall response score. However, the previous dwell time and argument memory analysis would predict the opposite.

The second analysis run switched to using the dwell time on the debate speaker who is listening to the other present their argument (the non-speaker). This analysis was run separate from the first, because these two measures have high multicollinearity (VIF's > 4). The reason for the high multicollinearity is that in the debate participants spent most of the time looking at the current debate speaker, and if they looked somewhere else it was typically the non-speaker. Nevertheless, this analysis is important given the deviation results, because they would seem to suggest that looking away from the current debate speaker to the non-speaker can improve memory for the current speaker's arguments. Although this does not make intuitive sense, it is possible that a viewer following the debate closely would look to the non-speaker regularly to read their reactions to the current speaker's arguments, thus increasing their dwell time on the non-speaker.

The distribution for dwell time on the current debate speaker had a small positive skew (Figure 68a), with the median at 28.3 seconds (*Max* = 92.9 seconds). Dwell time on the non-speaker had a strong positive skew (Figure 68b) due to a large number of participants having near zero dwell times on the non-speaker.

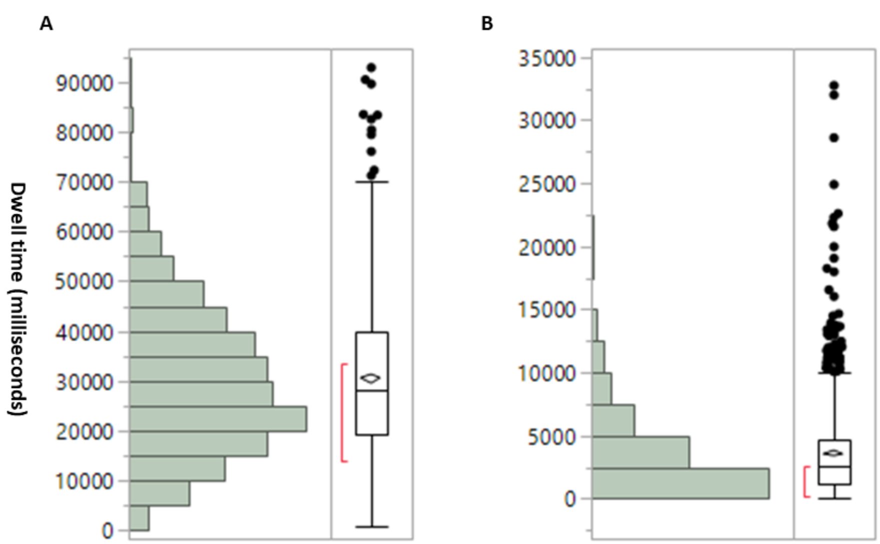

Figure 68. Distribution of dwell times (Milliseconds) of the debate speakers split by whether they were currently speaking. Figure A is for the current debate speaker. Figure B is for the non-speaker.

Debate dwell time on current speaker and free recall memory. The random effect structure included the participant intercept and allowed the intercept to vary for each baseline script (e.g., Pro-choice script 1 response score and Pro-life script 3 response score). The slope effect of script number (was it the first time the debater spoke, the second, etc.) was also allowed to vary.

Overall, the model with only dwell time was best (Table 63). As participants dwelled longer on the current debate speaker, their free recall response score for that script was higher (Figure 69). Note, that this relationship was fairly small in effect size (t = 2.08) and absolute magnitude (.02 increase in response score for each additional second of dwell time on the current speaker). In other words, the more a participant looked at a debater while a line of arguments was presented, the more their free recall response matched the content of that line of arguments. Not only does this fit with previous eye movement and memory effects, it has also been shown at the level of speech perception that fixating a speaker, and their mouth, improves identification of the words used (Lansing & McConkie, 2003).

Table 63

Summary of Debate Multilevel Regression for Dwell Time on the Current Debate Speaker and Free Recall Response Score (Script Scoring)

Variable	*B*	*SE(B)*	*t*
Intercept	14.06	1.50	9.35
Dwell Time on Current Debate Speaker (Seconds)	.02	.009	2.08

Note. Script scoring refers to the response score being calculated by comparing participant free recalls to the debate script used. No p-values are reported, because the developer of the statistical package does not provide them for the mathematical reasons. The t-values are used to interpret the effects.

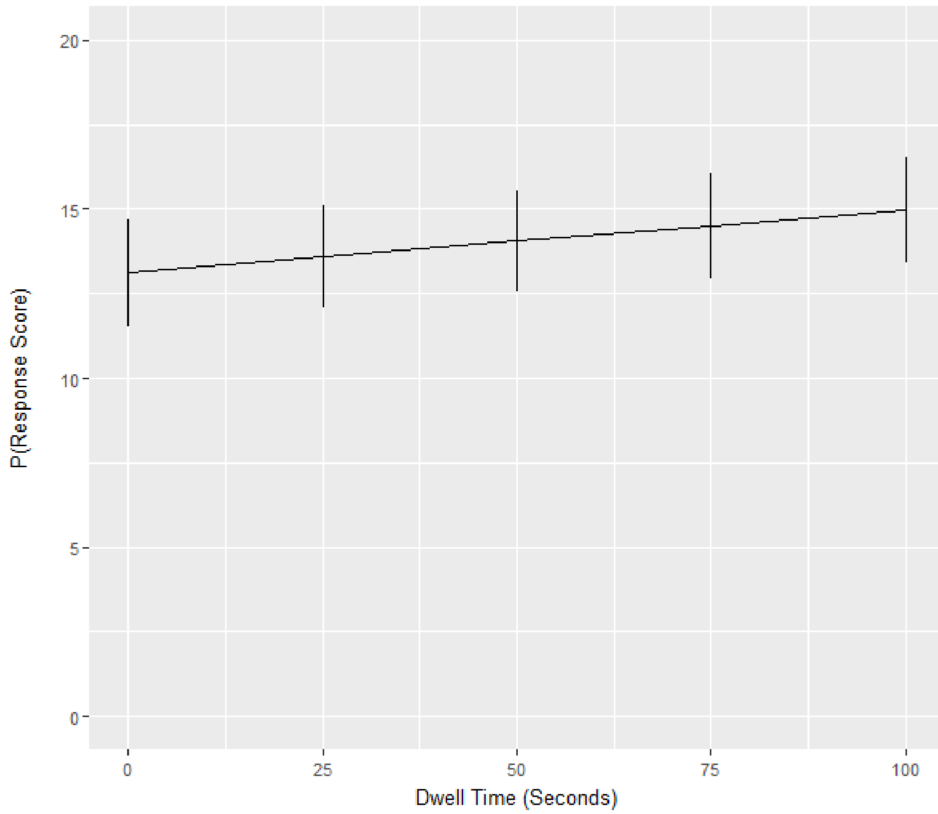

Figure 69. Debate video predicted response score for verbal free recall memory given dwell time on the head area of interest for the current debate speaker. The Y-axis shows the predicted response score for a participant given their average dwell time in seconds on the current debate speaker (X-axis). Error bars are 1 standard error.

Debate dwell time on non-speaker and free recall memory. The same random effect structure was used for the non-speaker model. Consistent with the current speaker analysis just above, a greater dwell time on the non-speaker resulted in lower response scores (Table 64). Taken together, these results, along with many of the eye movement and memory results, show a relatively reliable relationship between eye movements and memory. Importantly, the individual difference measures did not improve this model, indicating influence on memory is likely downstream effects of their influence on attention.

Table 64

Summary of Debate Multilevel Regression for Dwell Time on the Non-Speaker and Free Recall Response Score (Script Scoring)

Variable	*B*	*SE(B)*	*t*
Intercept	14.05	1.51	9.29
Dwell Time on Current Debate Speaker (Seconds)	-.08	.03	-2.47

Note. Script scoring refers to the response score being calculated by comparing participant free recalls to the debate script used. No p-values are reported, because the developer of the statistical package does not provide them for the mathematical reasons. The t-values are used to interpret the effects.

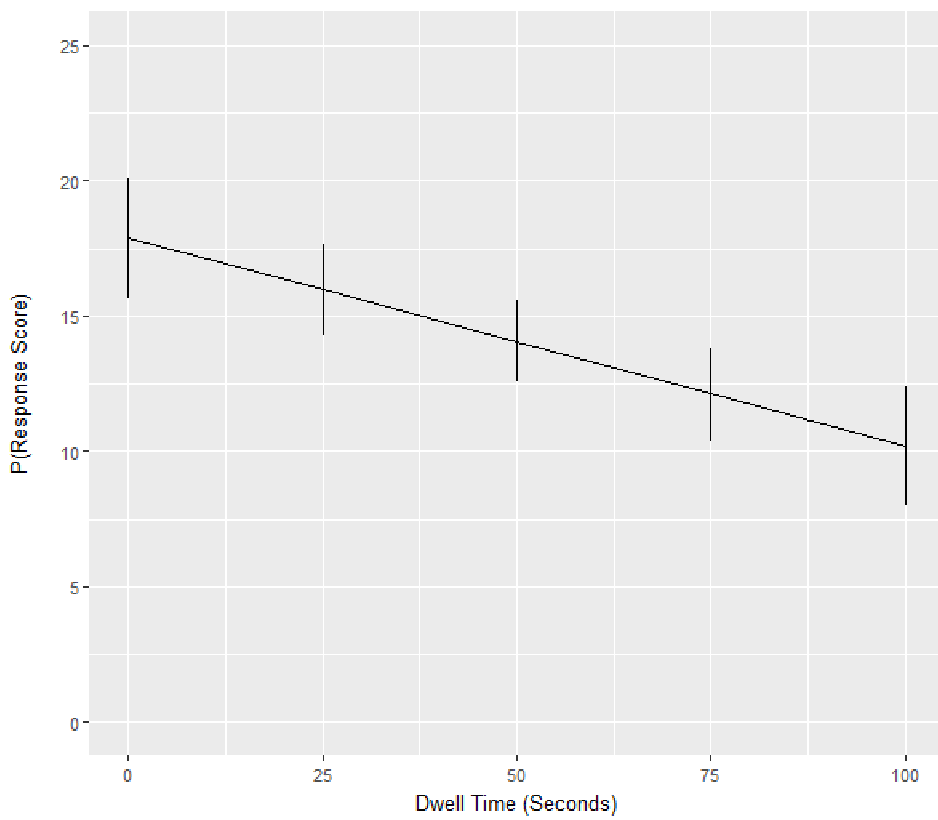

Figure 70. Debate video predicted response score for verbal free recall memory given dwell time on the head area of interest for the non-speaker. The Y-axis shows the predicted response score for a participant given their average dwell time in seconds on the non-debate speaker (X-axis). Error bars are 1 standard error.

This still leaves the question of how to interpret the gaze deviation results. Based on the dwell time analyses run, there is no clear interpretation, because it is not clear where eye movements that are resulting in the higher deviation are going. The analysis is based on mean deviation from the current speaker (M = 4.4° of visual angle, SD = 2.3°). This was on a screen that subtended 31.8° of visual angle horizontally. Throughout the video, the debaters are approximately 20° of visual angle apart (this varies based on their movements but stays relatively stable since they are seated). These values do not give any clear candidates for locations to which saccades away from the current speaker's face would be guided. Given that these fixations that increase deviation improve free recall responses, it is possible they are directed to a portion of the screen with relatively sparse visual information (a corner, the table top, the debaters jacket, etc.), and could function to improve processing of the verbal arguments by reducing the amount of visual information to be processed. This is a hypothesis that would be better addressed in a study designed to specifically test it. What is clear from the dwell time on the non-speaker analysis, is that greater deviation being driven by saccades to the non-speaker is excluded as a possible explanation for the results.

Free recall content analyses

All of the above analyses focused on specific cognitive processes – eye movements and subsequent memory. However, given the use of variables more commonly used in social psychology research, namely attitude congruence and social vigilantism, it is also of interest to explore participants' judgements of the information presented through how they expressed themselves when recalling the information presented. To this end, a content analysis of the participant free recalls was carried out. The free recalls were used for this purpose because these were open ended and allowed participants to express themselves in any way they saw fit. Note, however, that their task was simply to recall information from the videos, so any responses beyond simple memory information based on what was presented in the video were naturally occurring behavior that was unsolicited by the experimenters.

Three general categories of responses were coding for: elaborations, contradictions, and evaluations. A response was coded as an *elaboration* if it expanded on the message presented in the video. In other words, the recalled information was consistent with what was presented in the video but was not the same as the presented argument. For example, the main argument presented in the Non-controversial video was “Just because you do something differently, doesn’t mean you’re disabled.” An example response that was coded as an elaboration on this was: “This was a message regarding those who have disabilities, both physically and mentally,” because this participant elaborated on the type of disability (“…physically and mentally”). Importantly, if a response was entirely off topic, this would not be considered an elaboration. A response was coded as a *contradiction* if it gave the other side of the argument presented in the video (e.g., for the Non-controversial video “…it doesn’t matter how the person goes down the stairs, he *is* different than the rest.” [italics added by author for emphasis]). Lastly, a response was coded as an *evaluation* if it made a value judgment on the content of the video, as opposed to being a recollection of the information that was presented (e.g., “It was an encouraging video.”).

The same logic and hypotheses presented for the eye movement and memory analyses generally hold for the content analyses. However, the Tyranny of Film is not a valid null hypothesis for this analysis. This is because the idea of the Tyranny of Film is that it is a lack of top-down effects on eye movements despite the presence of top-down effects on higher-level cognition (e.g., comprehension of, or reactions to, the content). The content coding is looking for top-down processes, that could have occurred during video viewing. As such, the presence of a top-down effect in the content coding analysis does not exclude the Tyranny of Film but is rather a measure that could help support the Tyranny of Film is there were no effects on eye movements or memory. As such, the null hypothesis for the content coding is not as meaningful as it is for the eye movement and memory analyses.

The other two hypotheses, selective exposure and social vigilantism, still make predictions about participants' recall behavior. For selective exposure, if participants did engage in some type of selective exposure, two possible outcomes are possible. First, participants who selectively choose not to expose themselves to attitude-incongruent information may show very little elaboration, contradiction, and evaluation compared to other participants. Second, since these participants would have a relatively impoverished representations of the information presented, it is possible that during recall they would engage in more elaboration, trying to fill in the information they did not encode into long-term memory while watching the video. Note, that in the eye movements and memory analyses there was very little support for selective exposure, thus it is unlikely there would be selective exposure effects in the content coding analyses.

Regarding the Social Vigilantism hypothesis, for which there was some support from the eye movement and memory analyses, there are a number of alternative predictions. Generally, it would be expected that high SV individuals would have more elaborations, contradictions, and evaluations (i.e., a main effect of SV), in that all of these behaviors are ways in which a high SV person may impress their superior beliefs on others. Additionally, high SV individuals could engage in more of this behavior for attitude-incongruent information, because this is the information that a high SV individual would be arguing against. Based on this, contradictions may be especially high for attitude-incongruent information (i.e., an interaction of attitude congruence and SV). However, if a high SV individual does not agree with how the attitude-*congruent* information was presented or the arguments made, it could also be expected they could elaborate, contradict, and evaluate that information as well (i.e., show a main effect of SV).

Lastly, given the main trends from the eye movement and memory analyses, the most likely alternative hypothesis may be that there will an interaction of attitude and SV that is independent of attitude congruence.

Analyses and procedure. The content coding was completed separately for each video type (Non-controversial ad, Abortions ads, and Debate). The same procedure was used for the coding for each video, but the categories used varied based on the response possibilities for each video.

For the Non-controversial ad, only the 3 main overarching categories were used. For the abortion ads, the evaluation category was further split into whether the participant made a positive or negative evaluation. Thus, for the abortion ads, responses were coded as either elaboration, contradiction, evaluation, positive evaluation, or negative evaluation. The debate video categories were further extended similar to the abortion ads. Note that both the pro-life and pro-choice arguments were presented in the same video. Thus, coding included whether participants made an elaboration, and also if that elaboration was on the pro-life or pro-choice arguments. The same was done for the contradiction category. Evaluations were further extended to include both positive and negative evaluations for both the pro-life and pro-choice information. Lastly, for the debate visual information, participants frequently elaborated on the background information (e.g., gave relatively long, but inaccurate, elaborations on the table or the wall behind the debaters). Due to this, there was a background elaboration category for the debate visual coding.

Two coders completed the coding process for each of the categories for each video. To reach agreement at the a priori interrater reliability threshold (Cohen's Kappa = .8), the coders met after each round of coding to refine the operational definitions used for each category. This was done separately for each video. Once the threshold Cohen's Kappa was met, the coders resolved the remaining discrepancies. To analyze the content coding, logistic regression was used to account for the nominal outcome variable. Attitude and social vigilantism were the predictor variables. For the abortion ads, video (Pro-choice or Pro-life) was also included as a predictor test attitude congruence effects.

Results. To begin, a general takeaway from the content coding was that participants were completing the free recall memory as they were instructed. That is to say, the majority of the responses exclusively included recalls for the type of memory information requested (e.g., Non-controversial visual information, pro-choice ad verbal information, debate verbal information, etc.). Perhaps the best example of this was the debate video verbal responses, for which, regardless of attitude, participants recalled roughly equal amounts of information from both sides of the debate. As will be shown below, this resulted in relatively few instances of contradiction and evaluation but resulted in a fairly high rate of elaboration for all of the videos.

To overview the results, the majority of the analyses failed to reject the null hypothesis. Part of the reason for this was likely due to there being relatively few instances of contradiction and evaluation. However, for the abortion ads and the debate, there were a few instances of general top-down effects of attitude and SV. These effects generally took on the arch pattern seen for many of the eye movement and memory analyses.

Non-controversial ad verbal results. Overall, participants were fairly likely to elaborate on the content of the Non-controversial ad (Elaborations = 52 instances, N = 144), but there were very few instances of contradictions (Contradictions = 2) and evaluations (Evaluations = 3). Neither attitude nor social vigilantism predicted the likelihood that a participant would elaborate, contradict, or evaluate in their recall of the verbal content for the Non-controversial ad (*z's* <

1.29, $p's > .19$). In other words, a participant's attitude towards abortion and their level of social vigilantism did not influence their likelihood of giving information that went beyond the verbal information presented in the video.

Non-controversial ad visual results. The Non-controversial ad results also failed to reject the null hypothesis for any of the categories coded. There were again a relatively high number of elaborations (Elaborations = 46), but there were no contradictions, and there was only 1 evaluation. Neither attitude nor SV predicted the likelihood of elaboration, contradiction, or evaluation ($z's < 1.39$, $p's > .17$).

The Non-controversial verbal and visual content coding together indicate that for a video with information that essentially all participants should agree with, or at the very least be neutral on, attitude an SV did not significantly predict the response behaviors of elaboration, contradiction, or evaluation. Given this was the control video, it is not necessarily surprising that there were no individual difference effects. However, for the eye movement and memory analyses, there were effects for the Non-controversial video. Based on that, it is interesting that there were no effects in the content analysis.

Abortion ads verbal and visual results. The results for the content coding for the abortion ads did produce some significant results. Compared to the Non-controversial ad, generally participants were more likely to include responses that were coded as elaborations, contradictions or evaluations (Table 65). Given the still relatively low number of contradictions and evaluations, it might not be surprising that there were no statistically significant effects for those categories ($z's < .87$, $p's > .39$). Interestingly, there were significant effects for elaborations for both the verbal and visual recalls.

Table 65

Summary of Abortion Ads Content Coding Frequencies

Recall Type	Variable	Frequency (N = 144)
Verbal		
	Elaboration	63
	Contradiction	3
	Evaluation	9
	Positive Evaluation[3]	7
	Negative Evaluation	2
Visual		
	Elaboration	41
	Contradiction	4
	Evaluation	11
	Positive Evaluation	7
	Negative Evaluation	2

For the abortion ad verbal elaboration analysis, the best model had the participant intercept as a random effect, and attitude and SV as the predictor variables (Table 66). This

[3] When categories are broken down into their subcategories (e.g., Positive Evaluation and Negative Evaluation), they do not have to add up to equal the overall number of evaluations. This is because when responses were *not* broken down into sub-categories, each participant could only be coded as producing a single response per category (elaboration (0,1), contradiction (0, 1), and evaluation (0,1), but when broken down by sub-categories, 1) a participant could have both positive and negative evaluations, each of which was counted, or 2) a participant had an evaluation, but it was unclear whether it was either positive or negative, thus neither was counted.

means that the video which participants watched (Pro-choice or Pro-life ad) did not influence the likelihood of elaboration, indicating there were no attitude congruency effects. On the other hand, there was a significant effect of attitude overall (Table 66) but with a relatively small effect size (t = 1.96). As participants indicated being more Pro-choice, they were also more likely to elaborate, regardless of attitude congruence. The SV main effect was also close to being significant, such that high SV individuals showed a trend to be more likely to elaborate. Lastly, there was a non-significant and rather weak attitude by SV interaction that took on the arch shape (Figure 71). Taken together, these results support that there were general top-down effects on elaboration for controversial videos, but the effects were independent of the attitude-congruency of the controversial information.

Table 66

Summary of Abortion Ads Logistic Multilevel Regression Analysis for Verbal Elaboration

Variable	*B*	*SE(B)*	*z*	Sig. (*p*)
Intercept	-.33	.15	-2.20	.03
Attitude	.12	.05	1.96	.05
Social Vigilantism	.27	.16	1.73	.08
Att x SV	-.08	.06	-1.34	.18

Note. All continuous predictors were centered for the interaction. The .05 *p*-value for attitude rounded up to .05 from .049.

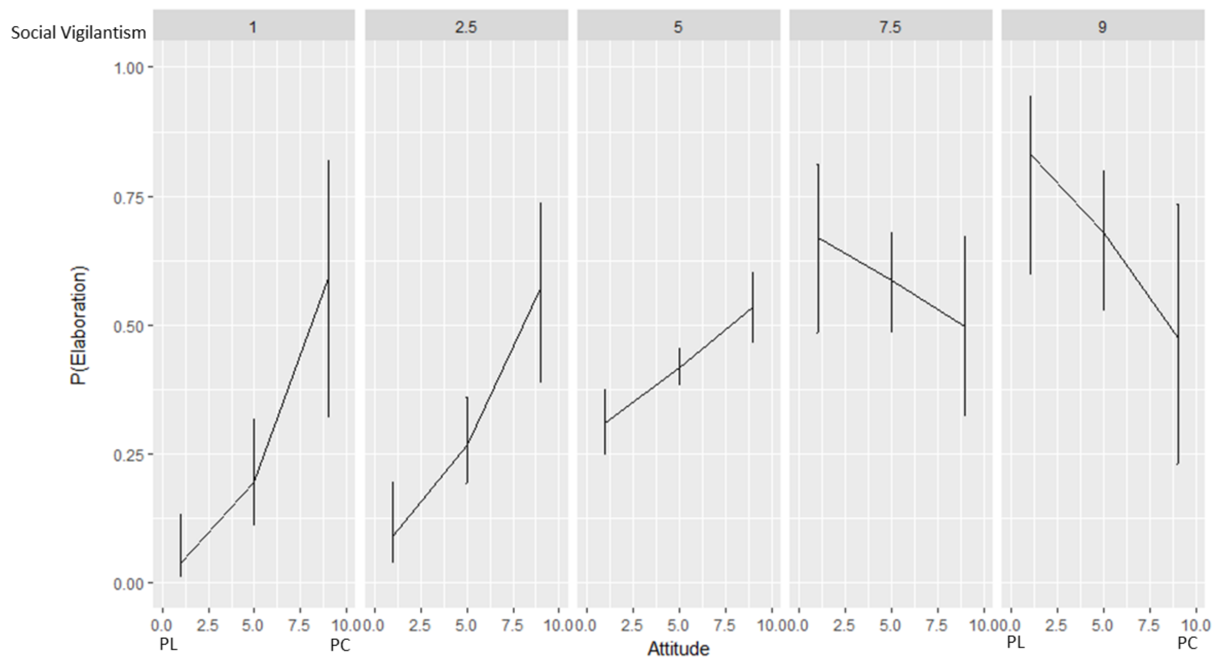

Figure 71. Abortion ads predicted elaboration in verbal free recall responses. The Y-axis shows the predicted likelihood of writing an elaboration for a participant given their attitude toward abortion (X-axis). The panels at the top show the level of Social Vigilantism (labeled on the top 1 – 9). Error bars are 1 standard error.

The effects for the abortion ad visual elaboration were different from those for the verbal information. The random effect structure used was the same as for the verbal elaboration (participant intercept), but the fixed effects included the video watched (Pro-life or Pro-choice ad) in addition to attitude and SV (Table 67). Again, overall the effects were relatively weak, and none of the individual difference measures were statistically significant. Nevertheless, the reported trends in the data were interesting. Overall, participants were more likely to elaborate for the Pro-life ad compared to the Pro-choice ad. Most of this appears to have been driven by what is likely a floor effect for low SV participants for the Pro-choice ad. There was also a non-significant trend for the interaction of SV and video, such that for the Pro-life ad, participants were fairly consistent in their rate of elaboration from low to high SV, but for the Pro-choice ad, participants were more likely to elaborate as they increased in SV. Thus, for the Pro-choice video, participants showed a non-significant trend for a main effect of SV in the hypothesized direction. Lastly, although non-significant, there was some descriptive evidence for the full Social Vigilantism hypothesis, with the Pro-life video showing the U-shape pattern and the Pro-choice showing a very weak arch pattern. Thus, this suggest that if there were more participants at high and low levels of SV, this might be a significant interaction. Thus, it is an interesting pattern in the data, that could be explored more.

Table 67

Summary of Abortion Ads Logistic Multilevel Regression Analysis for Visual Elaboration

Variable	*B*	*SE(B)*	*z*	Sig. (*p*)
Intercept	-1.05	.18	-5.96	< .001
Attitude	-.006	.06	-.11	.91
Social Vigilantism	.22	.16	1.40	.16
Video (Pro-choice)	-.44	.15	-2.99	.003
Att x SV	.04	.06	.61	.54
Att x Video	-.03	.06	-.61	.54
SV x Video	.26	.15	1.71	.09
Att x SV x Video	-.03	.06	-.55	.58

Note. All continuous predictors were centered for the interaction.

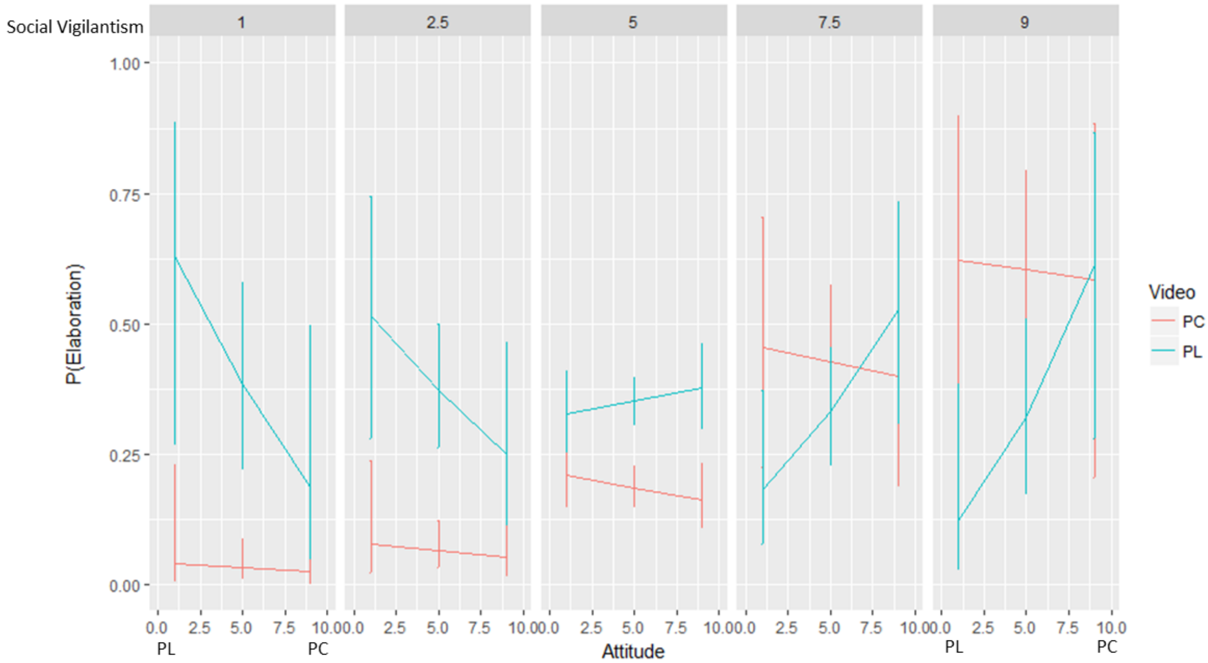

Figure 72. Abortion ads predicted elaboration in visual free recall responses. The Y-axis shows the predicted likelihood of writing an elaboration for a participant given their attitude toward abortion (X-axis). The panels at the top show the level of Social Vigilantism (labeled on the top 1 – 9). The red line of the Pro-choice ad, and the blue line is for the Pro-life ad. Error bars are 1 standard error.

The abortion ad elaboration results together indicate that there may have been some individual difference effects on the rate at which participants elaborated on both verbal and visual information. The effects tended to be weak and trends. However, considering that the participants' task was free recall memory, and that participants generally seemed to be on-task with their responses, the trends are interesting. That is to say, even though participants were doing the task they were given, there were still some top-down effects on their responses that were not strictly on-task. Thus, an experimental design and instructions that are better suited to specifically testing top-down effects on responses to and judgements of controversial videos might produce stronger effects. Thus, the weak trends presented here are interesting and could be beneficial to future research.

Debate results. Similar to the ads, there were not many significant results for the debate, but there were nevertheless interesting trends in the data. To begin, for the verbal free recall for the debate, participants were relatively less likely to give responses beyond correct free recall memory information (Table 68). Conversely, participants were descriptively more likely to give elaborations for the visual information (Table 68). There were some rather pointed evaluations of the debaters' appearances, even though both debaters were wearing the same type of clothes (e.g., "The pro-choice woman did not dress professionally, and she just wore a black jacket with a white shirt underneath. While the pro-life woman wore a suit and was very professional in the way that she looked and spoke."). This would potentially indicate that one of the debaters was more or less dressed up and is exactly the type of potential confound the was considered when the decision was made to use 2 versions of the debate video in which the debaters switched the side of the argument they were on. Overall, there were 12 negative evaluations in the visual recalls. However, it was also common that a participant would positively evaluate both of the debaters (e.g., "Both women were very well-kept and took care of themselves."). Overall, there were 11 positive evaluations in the visual recalls.

Table 68

Summary of Debate Content Coding Frequencies

Recall Type	Variable	Frequency (N = 144)
Verbal		
	Elaboration	20

	Pro-choice Elaboration	7
	Pro-life Elaboration	14
	Contradiction	5
	Pro-choice Contradiction	3
	Pro-life Contradiction	2
	Evaluation	13
	Positive Pro-choice Evaluation	10
	Positive Pro-life Evaluation	10
	Negative Pro-choice Evaluation	3
	Negative Pro-life Evaluation	2
Visual		
	Elaboration	52
	Pro-choice Elaboration	16
	Pro-life Elaboration	12
	Background Elaboration	35
	Contradiction	0
	Pro-choice Contradiction	0
	Pro-life Contradiction	0
	Evaluation	13
	Positive Pro-choice Evaluation	4
	Positive Pro-life Evaluation	7
	Negative Pro-choice Evaluation	6
	Negative Pro-life Evaluation	6

For the debate verbal recall responses, the null hypothesis was not rejected for any of the coding categories (*z's* < 1.32, *p's* > .19). Participants' attitude towards abortion and their level of social vigilantism did not influence their likelihood of giving information that went beyond the verbal information presented in the video. Taking a closer look comparing between elaborations of pro-choice and pro-life information showed that even for the non-significant effects, the parameter estimates were in the same direction (Pro-choice elaboration attitude b = -.10, Pro-life elaboration attitude b = -.11; Pro-choice elaboration attitude x SV b = -.20, Pro-life elaboration attitude x SV b = -.03). The same was true for the contradictions (Pro-choice contradiction attitude b = -.26, Pro-life contradiction attitude b = -.05; Pro-choice attitude x SV b = .14, Pro-life contradiction attitude x SV b = .29).

It is somewhat surprising that the effect from the abortion ads did not carry over to the debate video for the verbal recall response content coding. However, one possible reason for this may be that given the richness of the debate verbal information, participants were just less likely to elaborate (Elaborations = 20).

For the debate visual free recall memory response content coding, there were a few instances of top-down effects. First, there was a trend for Pro-life elaborations seen for the attitude variable, such that as participants indicated being more Pro-choice, they were less likely to make a Pro-life elaboration (Table 69). In this instance, a Pro-life elaboration is an elaboration of the appearance of the Pro-life debater. This may be evidence for a top-down effect on elaboration. However, the trend should be treated with caution, because 1) it was not quite statistically significant and 2) there were not overall top-down effects on elaboration as a whole or Pro-choice elaborations.

Table 69

Summary of Debate Logistic Multilevel Regression

Analysis for Visual Pro-life Elaboration

Variable	*B*	*SE(B)*	*z*	Sig. (*p*)
Intercept	-2.57	.36	-7.25	< .001
Attitude	-.23	.13	-1.79	.07
Social Vigilantism	.23	.34	.68	.49
Att x SV	.15	.12	1.20	.23

Note. All continuous predictors were centered for the interaction.

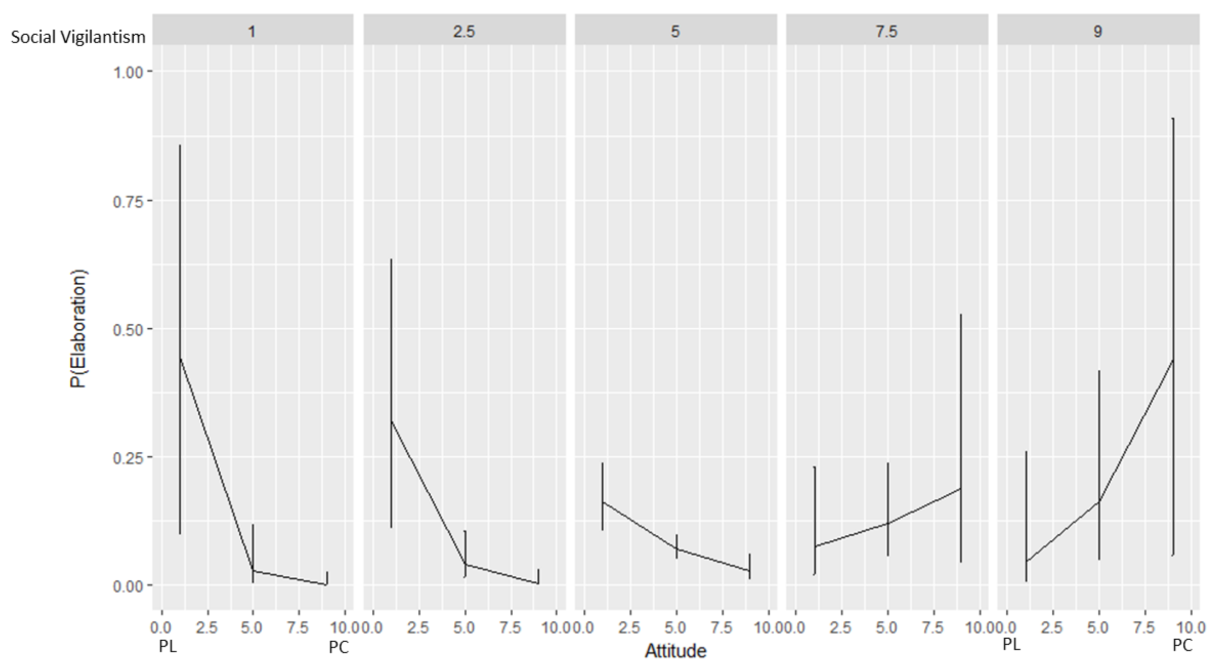

Figure 73. Debate video predicted elaboration in visual free recall responses. The Y-axis shows the predicted likelihood of writing an elaboration for a participant given their attitude toward abortion (X-

axis). The panels at the top show the level of Social Vigilantism (labeled on the top 1 – 9). Error bars are 1 standard error.

The rest of the content coding effects for the visual free recall memory responses were all for evaluations. There were relatively few evaluations overall. Only13 out of 144 participants gave an evaluation of the visual information in the ads. Based on this small number of evaluations, these results must be interpreted very cautiously. However, given the small number of evaluations, it is possible that if there were more and there was less noise in the data, there would be stronger effects as well.

To begin, there were 2 trending effects for the overall evaluation category (Table 70). There was a very nearly significant effect of SV that as participants indicated being higher in SV, they were more likely to give an evaluation. To qualify this, there was a trending interaction between SV and attitude, that created an arch pattern (Figure 74). Note, the paucity of evaluations overall can be seen in the figure, with near floor effects at low levels of SV. Together, these results show some support for the general top-down effect hypothesis, consistent with many of the eye movement and memory analyses.

Table 70

Summary of Debate Logistic Multilevel Regression Analysis for Visual Evaluations

Variable	*B*	*SE(B)*	*z*	Sig. (*p*)
Intercept	-2.62	.38	-6.87	< .001
Attitude	.19	.15	1.29	.19
Social Vigilantism	.70	.36	1.95	.05
Att x SV	-.24	.13	-1.84	.07

Note. All continuous predictors were centered for the interaction. *The p* = .05, when carried out to 3 decimals is *p* = .051.

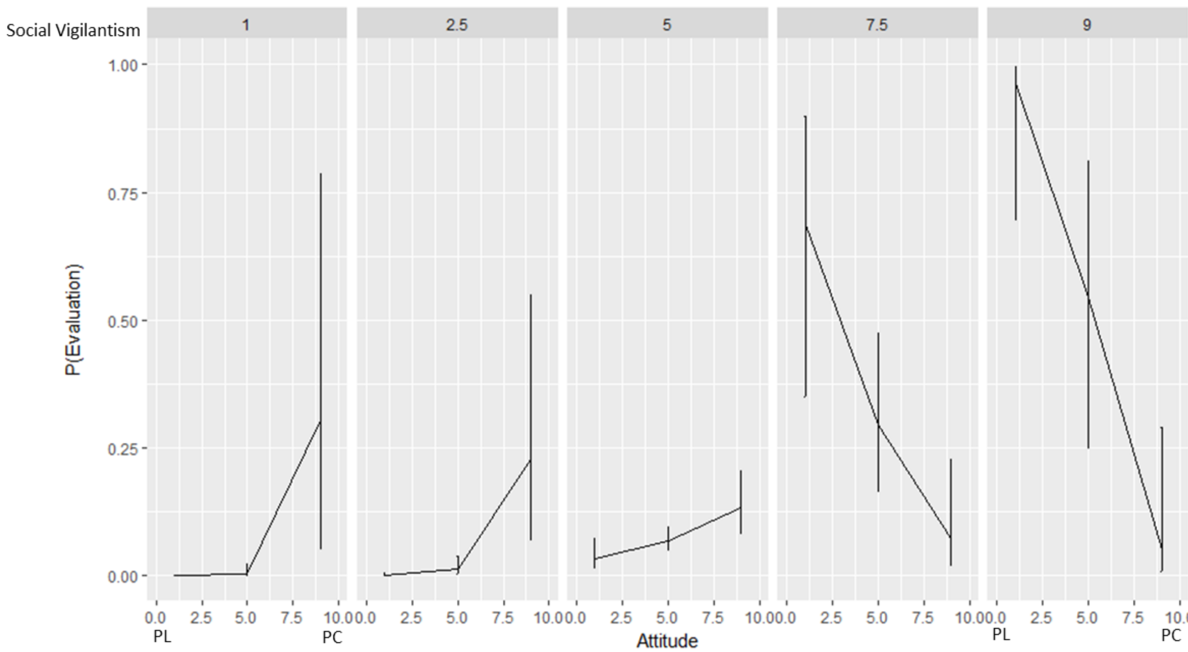

Figure 74. Debate video predicted evaluation in visual free recall responses. The Y-axis shows the predicted likelihood of writing an elaboration for a participant given their attitude toward abortion (X-axis). The panels at the top show the level of Social Vigilantism (labeled on the top 1 – 9). Error bars are 1 standard error.

Next, there were trending effects for the Pro-choice negative evaluations (Table 71), and a significant interaction between attitude and SV for the Pro-life positive evaluations (Table 72, Figure 75) with a small to moderate *t* value (t = -2.68). Importantly, each of these showed the same pattern of results as the overall evaluation, so it is likely that it was these subcategories of evaluation that drove the overall evaluation effect.

Table 71

Summary of Debate Logistic Multilevel Regression

Analysis for Pro-choice Negative Visual Evaluations

Variable	*B*	*SE(B)*	*z*	Sig. (*p*)
Intercept	-3.49	.55	-6.33	< .001
Attitude	.09	.22	.39	.69
Social Vigilantism	.86	.49	1.73	.08
Att x SV	-.17	.19	-.92	.36

Note. All continuous predictors were centered for the interaction.

Table 72

Summary of Debate Logistic Multilevel Regression

Analysis for Pro-life Positive Visual Evaluations

Variable	*B*	*SE(B)*	*z*	Sig. (*p*)
Intercept	-3.61	.59	-6.09	< .001
Attitude	.21	.22	.96	.34
Social Vigilantism	.69	.51	1.34	.19
Att x SV	-.44	.16	-2.68	.007

Note. All continuous predictors were centered for the interaction.

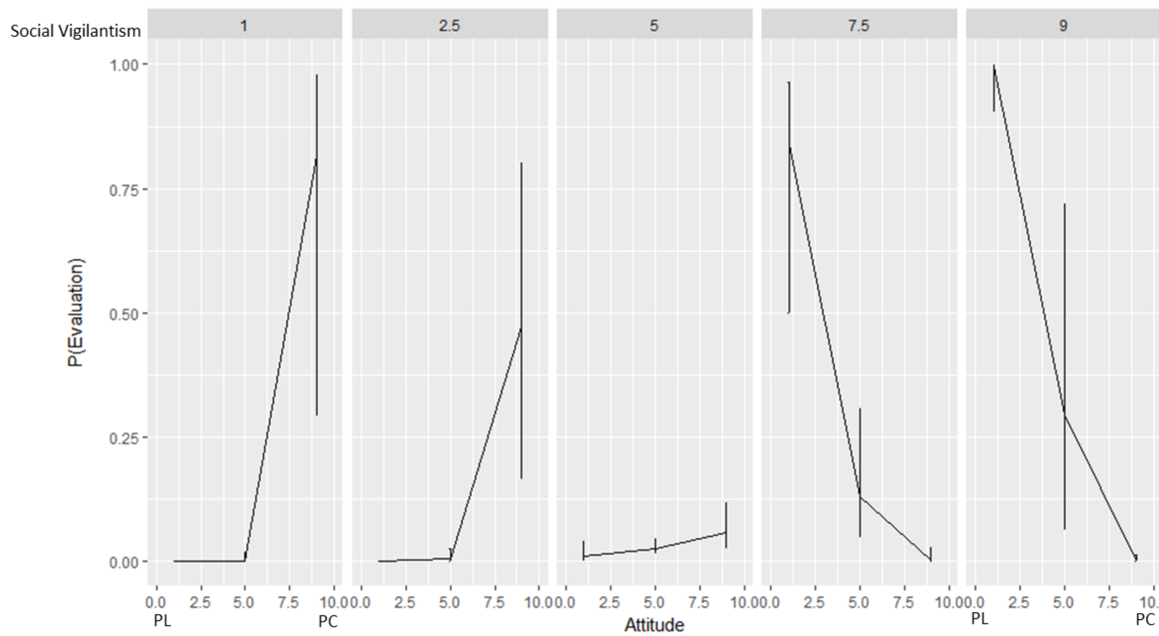

Figure 75. Debate video predicted pro-life positive evaluation in visual free recall responses. The Y-axis shows the predicted likelihood of writing an elaboration for a participant given their attitude toward abortion (X-axis). The panels at the top show the level of Social Vigilantism (labeled on the top 1 – 9). Error bars are 1 standard error.

One potentially simple explanation for these results is that one of the debaters were described more positively than the other. However, when debate video version was included in the models there were no differences between the two videos, and the models with debate video version were worse (i.e., had higher AIC values).

By ruling out the debate video version creating the significant evaluation effects, potential top-down effects can be considered. Interestingly, given that the overall pattern of significant results for evaluations of the visual information was driven two specific types of evaluation (Pro-choice negative and Pro-life positive), some potential attitude congruence interpretations of the data can be made. Specifically, Pro-choice negative evaluations were critical of the Pro-choice debater, and Pro-life positive evaluations were complimentary of the Pro-life debater. Although these are oppositely valanced evaluations, they could be based on a similar top-down processes. Based on this, the most likely hypothesis this type of interaction would support is the social vigilantism hypothesis, for which generally it would likely be expected that at low levels of SV participants would be more positive towards attitude-congruent information than -incongruent. Conversely, high SV individuals would be, perhaps, more critical of attitude congruent-information as well as -incongruent. However, the results seem to show the opposite trend. Individuals that identified as being low SV and more Pro-choice were more likely to be critical of the Pro-choice debater and compliment the Pro-life debater. Participants who were high in SV and Pro-life showed the same pattern of responses. Thus, even if at first glance these results appear related to attitude congruence, they best support a general top-down effect (the arch).

Free recall content analysis discussion

The content analysis was designed to identify if participants' attitude, attitude congruence, and/or social vigilantism influenced their likelihood of giving information that went beyond the free recall information they were asked to give. In other words, did participants give unsolicited responses during their free recalls that were either beyond what was presented in the video or off task. The three general categories that participant responses could have fallen into were elaboration on the information presented, contradiction of the information presented, or an evaluation of the information presented.

The most consistent result throughout all of the analyses was a failure to reject the null hypothesis. Unlike the eye movement and memory analyses, failing to reject the null is not meaningful for these analyses, because it does not allow for support of the Tyranny of Film. Nevertheless, these many null effects indicate that participants were on task when giving their free recall responses, which is important for the memory analyses. For the free recall task, participants were asked to recall as much verbal and then visual information from each video as possible. The lack of many contradictions and evaluations for all of the videos indicates that the participants were doing their best to follow the task instructions.

There was also some evidence for the top-down individual difference effects of attitude and SV on elaboration and evaluation in the experiment, and the large number of null effects should not undercut these. In fact, given that participants were mostly on task, these effects in the content coding show evidence that participants' attitude and SV levels influenced how they were processing the information presented beyond their eye movement and memory as presented above. Indeed, these top-down individual difference effects in the content analysis are consistent with 1) what would be expected based on the SV literature , and 2) the eye movement and memory effects.

One of the main trending effects of the content coding analyses was that participants were more likely to engage in elaboration or evaluation if they were higher in SV. This fits very well with the construct of social vigilantism in that individuals higher in SV should be likely to impress their beliefs on others, as indicated here by their written responses that went beyond the information presented.

Concerning the relationship to the eye movement and memory effects, there was one significant attitude by SV interaction (Debate Pro-life Positive Visual Evaluation) that created an arch pattern very similar to what was found for both the eye movement and memory analyses. Additionally, each of the other analyses presented with a figure descriptively showed an attitude by SV interaction. While the direction of the interaction varied between the analyses, it was consistent within its content coding category. The visual evaluations and the verbal elaborations showed an arch pattern, and the visual elaborations had a U-shape pattern.

In sum, the main interpretations of the content coding were 1) most participants completed the memory task as they were instructed, and 2) there were nevertheless top-down individual difference effects on both participants' elaborations and evaluations. Concerning this second point, these results are encouraging, because they indicate that in future experiments with responses designed more specifically to elicit responses such as elaborations, contradictions, and evaluations, the results may be stronger.

Chapter 5 - General Discussion

Over the past decade, visual attention researchers have started focusing more and more on the role of naturally occurring top-down processes in guiding visual selective attention in dynamic scenes, and the lack of significant effects found led to the development of the phrase *the Tyranny of Film* (Hutson et al., 2017; Loschky et al., 2015). The current study removed any remaining subtlety in the top-down differences created in previous studies by using what initially seemed to be a very heavy-handed manipulation of top-down processes—attitude congruence with arguments on the highly divisive topic of abortion.

Do people literally look at the world differently based on attitudes and personality, because they selective attend to visual information in their environment differently? In other words, do a person's social and political attitudes and their personality influence the basic cognitive processes they use to understand their environment? Taking the current study's research results as a whole, the answer is "Yes," high-level cognitive processes do exert top-down control on selective visual attention and subsequent memory. The most common top-down effect shown was the attitude by social vigilantism interaction that produced the arch or "U" patterns in numerous figures. However, these top-down effects were weak compared to the effects of the dynamic video scene stimulus itself. When watching a political video, whether it be an advertisement or a debate, the viewer tends to follow the information presented as the filmmaker intended (looking at the focal AOIs in the ads) or as common video viewing patterns would lead us to expect (i.e., looking at the speaker in the debate). Importantly though, this stimulus driven (i.e., bottom-up) processing of the stimulus is not absolute (i.e., truly *tyrannical*), since it may have little influence on viewers' comprehension processes while watching a video, and does not change their attitudes (Miller et al., In prep). In sum, to perceive and comprehend the information presented in a video, most viewers engage in quite consistent general attentional selection patterns (Dorr et al., 2010; Hutson et al., 2017; Loschky et al., 2015; Mital et al., 2010; Smith & Henderson, 2008), but in the remaining "attentional space" available, these same viewers also show their attitude and personality differences in more subtle variations in attention and subsequent memory.

Support for the Tyranny of Film, Social Vigilantism, and general attitude by social vigilantism effects

Memory effects. The Memory experiment showed unique effects of attitude congruence and SV, that ended up not being replicated in the Eye movement experiment, as will be discussed in more detail below. Many of the memory measures in the Memory and Eye movement experiment did not show effects of attitude congruence or social vigilantism. Importantly, although there were many null effects in both experiments, there were many effect trends are descriptive to our understanding of when top-down effects may be present. For example, in a debate, with a relatively small amount of persistent visual information (other than changing facial expressions and hand gestures), there may be less of an opportunity for top-down effects on memory. Conversely, in the advertisements that have very complex visual information that is presented for relatively short periods of time, it is much more likely that a viewer's attitude and level of social vigilantism will influence their memory for visual information. This was seen in significant and trending effects for both the visual multiple choice memory items (abortion ads) and image recognition memory (non-controversial and abortion ads). The majority of these memory effects were not driven by attitude congruence (e.g., in the non-controversial and abortion ad image recognition measures), but there were specific circumstances when attitude congruence did influence memory (e.g., the abortion ad visual multiple choice measure).

In the debate video, while no effects on visual memory were shown other than that participants had better memory for the debate speakers than for the background, there were effects on participants' memory for the arguments presented. Interestingly, participants' attitude congruence influenced their response bias for the argument recognition memory items, such that participants had a stronger "Old" bias for attitude-congruent arguments (i.e., they were more likely to indicate an argument they agreed with had been presented in the debate video when that argument was not actually presented in the video). This effect could have occurred due to a response bias or a in the retrieval process. The verbal free recall memory also showed top-down effects, this time in terms of the frequently observed attitude by SV interaction. This effect was driven by the participants' word counts in the free recall, which could be another form of response bias. That is to say, higher word counts could be due to better overall memory, but they could also simply be driven by a motivation to write longer responses regardless of memory. Importantly, the script-based scoring of the verbal free recalls in the Eye movement experiment showed no effect of attitude congruence with the argument content on free recall responses.

When comparing the memory results from the Memory experiment to those from the Eye movement experiment, it is clear the later results did not replicate the earlier ones, even though the same videos and memory stimuli were used in both experiments. Note, however, that the number of memory items was reduced in the Eye movement experiment to shorten it. In general, the memory results from the Eye movement experiment were weaker than those from the Memory experiment, and often times were not significant. However, despite this, the trends for nearly all of the analyses were consistent across all the videos in the Eye movement experiment.

Argument recognition showed an attitude by SV effect on sensitivity (d') that created the "U" pattern in figures (low SV, Pro-life participants and high SV, Pro-choice participants were the most sensitive to these items). The one exception to this was for the abortion ads, for which there was a weak trend of the relationship in the opposite direction (the Arch pattern). For the rest of the memory measures (visual multiple choice and free recall), the results mostly showed the Arch relationship for attitude and SV. Together, this indicates that there were individual difference effects on memory, but no attitude-congruence effects. Additionally, although the results were not always significant, the consistency of the direction of the relationships increases the likelihood that these weak top-down effects on memory were real.

Based solely on the memory results, the initial conclusion, as also presented above, is that there are strong stimulus-driven effects, but that weaker top-down processes also have an influence. Additionally, the different results between the Memory and Eye movement experiments points to the importance of the methods used in each experiment. The largest methodological difference between the experiments was in how the data was collected (online vs. in the lab with an experimenter and eye tracking). Based on the eye tracking data and reports from the data collection experimenters, participants in the lab almost uniformly watched each video presented for its entirety. This was not necessarily the case with the online data collection. It is quite possible that some participants decided not to watch all the videos, and these decisions could have been driven the videos' contents. This initially sounds like a major potential confound, and it does make comparisons between the experiments difficult. Nevertheless, it also points to a very important distinction and an area for future research. The online data collection may have created a more realistic viewing environment, in which the participants were able to choose whether they would watch the video presented or switch to another video or activity (e.g., checking Facebook, watching Netflix, getting a snack, etc.). In other words, due to the nature of the on-line data collection, participants had the opportunity to choose if they would selectively expose themselves to the information presented in the experiment at a macro level. Alternatively, the only macro level of selective exposure available to participants in the laboratory-based Eye movement experiment was to quit the experiment, which none of the participants did. Thus, the only available selective exposure options where at the micro level of their visual attentional selection of where to move their eyes. To address these potentialities, future work could include both macro and micro level selective exposure options in the laboratory, such as allowing participants to choose which videos to watch (Jang, 2014; Ju & Johnson, 2010; Knobloch-Westerwick & Meng, 2009; Marquart et al., 2016; Rosbergen et al., 1997; Teixeira et al., 2012), at the macro level, while also tracking their eyes, at the micro level.

Eye movement effects. Based on the significant effects of the individual differences on memory, the next question is, what was driving the memory effects? The two options, which are *not* mutually exclusive, and to an extent related to one another, are that the individual differences are guiding 1) eye movements, and/or 2) depth of processing. If individual differences guide eye movements, what a viewer attends to should influence their memory for the information in the video. The more selective attention is guided to specific information, the better memory for that information should be (Hollingworth & Henderson, 2002; Loftus, 1972; Pertzov et al., 2009; Tatler et al., 2005; Zelinsky & Loschky, 2005). If individual differences influence depth of processing (e.g., high SV people counterargue incongruent information more), viewers should have better memory for information that was processed at a deeper level (Bloom & Mudd, 1991; Craik, 2002; Craik & Lockhart, 1972; Craik & Tulving, 1975).

To disentangle eye movements from depth of processing that is independent from visual attention, the first step is to identify eye movement effects. Taking the eye movement results as a whole, the key takeaways, similar to the memory results, are 1) eye movements are driven by the video stimulus, but 2) the individual differences also have an influence on attentional selection.

In total, 12 general eye movement analyses were run (fixation duration, saccade length, gaze deviation, area of interest) for the 3 video types (non-controversial ad, abortion ads, debate), excluding the eye movement and reading analyses discussed below. The main effect shown across these analyses was that participants followed the video stimulus. They fixated the focal AOIs in the ads as the filmmakers intended, and they followed the debate by looking at the current speaker. Additionally, of these 12 analyses, there were 9 that at least trended to show the attitude by SV interaction (arch/”U” pattern) that was also found for many of the memory analyses. Importantly, the attitude by SV interaction got stronger as the eye movement measures used increased in refinement. The least specific measures used were fixation durations and saccade lengths followed by the gaze deviation measures. For these measures, the attitude by SV interaction was typically just a trend. Conversely, all of the AOI analyses had a significant attitude by SV interaction, which was strongest for the most focal AOIs (e.g., the debate speaker’s mouth > the debate speaker’s head > the debate speaker’s body). Taken together, these results support the assertion that participants’ attentional selection was primarily guided by the video stimuli, but that targeted and highly sensitive measures also showed top-down, individual difference effects on their attentional selection.

In addition to the attitude by SV interactions, there were two instances of significant attitude-congruence effects. These were that 1) Pro-choice participants were more likely to have longer fixation durations on attitude-congruent visual information in the abortion ads, and 2) Pro-life participants were more likely to have a greater deviation from the Pro-choice speaker in the debate video. These effects are presented cautiously, because they were found in fairly complex models that may not replicate, and they were found for specific measures, videos, and participants. Nevertheless, the presence of attitude-congruence effects does show that participants may have engaged in some degree of micro level selective exposure.

Eye movements and reading. One of the largest areas of eye movement research to date has been on eye movements during reading (Rayner, 1998). The purpose of the reading analyses in the current study was to take a fine-grained look at 1) if participants were reading the intertitles, and 2) if there were differences in reading style (e.g., did some participants skim the intertitles?). To answer these questions, four types of reading analysis were run: probability of fixating content words, dwell times on intertitles, fixation durations on words fixated, and probability of making a regressive eye movement.

Consistent with the previous results, overall participants did read the intertitles, so the question is if they had different reading styles based on the individual differences measures. It turned out that while participants overall did read the intertitles, there was variability in the probability that they would fixate all of the content words, as opposed to function words, in the intertitle. Specifically, the content word analyses again tended to show the attitude by SV interaction creating the arch pattern. There was also another targeted congruence effect, with Pro-life participants low in SV more likely to fixate congruent content words in the abortion ads. These results indicate that while participants overall read the intertitles, there is some evidence of individual differences resulting in skimming behavior, most notably by skipping content words.

Eye movements and memory. In the Eye movement experiment, the overall trend of the results was that 1) participants watched the videos as the filmmakers intended, but 2) there were some top-down effects resulting in an attitude by SV interaction. Previous work on eye movements and memory has shown a tight relationship between the two (Hollingworth & Henderson, 2002; Loftus, 1972; Pertzov et al., 2009; Richardson & Spivey, 2000; Tatler et al., 2005; Zelinsky & Loschky, 2005). In the current work, that relationship held overall. Furthermore, there were no additional effects of the individual differences measures not explained by the eye movement behavior. Importantly, this lack of individual difference effects does not indicate the individual differences were not the main predictor of the memory performance. Future work should be used to identify the direction of this relationship. It is possible that the effects are driven by attentional processes, but it is also conceivable that the eye movement effects are the result eye movements being driven by memory encoding processes that are the result of individual differences.

Taking all the eye movement and memory results together, when presented with a video, participants tended to watch it and process the information in it. However, the video stimuli did not have total control over the viewers' behavior. Participant attitude and level of social vigilantism, and sometimes attitude congruence, did influence attention and subsequent memory.

It is very important to note that the results in support of top-down effects in this study were likely found due to a series of factors that created an experiment with high power and analyses with high sensitivity. The factors that increased power and sensitivity include: 1) the number of participants ($N = 144$) is a large sample size for an eye tracking study, 2) the eye tracking equipment (EyeLink1000[Plus]) is highly precise and accurate, 3) the stimuli and memory measures were developed with colleagues with expertise in diverse areas (visual cognition and attention, social psychology, film and media studies, film editing), 4) a large number of memory and eye-tracking dependent measures were developed through a series of pilot experiments, 5) many of those dependent variables were highly sensitive, 6) the predictor variables of attitude and SV were well-developed measures sensitive to participant individual differences. All of this is mentioned to further support that the top-down effects shown are quite subtle, and it was the great care taken in the development of this study that allowed for these top-down effects to be teased out of the much stronger stimulus-driven effects. This helps to show why most previous work has struggled to show evidence of such top-down effects during video watching, even when logically it seemed that there should have been strong effects (Huff et al., 2017; Hutson et al., 2017; Loschky et al., 2015). Thus, future work testing for similar effects will likely need to use similarly intensive methods to have the power and sensitivity needed to replicate the current top-down results. Put differently, it would not be difficult for a less intensive study to fail to replicate the current top-down effects.

What is the role of high-level cognitive processes in scene perception: What is the "Tyranny of Film?"

The finding that individual differences influence eye movements in video (and subsequent memory) in addition to the stimulus-driven effects is an almost entirely novel finding. Previous research on top-down processes and eye movements in scenes has shown that task manipulations typically have a strong effect on eye movements in both static scenes (pictures) (Borji & Itti, 2014; Greene et al., 2012; Yarbus, 1967) and dynamic scenes (videos) (Hutson et al., 2017; Lahnakoski et al., 2014; Smith & Mital, 2013; Spanne, 2006). Importantly, these tasks that create top-down effects typically require the viewers to look different places than they would during free viewing (for an exeption, see Taya et al., 2012). There has also been evidence for top-down effects driven by individual differences (e.g., political leaning) in static scenes (Dodd et al., 2012; Hart et al., 2009; Ju & Johnson, 2010; Mills et al., 2011; Teixeira et al., 2012) and experience with tennis in videos of tennis matches (Taya, Windridge, & Osman, 2013). Conversely, there has been relatively little evidence of naturally occurring top-down effects on attentional selection is dynamic scenes. Some recent work on comprehension processes and film perception have shown small, highly targeted effects (Hutson et al., 2017; Loschky et al., 2015), and there is some evidence from fMRI research (Donohew et al., 2017). The current research however, is the first to show relatively consistent top-down effects on attentional selection in video driven by naturally occurring individual differences. As such, the current research is consistent with previous work in that eye movements during video viewing are primarily stimulus-driven, but the findings also meaningfully extend this work to show naturally occurring top-down effects. In particular, this work extends meaningfully on the highly related work of Huff et al. (2017). They found no effects of sports fandom congruence (the soccer team a participant supports) on eye movements (gaze similarity) during a soccer match or subsequent memory. The strongest effects on attention in the current study support the Tyranny of Film and are thus consistent with the Huff et al. (2017) results that attitude congruence did not influence attentional selection or subsequent memory. However, the reliable top-down effects in the current study show that the Tyranny is not absolute, and it was likely a combination of all the factors that gave the current study's design and analyses high power and sensitivity that enabled it to show those top-down effects.

The fact that high-level, naturally occurring cognitive processes guide visual selective attention in video is very important. While the film stimulus was the most important component in guiding eye movements, it was not the only factor driving viewing behavior. The handful of attitude-congruence effects, such as the SV effect for the Memory Experiment visual multiple choice, add an additional layer to our understanding of high-level cognitive processes in scene perception. Specifically, while the attitude by SV interaction indicates top-down effects driven more by personality differences, the congruence effects show an online, comprehension-based influence on eye movements and memory. Similar to the targeted comprehension effects in Loschky et al. (2015) and Hutson et al. (2017), this indicates the potential for comprehension effects on attentional selection during video watching, but raises the question of why they are so weak.

What is the "Tyranny of Film?" The presence of top-down effects in the current study indicates that the Tyranny of Film (Hutson et al., 2017; Loschky et al., 2015) may be too strong a phrase to describe eye movement behavior in video. However, the phrase Tyranny of Film was coined using hyperbole to bring attention to the surprising difficulty researchers have had finding top-down effects on eye movements in dynamic scenes. This study found relatively consistent top-down effects, but they were subtle and the small number of attitude-congruence effects on attentional selection were highly targeted. As such, the Tyranny of Film hypothesis is, surprisingly, still supported because the strength of top-down effects typically reported using static stimuli (text and static scenes) appears to be diminished with the video stimuli used in the current study.

What creates the Tyranny of Film? At a broad level, the Tyranny of Film has 2 components: 1) attentional synchrony 2) despite measured large differences in top-down processes (memory, biases, comprehension, and other cognitive processes that the perceiver incorporates into processing a scene.). Note, however, that the Tyranny of Film can be reliably broken, or at least turned down, by task manipulations that allow the viewer to use volitional top-down (Baluch & Itti, 2011) processes to guide their attention .

A fair amount of work has been done to identify attentional synchrony, to validly measure it, and to explain why dynamic scenes produce it (Cutting, 2015; Cutting, Brunick, DeLong, Iricinschi, & Candan, 2011; Dorr et al., 2010; Mital et al., 2010; Smith & Mital, 2013; Wang et al., 2012). The main drivers of attentional synchrony are 1) the strength of bottom-up features in video and film, specifically motion (Dorr et al., 2010; Mital et al., 2010), 2) the film editing techniques used, with viewers typically reorienting to the screen center immediately following cuts (Loschky et al., 2015; but see Mital et al., 2010; Wang et al., 2012), and 3) the filmmaking techniques of lighting, mise en scene, framing conventions, etc. (Cutting, 2015; Cutting et al., 2011). High-level saliency, such as the bias to look at people, is also likely highly relevant to creating attentional synchrony (Fletcher-Watson et al., 2008; Humphrey & Underwood, 2010; Smith & Mital, 2013; Zwickel & Võ, 2010). In addition to the above factors, there are also general motor biases in the vision system that guide eye movements regardless of stimulus content (Clarke et al., 2017; Henderson & Smith, 2009; Tatler & Vincent, 2008, 2009). Importantly, none of these factors necessitate the Tyranny of Film. That is, despite the strength of the bottom-up features and motor biases in the visual system, the cognitive mechanisms that produce top-down guidance of eye movements should theoretically still have an effect. So, the question is when and how top-down cognitive processes can break through the processes that create attentional synchrony, and thus the Tyranny of film.

Research on this question, broadly, has taken many forms over the past few decades. The research question of interest is what determines fixation durations. This may seem counterintuitive, given the majority of the analyses presented were based on fixation locations (e.g., which debater did the participant look at). However, research using both text and scenes has shown that in order for top-down processes to influence eye movements a fixation duration threshold must be met (Henderson & Pierce, 2008; Henderson & Smith, 2009; Yang, 2002; Yang & McConkie, 2001). For example, research by Yang and McConkie (2001) had participants read text, and during a participant's saccade, they occasionally changed the text for a single eye fixation by replacing the letters with random letters (among other manipulations). Intuitively, randomly switching letters to create non-words should have a large influence on how a person reads that text, and analyses of participant fixation durations showed just this. However, a hazard analysis of the likelihood that a fixation would end at each point in time (e.g., in bins of 20-50 ms) gave a very different picture of the eye movement behavior. Comparing the original text to the random letters, the first time point showing a significant difference in the likelihood of a fixation ending was at approximately 175-200 milliseconds. In other words, the content of visual information being processed during the current fixation does not begin to influence eye movement behavior until at least 175 milliseconds have elapsed. During text reading, the average fixation duration is approximately 225-250 milliseconds (Rayner, 1998), and in scenes it is 260-330 milliseconds (Rayner, 2009; Rayner, Smith, Malcolm, & Henderson, 2009). Thus, a large number of fixations do not have durations long enough for top-down processes to influence fixation locations. Similar effects have been shown using static scenes as well (Henderson & Pierce, 2008; Henderson & Smith, 2009).

Based on results like those presented above, various models of eye movement behavior have been developed for fixation durations (Findlay & Walker, 1999; Nuthmann, Smith, Engbert, & Henderson, 2010; Yang, 2002). Generally, these models argue the length of fixation durations are determined by processes that inhibit the execution of a saccade. Additionally, there are posited to be both autonomous and process-monitoring processes (Findlay & Walker, 1999; Henderson & Smith, 2009; Yang & McConkie, 2001). The autonomous processes function to keep the eyes moving. According to Yang and McConkie (2001), the saccades that occur before 175-200 milliseconds despite the random text are thought to be driven by these autonomous processes. Within a mixed model of eye movement control, process-monitoring proposes there is also moment-to-moment processing that influences fixation durations. This moment-to-moment processing can rely on both perceptual (bottom-up) and cognitive (top-down) processes that inhibit saccades.

There are important differences between these different models of the “when” of eye movement control, but a key unifying element is that the cognitive inhibitory processes are not immediate, and the perceptual inhibitory processes can allow the motor system to execute a saccade before top-down processes can inhibit it. Returning to the Yang and McConkie, the time course for top-down inhibitory processes during text reading appears to be at approximately 175-200 milliseconds. Comparatively, in scene viewing, low-level effects of the scene (blur or stimulus onset) have been shown to affect fixation duration length at about 200 milliseconds (Henderson & Smith, 2009; Loschky & McConkie, 2005), but may require more time depending on the top-down processes.

An interesting research question to further understand the eye movement behavior that has been termed the Tyranny of Film is what the distribution of fixation durations in dynamic scenes is, and do top-down manipulations similar to those used in text and static scenes show similar unique fixation duration distributions that would indicate mixed control model of eye movements?

If future research shows that top-down effects in dynamic scenes do not influence eye movements until more than a set amount of processing time, this would to a certain extent help explain the Tyranny of Film. As described above, the top-down effects shown in text and static scenes are typically time-locked to a manipulation. Even given this high precision in the time of the top-down process manipulation and eye movement measures, on a trial-by-trial basis, top-down effects on eye movements are relatively unlikely. It is the aggregation of the eye movements across all trials that shows top-down effects. Conversely, in dynamic scenes, there is an initial, one time top-down manipulation, and eye movement measures are collected throughout the dynamic scene (Huff et al., 2017; Hutson et al., 2017; Loschky et al., 2015). As such, even if, hypothetically, top-down processes are having a strong effect on certain eye movements in a dynamic scene, by aggregating eye movement behavior across the entire scene (up to 8 minutes in the current experiment), the eye movements that were guided by top-down processes could be lost in the noise of the data. Support for this can be seen in the current data, as analysis more specific in the time of measurement tended to be more sensitive to eye movement differences (e.g., analysis for intertitle presentations or for specific memory questions). Similar effects have been found for comprehension effects on eye movements in film, where specific moments in a film show an effect (Hutson et al., 2017; Loschky et al., 2015). At a more general level, there is also natural top-down variability in eye movement behavior throughout the time course of viewing a video (Smith & Mital, 2013).

Taking all of this together, what is the Tyranny of Film? The features of film and the visual system that create attentional synchrony are a large component. However, the key to the Tyranny of Film is that researchers have not been able to find strong, reliable naturally occurring top-down effects in dynamic scenes up to this point. Three possible explanations for this are 1) that mandatory (non-volitional, automatic, knowledge-based) top-down effects just are not as common as typically assumed, 2) that the attentional synchrony created by highly produced videos results in most eye movements being guided by bottom-up scene features, and 3) that due to data being aggregated across a large number of eye movements the common eye movement metrics used in static scenes are not sensitive enough to identify top-down effects. It is also possible for these three factors to be interacting.

At what stage of information processing do the current memory effects occur?

Interestingly, the Eye movement experimental design allowed for a test of the eye-mind hypothesis (Just & Carpenter, 1980; Reichle et al., 1998; Reilly & Radach, 2006), and dissociations between eye movements and memory. Overall, there was fairly strong support for the eye-mind hypothesis, in that participant eye movements generally showed a relationship to moment-to-moment cognitive processes. At a gross level, this was seen in the reliable relationship between eye movements and memory. Many of these analyses, however, were aggregate data across entire videos. The visual multiple choice and area of interest analysis, however, showed a finer grained relationship between eye movements and memory since many of the memory items were only on the screen for 2-3 seconds. These results overall show that when a person's attitude or level of social vigilantism influence their visual attention in a video, they are related to the subsequent memory processing.

It was also hypothesized that a person's goal while watching the video could have an influence on their memory for it, somewhat independently of the information they fixated. In other words, it was possible that participants would fixate the same information (i.e., show attentional synchrony), but have different memories for that information due to, for example, a resistance strategy they were engaging in (e.g., counter arguing). Since the eye movement and memory analyses never included an individual difference measure in the best model, there was no statistical support for this. However, this does not rule out the possibility that the top-down effects were guiding, for example, memory encoding processes, which then influenced eye movement behavior. For instance, in the debate there was an attitude by SV interaction for participant dwell time and fixation durations. This effect was also present for the debate free recall word count. Dwell time and free recall analyses in the debate showed that the more time a participant spent on the current debate speaker, the more words they recalled overall. Additionally, having longer fixation durations is typically associated with a deeper level of processing of the information at fixation. As such, it is possible the eye movement and memory relationship is the result of participants, based on their level of attitude and SV, engaging in more or less encoding of the video information.

This support for the eye-mind connection replicates a large amount of previous research, but this is one of the first examples of it in political media. Additionally, it was entirely plausible there would have been a dissociation between eye movements and memory based on attitude congruence. As such, the lack of a measured dissociation is meaningful.

Levels of memory representation. Another important insight from the current work and area for future inquiry is the level of memory representation at which the top-down effects occurred. Van Dijk and Kintsch (1983) proposed 3 levels of representation for text: surface, propositional, and situational. Subsequent work verified that people do in fact encode and are able to retrieve all 3 levels of representation (Fletcher & Chrysler, 1990; Schmalhofer & Glavanov, 1986).

In the current work, the recognition memory items used manipulated the surface structure of the arguments presented in the videos, but the proposition and situation text base remained the same. Thus, the recognition memory results show that the interaction of the individual differences of attitude towards abortion and SV influence memory representations at the surface level.

The free recall memory effects could theoretically be driven by memory differences at any or all levels of memory representation. Interestingly, based on the free recall memory results, an argument can be made that the effects occurred at the situational level of representation. The content analyses showed that the most common feature of the free recall responses was that participants would elaborate on the information presented in the videos (Tables 65 & 68). Participants were instructed to recall only what was presented in the videos, thus an elaboration was an inference about what was presented in the video. Inferences are a hallmark of a situational level of representation (Graesser, Singer, & Trabasso, 1994; McKoon & Ratcliff, 1992; Zwaan, Magliano, & Graesser, 1995). Since the majority of the content participants were adding to their free recalls were elaborations, which denote a situational level of representation, it is likely this is the level at which memory effects occurred. However, it is important to note that the free recall memory effects shown were simply for word count, which is agnostic to the content of the free recall. As such, a future analysis of the data and future work should identify if the additional words used that created the memory effect were indeed the elaborations participants added.

What is driving the top down effects?

As conceived and presented in the introduction, it was predicted that top-down effects in the current research would take the form of resistance strategies to the information presented. In the Memory experiment there was some evidence for this seen in support for the social vigilantism hypothesis (e.g., low SV people are more likely to selective expose, while high SV people attend more to attitude-incongruent information). There was also some targeted evidence for attitude congruence effects in the Eye movement experiment (e.g., abortion ad fixation durations showed weak SV effect). However, when viewers in the current study were watching political videos, most of evidence for top-down effects was for overall personality effects, which were independent of congruence with the information presented.

There has not been much work looking at top-down effects on attentional selection and subsequent memory driven by personality differences, but there are 3 corollary lines of research that have shown consistent effects. First, in a series of studies on the effect of political leaning (conservative vs. liberal), Dodd and colleagues found that when presented simultaneously with aversive and appetitive stimuli, participants who identify as more conservative are more likely to attend to the aversive stimulus first while those who identify as more liberal typically attend to the appetite stimulus first (Dodd et al., 2012). Similarly, political orientation has a similar effect on memory for aversive and appetitive images (Mills et al., 2016). Second, individual difference effects on attention have also been found in fMRI research, such that a person's reported level of sensation seeking predicts brain activity in areas that influence visual attention (e.g., anterior cingulate cortex) while watching public service announcements on drug use (Donohew et al., 2017). Lastly, although not discussed in the paper, Huff et al. (2017) did appear to show a main effect of memory based on soccer team fandom.

Drawing direct connections between the current work and these previous individual difference effects should be done cautiously given the differences in the individual differences measured and the stimuli. However, it does seem safe to say that there are individual differences that influence attention and memory independent from the stimulus type. The cause of these individual difference effects in the current study is not clear. The effect, however, is very clear, and through close examination of the individual difference arch/”U” interaction a number of hypotheses can be generated.

To begin, the effect can be explained clearly through the cognitive effects studied in the current work. Specifically, both attentional (e.g., fixated the focal points of interest in the scenes) and subsequent memory performance varied based on attitude and SV. The arch/”U” pattern showed that at low levels of SV, participants who identified as pro-choice processed more of the videos at a high enough level to allow for better memory performance when compared to more pro-life participants. At high levels of SV the relationship was the opposite -- pro-life participants showed greater attentional engagement and memory.

This interaction was not driven by the content of the videos, because attitude congruence was not significant in the interaction. However, there are features of the arguments presented that may indicate something about participants based on their attitude towards abortion. Specifically, the pro-life side of the abortion issue is typically described as an “easy” argument (Carmines & Stimson, 1980; Cobb & Kuklinski, 1997; Pollock, Lilie, & Vittes, 1993), because it unequivocally states that abortion should be illegal without any caveats. Conversely, the pro-choice side of the issue is described as “hard” (Carmines & Stimson, 1980; Cobb & Kuklinski, 1997; Pollock et al., 1993), because it uses more nuanced arguments about when abortion should be legal. Thus, as it pertains to the issue of abortion, it is possible pro-life people tend to use an “easy” framework for thinking about their position and pro-choice people tend to use a “hard” framework. Importantly, the same individuals could use the opposite framework for a different issue, depending on whether they agree with the easy or hard side of the issue.

Given the cognitive explanation of the arch/”U” pattern, and the assumption about the types of arguments preferred based on participant attitude, the interaction takes on more meaning. Specifically, at low levels of SV, the results fit the types of arguments participants prefer. Pro-life participants prefer easy arguments, so at low levels of SV they engage with the information presented at that level. Conversely, since pro-choice participants use hard arguments, they engage with the information more. Using this line of reasoning, the big question is why the relationship flips at high levels of SV. It may be that high SV, pro-choice people, who prefer complex arguments, do not attend to the information presented because they feel that they already know the issue on both sides and do not need to have the arguments presented to them again. This could potentially be described as blanket selective exposure (i.e., selective exposure to an entire issue). A potential reason for this could be that when a high SV, pro-choice individual attends to political information, they know they typically engage in very cognitively demanding processing of that information, regardless of the congruence of the information (Miller et al., in prep). That is to say, they may know that based on the complexity of the "hard" arguments they use and the high demand of counterarguing or attitude bolstering that any level of engagement with the issue will be very cognitively demanding. As such, the blanket selective exposure may be done to essentially conserve energy, because high SV, pro-choice people may not think they will gain anything new from the information presented. Conversely, high SV, pro-life people may attend to the information presented because they have high belief superiority, and their easy framework for processing the arguments allows them to easily resist persuasion (i.e., regardless of the pro-choice argument, abortion should be illegal) and bolster their attitudes. In other words, they may not have to expend as much energy to argue their position on the issue, regardless of whether it is with the pro-choice or pro-life ad, so they are more likely to attend to the information presented.

The above explanation posits cognitive biases based on a person's motivation to process the information and a decision making heuristic to conserve energy. Another potential explanation is that all people engage the information to the greatest extent possible, but the types of cognitive processes they use influence their attention and subsequent memory. At low levels of SV a person does not use many cognitive processes beyond those for processing the information presented, which allows them to use all their cognitive resources (e.g., working memory) to attend to the information presented. Conversely, high SV individuals may be engaging in many highly cognitively demanding processes (e.g., counterarguing & attitude bolstering), which may not leave enough cognitive resources to fully attend to the specific information presented. Thus, at low levels of SV, pro-choice individuals show more attentional selection to the focal points of the videos and better subsequent memory overall, because their "hard" process of thinking about the arguments results in them overall attending more to the arguments. Conversely, pro-life participants may not be using all of their cognitive resources due to using an "easy" process of thinking about the arguments. At high levels of SV, the relationship would change based on how cognitive resources are allocated. Pro-life people at low levels of SV were not using all of their cognitive resources, because of the easy way of processing the arguments. However, when they are high in SV, pro-life people may use more cognitive resources to process the information because they are engaging in resistance strategies to maintain their specific attitude on the abortion issue. Based on this argument, intuitively it would be expected that high SV, pro-choice people would also see the boost based on engaging in resistance strategies and attitude bolstering. However, cognitive resources are limited, and it is possible that high SV, pro-choice people sacrifice deep processing of the information presented in order to engage in resistance strategies and attitude bolstering. Specifically, when a pro-choice person, for example, is working to develop a counterargument to either side of the abortion issue, they will likely be using a hard argument that is high in complexity. Developing a hard argument would likely use many of the working memory resources a person has, which would leave few resources to focus on the specifics of the information being presented. Conversely, when a pro-life person develops a counterargument, they would likely be using an easy argument that would leave working memory resources to attend to the information presented. Importantly, this general principle of cognitive load influencing the information that is eventually encoded into long term memory has been researched extensively in the area of education (Mayer & Moreno, 2003; Paas, Renkl, & Sweller, 2004).

While the cognitive load hypothesis works well based on the memory results in the current study, one potential limitation is the attention effects. Specifically, for high SV, pro-choice individuals the argument is that they are engaged in the very cognitively demanding task of developing arguments and counterarguments to the information presented. In other words, their attention is internally focused. Based on the high cognitive load, it would be expected that high SV, pro-choice people would also have longer fixation durations (Carroll, Young, & Guertin, 1992; Crundall & Underwood, 1998; Loftus & Mackworth, 1978). However, the fixation duration results also showed the arch pattern (Figures 15 & 19). This is not to say that if someone is focusing their attention on developing counterarguments or attitude bolstering they would not have shorter fixation durations, but this is an issue that would need to be resolved through research to show support for the cognitive load hypothesis for the arch/”U” pattern.

The difference between these first two possible explanations for the arch/”U” pattern is that one predicts the effect is due to a decision making heuristics used to conserve energy, and the other is based solely on cognitive load. In other words, one assumes people makes decisions about whether or not to engage with the information presented (a form of selective exposure), and the other assumes people always fully engage with the information presented. As such, one future avenue for research would be to test participant engagement with political information based on attitude and SV. Importantly, these are not mutually exclusive hypotheses, and both could create the arch pattern given the situation in which a person is confronted with political information.

A third potential explanation is that a person's overall goal, not specifically their goal to resist persuasion, while watching any political video has a general impact on their attentional selection and subsequent memory. Research on memory representation has shown there are 3 levels of memory representation: surface, propositional, and situational (Fletcher & Chrysler, 1990; van Dijk & Kintsch, 1983). Importantly, the goal a person has while reading a text influences the levels of representation they encode (Schmalhofer & Glavanov, 1986). For the memory measures there were a number of examples for the argument memory that participants' memory was either better for the recognition memory items or the free recall. This is most notable for the debate argument recognition in the Eye movement Experiment, for which the recognition memory items showed a "U" pattern (Figure 49) and the free recall showed an arch pattern (Figure 51). In other words, at low levels of SV, pro-life participants encoded more surface level representations while pro-choice participants may have had a better situational representation of the arguments presented. At high levels of SV this relationship was reversed. Individuals with better surface level representations of the arguments presented may have a goal of attending to and encoding more detailed information, while people with stronger situational representations have a goal or way of processing the information presented that focuses on the overall meaning and relationships.

Lastly, the above hypotheses make predictions about the results based on the constructs used in the current study, which results in relatively complex descriptions of relationships based on each level of a 2-way interaction. These complex descriptions are helpful in thinking through the effect, but they lack parsimony. It is possible that there is an underlying mechanism that was not measured in the current study that explains behavior based on the relationship between attitude and SV. For example, in the Memory Experiment, Need for Cognition (Petty et al., 1984) was included as a control variable because variability in memory performance could have potentially been explained entirely by NFC. This was not found in the Memory Experiment, but it is possible a construct like NFC is related to attitude and SV and explains the variability in engagement with political information based on attitude and SV. In fact, given the differences in the results between the two experiments, it is possible with the experimental controls of the Eye tracking Experiment, NFC could still be an underlying factor. Similarly, Dodd and colleagues argued that a person's biological predisposition to confront violations of their preferences (aversive) compared to desirable situations (appetitive) may be predictive of their political orientation. Thus, the argument is that the individual differences measured (political orientation) is a proxy measure of genetic variability that predicts attentional selection and memory. It would be beneficial for future work to be designed to identify if there are lower-level predictors of attitude towards abortion and social vigilantism. Since abortion attitude is tightly related to political orientation (Pew Research Center, 2017), it is possible political orientation and the potential genetic variability that predicts political orientation was an underlying factor influencing attentional selection and subsequent memory in the current study. In order to identify any underlying factors, the best approach is to test the above hypotheses to develop a clear explanation for the arch/”U” that may then point towards the most likely underlying factors to test.

Limitations and future directions

One of the main theoretical bases for the hypotheses predicting top-down effects was the phenomenon of selective exposure. As mentioned previously, selective exposure is a large construct that can have different meanings given the context in which it is used. In the current study, participants were presented with information that was either pro- or counter-attitudinal. This means that they did not choose to be presented with the counter-attitudinal information, which means the situation participants found themselves in within the experiment was not necessarily the same as they would normally encounter in their daily lives (Slater, 2004). Specifically, in their day-to-day lives they can typically easily avoid information they disagree with by choosing not to access it (e.g., not clicking on a link to a news story they infer that they will disagree with) or terminating access to that information when confronted by it (e.g., changing the TV channel). However, the situation presented in the current study is not entirely artificial. People are regularly confronted with videos they disagree with, especially during elections. In these situations, they likely have more control over whether they disengage with the video (e.g., changing the channel or leaving the room). However, participants in the presented experiment did have the ability to tune out or avoid counter-attitudinal information as well, and this included everything up to quitting the experiment (the informed consent reminded each participant this was an option they could take at any point without any repercussions). Thus, despite the study of selective exposure in an experimental context with only limited options for avoiding counter-attitudinal information, the behaviors participants engaged in are ones that clearly occur in real world environments. Additionally, a key benefit of having experimental control was the highly sensitive tests of important theoretical relationships between high-level cognitive processes and eye-movements in dynamic scene videos.

To address this limitation in future work, experimental designs from selective exposure research should be implemented to more fully capture the full range of selective exposure behaviors that people deploy on a daily basis. These include, but are not limited to, 1) allowing participants to choose the videos they want to watch and the order in which they will be watched (Jang, 2014; Knobloch-Westerwick & Meng, 2009), and 2) allowing participants to skip videos. One highly ecologically valid study design using these designs would be to present the experiment in the format used on YouTube. YouTube regularly presents viewers with advertisements before they are able to watch their intended video. Sometimes viewers are able to skip the advertisement after a short delay, and sometimes they are asked to provide feedback to improve the congruence of the ads with their interests. An experiment that used the same videos and dependent variables as the current study, but formatted using the design of YouTube could allow for more direct tests of selective exposure at a more macro level in addition to the micro level of eye movement behavior. Additionally, this format would make the research more directly translatable to real world behavior.

Conclusions

How do high-level cognitive processes influence visual attention and subsequent memory in dynamic scenes? Interest in this question has grown over the past decade, in part because results have pointed towards the answer that high-level cognitive processes have very little influence on attention while watching videos and subsequent memory for their contents. The current study was designed to remove as much subtlety from previous studies as possible by using the strongest naturally occurring, top-down differences we could think of. Specifically, the study asked, how does attitude congruence with the issue of abortion and social vigilantism influence attentional selection and memory encoding in political videos? Results from the Memory experiment indicate that there were some memory effects of attitude congruence and attitude congruence with SV. These effects supported the Social Vigilantism Hypothesis, and potentially the Selective Exposure Hypothesis. The Eye movement experiment extended these results by showing that both attitude and social vigilantism influenced attentional selection and subsequent memory, but these effects were subtle compared to stimulus driven effects and were mostly independent of attitude-congruence.

Theoretically this work is very important to further our understanding of the dynamics and relationships between attentional selection and memory in dynamic video stimuli, and how these processes are influenced by top-down processes. However, the benefits of the current study go far beyond this. Understanding how people engage with politically charged information is of critical importance given the current state of politics in the United States and around the world. Understanding the individual differences that drive attentional selection and subsequent memory encoding could eventually be used to help promote critical engagement political media. This critical engagement could help people identify when incorrect information is being presented to them by a party with the intent to change or bolster their attitude.

Current political events have increased the worlds interest in how people consume and understand the overabundance of political information created today. Do we literally look at the world differently based on our political attitudes? The answer is yes, but not in the way people would traditionally think. At the grossest level, attitude does not influence how we watch political videos, because attitude congruence has very limited effects. Perhaps more surprisingly, though, is that the individual differences of a person's attitude along with their level of social vigilantism does have an effect, regardless of attitude congruency. Current theories in cognitive and social psychology did not predict this general effect, which means this is a novel finding that opens the door to many new lines of research to identify why individual differences have a generalized effect on fundamental cognitive processes. Furthering our understanding of how people understand political information could guide programs to help create a more informed and independent electorate.

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Appendix A - Political Advertisement Shot-by-shot breakdown

Non-controversial Ad

Shot	Shot Type	Shot Description
1	Close-up	Boots of a person walking up steps
2	Close-up	Starts on shoes of person doing crab walk. Person crabwalks from right to left across shot.
3	Wide shot	Staircase with 3 people going up/down stairs including the person with the boots and the crabwalker.
4	Intertitle	"Just because you do something differently"
5	Wide shot	Staircase with 5 people on stairs.
6	Close-up	Feet of male as he jumps backwards.
7	Wide shot	Staircase with 4 people. The male is landing is jump and then begins to jump over hand railing.
8	Medium shot	Male jumping over hand railing, and running down grass beside stairs.
9	Medium close-up to wide shot.	Females face and upper torso as she reaches top of stairs. Once female is off screen, text displayed: "doesn't mean you're "disabled".
10	Intertitle	Abilities in Motion. "helping you, help yourself."
11	Intertitle	www.abilitiesinmotion.org

Pro-choice Ad

Shot	Shot Type	Shot Description
1	Intertitle	"The following is a paid advertisement of Kansans for Choice
2	Close-up	Left hand scrolling on computer trackpad
3	Close-up	Hands knitting
4	Close-up	Back of person (out of focus). Hand drawing (in focus)
5	Close-up	Hands holding pen and signing document
6	Intertitle	Woman today have the right to accomplish anything.
7	Close-up	Hand pointing at math equation on chalkboard and writing in chalk
8	Close-up	Hands playing piano
9	Close-up	Hand brushing across chain link fence
10	Close-up	Hand holding chain link fence. Face out of focus behind hand.
11	Intertitle	Women of all ages choose to have an abortion.
12	Close-up	Hands clasped in lap. Red fingernail polish.
13	Close-up	Hands laid on top of one another in lap
14	Close-up	Hands pressed together in front of chest
15	Intertitle	There are many reasons for choosing an abortion.
16	Close-up	Woman putting head in hands.
17	Medium Close-up	Woman sitting and rubbing face with hands

18	Medium Close-up	Woman sitting with hand for forehead
19	Close-up	Woman putting head in hands.
20	Intertitle	The rights of the fetus should not outweigh a woman's rights.
21	Extreme Close-up	Eye
22	Close-up	Four hands coming together in the center of screen
23	Intertitle	Vote for choice. Vote YES on the amendment for abortion rights.

Pro-life Ad

Shot	**Shot Type**	**Shot Description**
1	Intertitle	The following is a paid advertisement of Kansans For Life
2	Close-up	Hand on asphalt being traced by chalk (Beginning of tracing)
3	Close-up	Hand on asphalt being traced by chalk (End of tracing)
4	Close-up	Outline of chalk hand
5	Intertitle	Innocent lives should be protected
6	Close-up	Hand playing piano
7	Close-up	Hand pointing at numbers on a board
8	Close-up	Hand putting eye on a Play-Doh creation
9	Close-up	Hands on scooter handles. Scooter going down street.
10	Close-up	Hand holding a lady bug
11	Intertitle	Abortion is irresponsible and unsafe
12	Close-up	Hands holding sand with some sand falling between hands
13	Close-up	Hands planting a small green plant
14	Close-up	Hands holding blue berries
15	Close-up	Hands holding green apple
16	Intertitle	Life begins at conception.
17	Close-up	Baby's hand grasping adult finger
18	Intertitle	Life should be given a chance.
19	Extreme Close-up	Eye
20	Close-up	Pregnant woman rubbing her stomach
21	Intertitle	Choose life. Vote NO on the amendment for abortion rights.

Appendix B - Memory Experiment Memory Stimuli

Recognition memory items.

Non-controversial video.

Visual multiple choice.

1. How many people were shown in the video?
    a. 3
    b. 4
    c. 5
    d. 6
2. What color boots did the first person shown have?
    a. Black
    b. Grey
    c. Brown
    d. Tan
3. What color was the tent in the background?
    a. Orange and Yellow
    b. Purple and Orange
    c. Red and Green
    d. Red and White
4. How many flights of stairs were shown?
    a. 2
    b. 3
    c. 4
    d. 5
5. What type of pants was the person that jumped over the handrail wearing?
    a. Jeans
    b. Khakis
    c. Shorts
    d. Corduroys
6. What hairstyle did the person who skipped all the way down the steps have?
    a. Ponytail
    b. Curly
    c. Straight
    d. Bun
7. What was the person doing the crabwalk wearing?
    a. Hooded Sweatshirt
    b. Heavy Jacket
    c. Long Sleeve Shirt
    d. Fleece Jacket

Argument recognition.

Argument 1 Foil: If you do something differently, it does not make you “disabled.”

Argument 2 Original: Abilities in motion “Helping you, help yourself.”

Visual recognition.

Image 1 Foil:

Image 2 Foil:

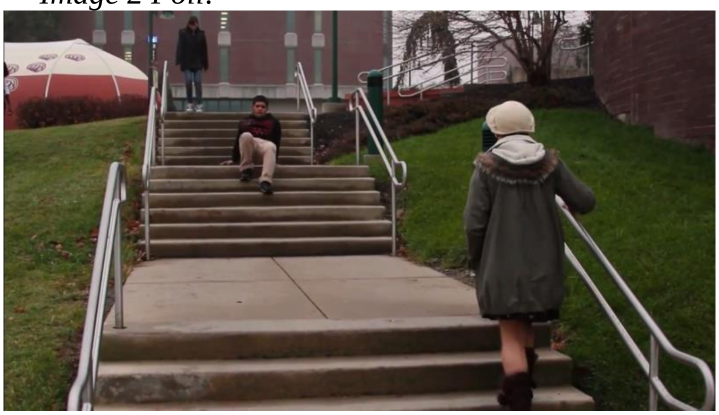
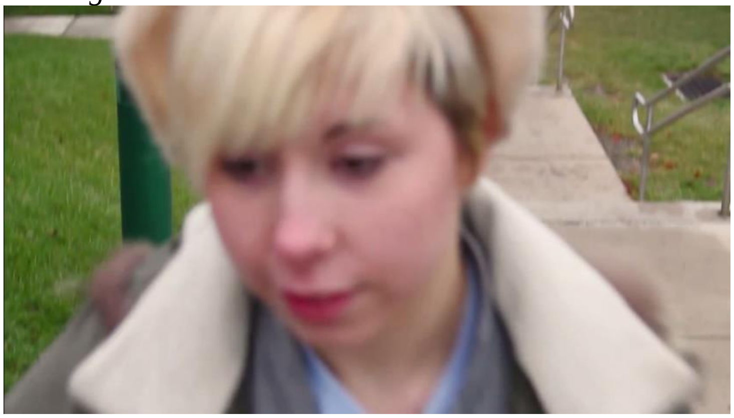


Image 3 Original:

Image 4 Original:

Image 5 Original:

Image 6 Foil:



Pro-choice video.
Visual multiple choice.

1. The opening scene showed a person. What was the person doing?
    a. *Drawing a picture*
    b. *Using a computer*
    c. *Drawing on a chalkboard*
    d. *Knitting a scarf*
2. One scene showed a woman knitting a scarf. What color was the scarf?
    a. *White*

    b. *Grey*
    c. *Red*
    d. *Yellow*
3. One scene showed a man drawing. What color was the man's shirt?
    a. *Green*
    b. *Grey*
    c. *Red*
    d. *Blue*
4. One scene showed a person brushing a fence. What was the color of the person's hoodie?
    a. *Blue*
    b. *Grey*
    c. *Green*
    d. *Black*
5. One scene showed a woman knitting. What was behind the woman?
    a. *Window*
    b. *Quilt*
    c. *Couch*
    d. *Table*
6. One scene showed a person scrolling on the computer. What type of ring was the person wearing?
    a. *Diamond Engagement Ring*
    b. *Gold Wedding Ring*
    c. *Silver Thumb Ring*
    d. *Class Ring*
7. One scene showed a person playing an instrument. What instrument was being played?
    a. *Piano*
    b. *Guitar*
    c. *Harp*
    d. *Violin*
8. One scene showed a close-up of a woman wearing blue jeans with her hands clasped. What color fingernail polish did she have?
    a. *Pink*
    b. *Clear/none*
    c. *Red*
    d. *White*

Argument recognition.

Argument 1 Foil: Today, women have the freedom to accomplish anything.

Argument 2 Foil: Abortions are an option chosen by women of all ages.

Argument 3 Original: There are many reasons for choosing an abortion.

Argument 4 Original: The rights of the fetus should not outweigh a woman's rights.

Visual recognition.

Image 1 Foil:

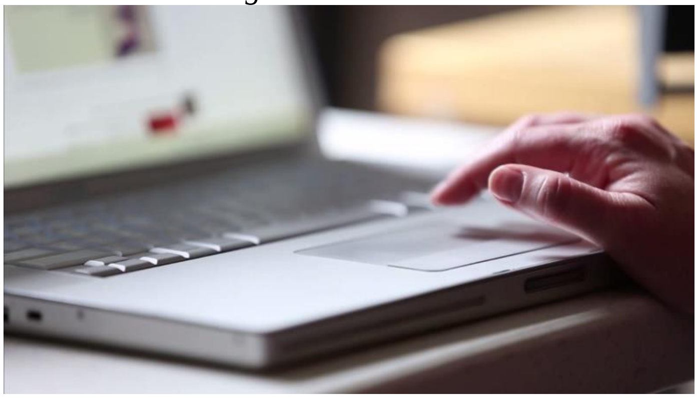


Image 2 Original:

Image 3 Foil:

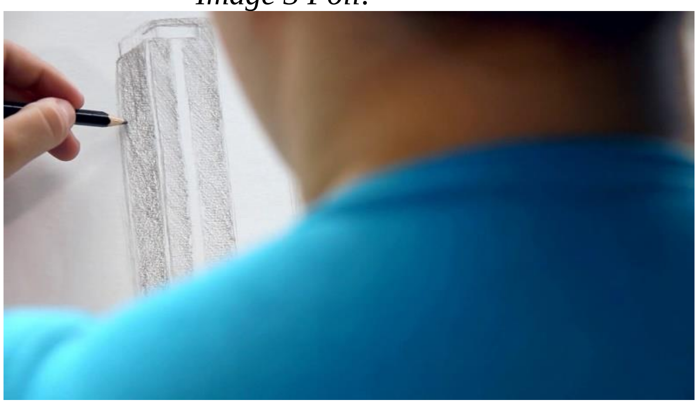


Image 4 Foil:

Image 5 Original:

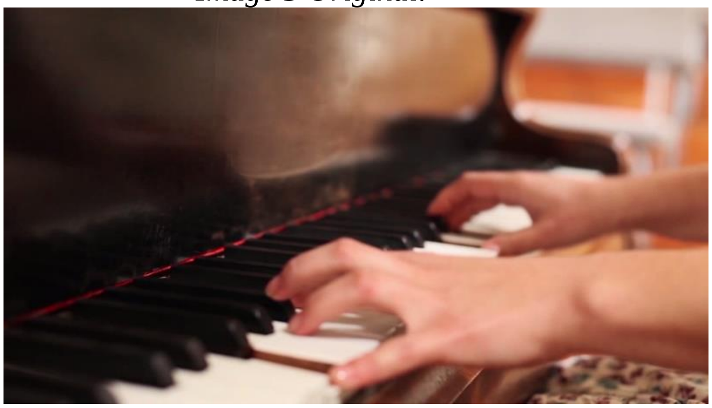


Image 6 Foil:

Image 7 Original:

Image 8 Original:

Image 9 Foil:

Image 10 Original:

Image 11 Foil:

Image 12 Original:

Pro-life video.
Visual multiple choice.

1. One scene showed a child counting. What number sequence was the child counting?
    a. *1, 2, 3, 4, 5*
    b. *2, 3, 4, 5, 6*
    c. *3, 4, 5, 6, 7*
    d. *4, 5, 6, 7, 8*
2. One scene showed a child holding berries. Which type of berries was shown?

a. Blackberries
b. Blueberries
c. Raspberries
d. Strawberries

3. One scene showed a child holding an apple. What color of apple was shown?
    a. *Green*
    b. *Yellow*
    c. *Orange-red*
    d. *Dark Red*
4. One scene showed a child drawing with chalk. What color was the chalk?
    a. *Green*
    b. *Blue*
    c. *Yellow*
    d. *Red*
5. One scene showed a child making a play-doh creation. What color was the very **top** piece of the play-doh creation?
    a. *Yellow*
    b. *Red*
    c. *Blue*
    d. *Orange*
6. One scene showed a child on a scooter. What was color of the child's shirt?
    a. *Orange*
    b. *White*
    c. *Yellow*
    d. *Red*
7. One scene showed a child on a scooter. How many parked cars did the child on the scooter pass?
    a. *1*
    b. *2*
    c. *3*
    d. *4*
8. One scene showed a child with a bug crawling on their hand. What type of bug was it?
    a. *Lady Bug*
    b. *Lightning Bug*
    c. *Beetle*
    d. *Roly Poly*

Argument recognition.

Argument 1 Foil: We should protect innocent lives.
Argument 2 Original: Abortion is irresponsible and unsafe.
Argument 3 Original: Life begins at conception.
Argument 4 Foil: All life should be given an opportunity.

Visual recognition.

Image 1 Original:

Image 2 Foil:

Image 3 Original:

Image 4 Foil:

Image 5 Original:

Image 6 Foil:

Image 7 Original:

Image 8 Original:

Image 9 Original:

Image 10 Foil:

Image 11 Foil:

Image 12 Foil:

Debate video.
Visual multiple choice.

1) Of the options below, what type of jewelry was the debater on the left wearing?
    a. Necklace
    b. Brooch
    c. Nose Stud
    d. None

2) Of the options below, what type of jewelry was the debater on the right wearing?
    a. Necklace
    b. Brooch
    c. Nose Stud
    d. None

3) What color hair did the debater on the left have?
    a. Blonde
    b. Red
    c. Brown
    d. Black

4) What color hair did the debater on the right have?
    a. Blonde
    b. Red
    c. Brown
    d. Black

5) What color fingernail polish did the debater on the left have?
    a. Clear/none
    b. Blue
    c. Red

d. White

6) What color fingernail polish did the debater on the right have?
   a. Clear/none
   b. Blue
   c. Red
   d. White

7) How did the debater on the left wear their jacket?
   a. Unbuttoned
   b. Sleeves rolled up
   c. Shirt collar over jacket lapel
   d. Buttoned

8) How did the debater on the right wear their jacket?
   a. Unbuttoned
   b. Sleeves rolled up
   c. Shirt collar over jacket lapel
   d. Buttoned

9) What hairstyle did the debater on the left have?
   a. Straight
   b. Curly
   c. Hair up
   d. Braided

10) What hairstyle did the debater on the right have?
   a. Straight
   b. Curly
   c. Hair up
   d. Braided

11) What was the background behind the speakers?
   a. Blank wall
   b. Bookshelf
   c. Curtain
   d. Wood paneling

12) Which of the following is true?
   a. The debater on the left put her notes on the table as she finished
   b. The debater on the right put her notes on the table as she finished
   c. Both debaters held their notes throughout
   d. Both debaters put their notes on the table when finished

Argument recognition.

PC Argument 1 Original: Women have been denied the right to have a choice throughout history.

PC Argument 2 Foil: It is a woman's civil right to choose to cease being pregnant.

PC Argument 3 Foil: Denying pregnant women access to abortion promotes the idea that they are only "baby makers."

PC Argument 4 Original: Abortion makes the decision to carry a child to term completely up to the woman, so if she was impregnated against her will, or decides she is not quite ready yet to become a mother, then she can choose if the baby will be born or not.

PC Argument 5 Foil: Pregnant women who have to give birth ought to have full choice in whether or not to be pregnant.

PC Argument 6 Foil: Because the pregnant woman has to make a nine-month commitment, it should be up to her whether or not she wants to carry it.

PC Argument 7 Original: Given all that accompanies the nine or so months of carrying a fetus to term, it should be up to the one who must endure the incredible discomfort to choose whether or not she wants to do so.

PC Argument 8 Foil: If a woman did not agree to be pregnant, why should she have to endure nine months of suffering.

PC Argument 9 Original: Pregnancy should always be a planned and informed choice, so when that is taken away from a woman, she ought to have a right to regain that choice.

PC Argument 10 Original: Given that it is a woman's choice to carry a fetus to term, she should be allowed to make this choice in the safest way possible.

PL Argument 1 Foil: Even though the child is dependent on his/her mother, the right to life should supersede the mother's choice because the child is an innocent human being who has committed no wrongdoings before the law.

PL Argument 2 Original: An unborn child is a living member of human kind, whose life ought to be preserved inside or outside his or her mother's womb.

PL Argument 3 Foil: A developing unborn child is human life, regardless of whether or not the child has gone through puberty. All human life is worth protecting regardless of developmental stage.

PL Argument 4 Original: Metabolism growth and responsiveness are apparent in observations of an unborn child, and reproduction is only a matter of development.

PL Argument 5 Foil: DNA evidence shows that the unborn child is not simply an extension of the mother's body, but his or her own person.

PL Argument 6 Foil: The unborn child is his or her own living person, and has done nothing deserving of the death penalty.

PL Argument 7 Original: Since contraceptives are widely available in the US, and adoption is a viable option for an unwanted child, abortion should be seen as irresponsible.

PL Argument 8 Original: Partners risking unprotected sexual intercourse ought to be held to the consequences of their action; a living being.

PL Argument 9 Foil: The parents' irresponsible behavior should not entail such a destructive result for the unborn child.

PL Argument 10 Original: Mothers who choose to have a chemical abortion will often suffer acute pain and nausea and have to dispose of the corpse.

Visual recognition.

Pro-choice (Left)/Pro-life (Right) Debate Images

Image 1:

Image 2:

Image 3:

Image 4:

Image 5:

Image 6:

Image 7:

Image 8:

Pro-life(Left)/Pro-choice (Right) Debate Images

Image 1:

Image 2:

Image 3:

Image 4:

Image 5:

Image 6:

Image 7:

Image 8:

Appendix B: Eye Movement Experiment Memory Stimuli.

***Recognition memory items* (Correct answers highlighted).**

Non-controversial video.

Visual multiple choice.

1) How many people were shown in the video?
    a. 3
    b. 4
    c. 5
    d. 6

2) What color boots did the first person shown have?
    a. Black
    b. Tan
    c. Gray
    d. Brown

3) What color was the tent in the background?
    a. Orange and Yellow
    b. Purple and Orange
    c. Red and Green
    d. Red and White

4) How many flights of stairs were shown?
    a. 2
    b. 3
    c. 4

d. 5

5) What type of pants was the person that jumped over the handrail wearing?
   a. Khakis
   b. Jeans
   c. Shorts
   d. Corduroys

6) What hairstyle did the person who skipped all the way down the steps have?
   a. Curly
   b. Straight
   c. Ponytail
   d. Bun

7) What was the person doing the crabwalk wearing?
   a. Heavy Jacket
   b. Hooded Sweatshirt
   c. Long Sleeve Shirt
   d. Fleece Jacket

Argument recognition.

Argument 1 Foil: If you do something differently, it does not make you "disabled."

Argument 2 Original: Abilities in motion "Helping you, help yourself."

Pro-choice ad.

Visual multiple choice.

1) The opening scene showed a person. What was the person doing?
   a. Drawing a picture
   b. Drawing on a chalkboard
   c. Using a computer
   d. Knitting a scarf

2) One scene showed a woman knitting a scarf. What color was the scarf?
   a. Red
   b. White
   c. Yellow
   d. Gray

3) One scene showed a man drawing. What color was the man's shirt?
   a. Blue
   b. Green
   c. Gray
   d. Red

4) One scene showed a person brushing a fence. What was the color of the person's hoodie?
   a. Black

b. Gray
c. Blue
d. Green

5) One scene showed a woman knitting. What was behind the woman?
   a. Quilt
   b. Table
   c. Couch
   d. Window

6) One scene showed a person scrolling on the computer. What type of ring was the person wearing?
   a. Gold Wedding Band
   b. Silver Thumb Ring
   c. Diamond Ring
   d. Stacked Rings

7) One scene showed a person playing an instrument. What instrument was being played?
   a. Guitar
   b. Harp
   c. Piano
   d. Violin

Argument recognition.

Argument 1 Foil: Today, women have the freedom to accomplish anything.

Argument 2 Foil: Abortions are an option chosen by women of all ages.

Argument 3 Original: There are many reasons for choosing an abortion.

Argument 4 Original: The rights of the fetus should not outweigh a woman's rights.

Pro-life ad.
Visual multiple choice.

1) One scene showed a child counting. What number sequence was the child counting?
   a. 1, 2, 3, 4, 5
   b. 2, 3, 4, 5, 6
   c. 3, 4, 5, 6, 7
   d. 4, 5, 6, 7, 8

2) One scene showed a child holding berries. Which type of berries was shown?
   a. Blackberries
   b. Raspberries
   c. Strawberries

d. Blueberries

3) One scene showed a child holding an apple. What color of apple was shown?
    a. Yellow
    b. Orange-red
    c. Green
    d. Dark red

4) One scene showed a child making a Play-Doh creation. What color was the very top piece of the Play-Doh creation?
    a. Green
    b. Orange
    c. Red
    d. Blue

5) One scene showed a child on a scooter. What was color of the child's shirt?
    a. Orange
    b. Red
    c. White
    d. Yellow

6) One scene showed a child on a scooter. How many parked cars did the child on the scooter pass?
    a. 1
    b. 2
    c. 3
    d. 4

7) One scene showed a child with a bug crawling on their hand. What type of bug was it?
    a. Lightning bug
    b. Lady bug
    c. Beetle
    d. Roly poly

Argument recognition.

Argument 1 Foil: We should protect innocent lives.
Argument 2 Original: Abortion is irresponsible and unsafe.
Argument 3 Original: Life begins at conception.
Argument 4 Foil: All life should be given an opportunity.

Debate video.
Visual multiple choice

13) Of the option below, what type of jewelry was the debater on the left wearing?

e. Necklace
f. Brooch
g. Nose Stud
h. None

14) Of the option below, what type of jewelry was the debater on the right wearing?
e. Necklace
f. Brooch
g. Nose Stud
h. None

15) What color hair did the debater on the left have?
e. Blonde
f. Red
g. Brown
h. Black

16) What color hair did the debater on the right have?
e. Blonde
f. Red
g. Brown
h. Black

17) What color fingernail polish did the debater on the left have?
e. Clear/none
f. Blue
g. Red
h. White

18) What color fingernail polish did the debater on the right have?
e. Clear/none
f. Blue
g. Red
h. White

19) How did the debater on the left wear their jacket?
e. Unbuttoned
f. Sleeves rolled up
g. Shirt collar over jacket lapel
h. Buttoned

20) How did the debater on the right wear their jacket?
   e. Unbuttoned
   f. Sleeves rolled up
   g. Shirt collar over jacket lapel
   h. Buttoned

21) What hairstyle did the debater on the left have?
   e. Straight
   f. Curly
   g. Hair up
   h. Braided

22) What hairstyle did the debater on the right have?
   e. Straight
   f. Curly
   g. Hair up
   h. Braided

23) What was the background behind the speakers?
   e. Blank wall
   f. Bookshelf
   g. Curtain
   h. Wood paneling

24) Which of the following is true?
   e. The debater on the left put her notes on the table as she finished
   f. The debater on the right put her notes on the table as she finished
   g. Both debaters held their notes throughout
   h. Both debaters put their notes on the table when finished

Argument recognition.

PC Argument 1 Original: Unfortunately, having a choice has been a right denied to women for the majority of history, and even still today.

PC Argument 2 Foil: It is a woman's civil right to choose to cease being pregnant.

PC Argument 3 Foil: Denying pregnant women access to abortion promotes the idea that they are only "baby makers."

PC Argument 4 Original: Abortion makes the decision to carry a child to term completely up to the woman, so if she was impregnated against her will, or decides she is not quite ready yet to become a mother, then she can choose if the baby will be born or not.

PC Argument 5 Foil: Pregnant women who have to give birth ought to have full choice in whether or not to be pregnant.

PC Argument 6 Foil: Because the pregnant woman has to make a nine-month commitment, it should be up to her whether or not she wants to carry it.

PC Argument 7 Original: Given all that accompanies the nine or so months of carrying a fetus to term, it should be up to the one who must endure the incredible discomfort to choose whether or not she wants to do so.

PC Argument 8 Foil: If a woman did not agree to be pregnant, why should she have to endure nine months of suffering.

PC Argument 9 Original: Pregnancy should always be a planned and informed choice, so when that is taken away from a woman, she ought to have a right to regain that choice.

PC Argument 10 Original: Given that it is a woman's choice to carry a fetus to term, she should be allowed to make this choice in the safest way possible.

PL Argument 1 Foil: Even though the child is dependent on his/her mother, the right to life should supersede the mother's choice because the child is an innocent human being who has committed no wrongdoings before the law.

PL Argument 2 Original: An unborn child is a living member of human kind, whose life ought to be preserved inside or outside his or her mother's womb.

PL Argument 3 Foil: A developing unborn child is human life, regardless of whether or not the child has gone through puberty. All human life is worth protecting regardless of developmental stage.

PL Argument 4 Original: Metabolism, growth, and, responsiveness are apparent in observations of an unborn child, but the function of contention here would be reproduction.

PL Argument 5 Foil: DNA evidence shows that the unborn child is not simply an extension of the mother's body, but his or her own person.

PL Argument 6 Foil: The unborn child is his or her own living person, and has done nothing deserving of the death penalty.

PL Argument 7 Original: Since contraceptives are widely available in the US, and adoption is a viable option for an unwanted child, abortion should be seen as irresponsible.

PL Argument 8 Original: Partners risking unprotected sexual intercourse ought to be held to the consequences of their action; a living being.

PL Argument 9 Foil: The parents' irresponsible behavior should not entail such a destructive result for the unborn child.

PL Argument 10 Original: Mothers who choose to have a medical abortion, also known as "abortion pill," will often suffer acute pain and nausea, and have to dispose of the corpse.

Free recall memory prompts.

Main free recall memory instructions.

"For each video we would like you to give a description. Imagine you are describing it to a friend who did not see the video, but needs a representation clear enough they could form an opinion on the content and describe it to another friend. You should describe things in the order in which they occurred, with as much detail as possible."

<u>"Note</u>: A one or two sentence description is not sufficient to describe all of the visual or verbal content in any of the videos."

Verbal free recall prompt.

"First, you will be asked to recall the written and spoken information. Please give a detailed and full description of any and all material you read and heard starting from the beginning and going until the end of the video."

Verbal free recall feedback.

"Below is an example of the detail we expect for your Argument description. The answer you gave is below the example. How does what you wrote compare to the example?"

"Example Argument Response: 64 Words"

"The video mainly sought to educate viewers on all of the benefits of walking. It starts by saying walk for better health. Walking five times a week for thirty minutes can improve a person's health and longevity. This is done through reducing coronary disease risk, lowering blood pressure, reducing cholesterol, and increasing bone density. It ends by saying it is time to start walking."

"Your Argument Response:"

"<participant response displayed here>"

Visual free recall prompt.

"Second, you will be asked to describe the visual information you saw (This includes people, objects, scenes, etc., BUT not any text presented). Please give a detailed and full description of any and all visual/pictorial information you saw starting from the beginning and going until the end of the video."

Visual free recall feedback.

"Below is an example of the detail we expect for your Visual description. The answer you gave is below the example. How does what you wrote compare to the example?"

"Example Visual Response: 97 Words"

"An animated character appeared on the screen walking from left to right on a sunny day through a city. There was then a bus that drove by, and the character appeared in a forest, walked over a hill, over a bridge, through a museum with a Tyrannosaurus Rex skeleton, and finally down steps in the museum. He was not drawn realistically, but more so aligned with how a stick figure would be sketched with the exception of a basic red shirt and blue pants. The rest of the animations were similar to this style of elementary artwork."

"Your Visual Response:"

"<participant response displayed here>"

Appendix C - Individual Difference Measures

Social Vigilantism Scale (Saucier & Webster, 2010)

Please use the 9 point scale below to indicate your agreement with each statement.

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Disagree Very Strongly								**Agree Very Strongly**	

1 _______ While in an argument, I worry that the person I am arguing with will form a negative impression of me.

2 _______ Arguing over controversial issues improves my intelligence.

3 _______ I enjoy avoiding arguments.

4 _______ I am energetic and enthusiastic when I argue.

5 _______ Once I finish an argument I promise myself that I will not get into another.

6 _______ Arguing with a person creates more problems for me than it solves.

7 _______ I have a pleasant good feeling when I win a point in an argument.

8 _______ When I finish arguing with someone I feel nervous and upset.

9 _______ I enjoy a good argument over a controversial issue.

10 _______ I get an unpleasant feeling when I realize I am about to get into an argument.

11 _______ I enjoy defending my point of view on an issue.

12 _______ I am happy when I keep an argument from happening.

13 _______ I don not like to miss the opportunity to argue a controversial issue.

14 _______ I prefer being with people who rarely disagree with me.

15 _______ I consider an argument an exciting intellectual challenge.

16 _______ I find myself unable to think of effective points during an argument.

17 _______ I feel refreshed and satisfied after an argument on a controversial issue.

18 _______ I have the ability to do well in an argument.

19 _______ I try to avoid getting into arguments.

20 _______ I feel excitement when I expect that a conversation I am in is leading to an argument.

21 _______ I feel that my ideas should be used to educate others.

22 _______ I feel as if it is my duty to enlighten other people.

23 _______ I need to win any argument about how people should live their lives.

24 _______ I like to imagine myself in a position of authority so that I could make the important decisions around here.

25 _______ I try to get people to listen to me, because what I have to say makes a lot of sense.

26 _______ Those people who are more intelligent and informed have a responsibility to educate the people around them who are less intelligent and informed.

27 _______ I feel a social obligation to voice my opinion.

28 _______ If everyone saw things the way that I do, the world would be a better place.

29 _______ I think that some people need to be told that their point of view is wrong.

30 _______ There are a lot of ignorant people in society.

31 _______ Some people just believe stupid things.

32 _______ I often feel that other people do not base their opinions on good evidence.

33 _______ It frustrates me that many people fail to consider the finer points of an issue when they take a side.

34 _______ I frequently consider writing a "letter to the editor."

Need For Cognition Scale (Petty, Cacioppo, & Kao, 1984)

On the pages that follow are a number of opinion statements about your personal views, ethics, and personal morality. Please use the 9 point scale below to indicate your agreement with each statement.

1 2 3 4 5 6 7 8 9

Disagree Very Strongly Agree Very Strongly

1 _______ I really enjoy a task that involves coming up with new solutions to problems.

2 _______ I believe that if I think hard enough, I will be able to achieve my goals in life.

3 _______ I am very optimistic about my mental abilities.

4 _______ I would prefer a task that is intellectual, difficult, and important to one that is somewhat important but does not require much thought.

5 _______ I tend to set goals that can be accomplished only be expending considerable mental effort.

6 _______ When something I read confuses me, I just put it down and forget it.

7 _______ I take pride in the products of my reasoning.

8 _______ I don't usually think about problems that others have found to be difficult.

9 _______ I am usually tempted to put more thought into a task than the job minimally requires.

10 _______ Learning new ways to think doesn't excite me very much.

11 _______ I am hesitant about making important decisions after thinking about them.

12 _______ I usually end up deliberating about issues even when they do not affect me.

13 _______ I prefer to just let things happen rather than try to understand why they turned out that way.

14 _______ I have difficulty thinking in new and unfamiliar situations.

15 _______ The idea of relying on thought to make my way to the top does not appeal to me.

16 _______ The notion of thinking abstractly is not appealing to me.

17 _______ I am an intellectual.

18 _______ I find it especially satisfying to complete an important task that required a lot of thinking and mental effort.

19 _______ I only think as hard as I have to.

20 _______ I don't reason well under pressure.

21 _______ I like tasks that require little thought once I've learned them.

22 _______ I prefer to think about small, daily projects to long-term ones.

23 _______ I would rather do something that requires little thought than something that is sure to challenge my thinking abilities.

24 _______ I find little satisfaction in deliberating hard and for long hours.

25 _______ I think primarily because I have to.

26 _______ I more often talk with other people about the reasons for and possible solutions to international problems than about gossip or tidbits of what famous people are doing.

27 _______ These days, I see little chance for performing well, even in "intellectual" jobs, unless one knows the right people.

28 _______ More often than not, more thinking just leads to more errors.

29 _______ I don't like to have the responsibility of handling a situation that requires a lot of thinking.

30 _______ I appreciate opportunities to discover the strengths and weaknesses of my own reasoning.

31 _______ I feel relief rather than satisfaction after completing a task that required a lot of mental effort.

32 _______ Thinking is not my idea of fun.

33 _______ I try to anticipate and avoid situations where there is a likely chance I will have to think in depth about something.

34 _______ I don't like to be responsible for thinking of what I should be doing with my life.

35 _______ I prefer watching educational to entertainment programs.

36 _______ I often succeed in solving difficult problems that I set out to solve.

37 _______ I think best when those around me are very intelligent.

38 _______ I am not satisfied unless I am thinking.

39 _______ I prefer my life to be filled with puzzles that I must solve.

40 _______ I would prefer complex to simple problems.

41 _______ Simply knowing the answer rather than understanding the reasons for the answer to a problem is fine with me.

42 _______ When I am figuring out a problem, what I see as the solution to a problem is more important than what others believe or say is the solution.

43 _______ It's enough for me that something gets the job done, I don't care how or why it works.

44 _______ Ignorance is bliss.

45 _______ I enjoy thinking about an issue even when the results of my thought will have no effect on the outcome of the issue.

Attitude Strength Measures

Please rate how you feel about ***abortion, as a legal medical procedure****.*

Section I: Extremity

It is good	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	*It is bad*
It is foolish	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	*It is wise*
It is unnecessary	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	*It is necessary*

It is harmful	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	*It is beneficial*
I favor it	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	*I oppose it*