Memory for Positive, Negative, and Comparison Ads: Studying Semantic Associations Between Candidates and Issues Using EEG

Dissertation

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Abstract

Political advertisements are a ubiquitous force during political campaigns. The 30-second TV spot is a particularly prominent form of political advertising, securing the bulk of advertising expenditures. Although political TV ads arouse contempt and condemnation from politicians, the media, and citizens, research has shown that these ads offer citizens substantive information about political candidates. Furthermore, survey and experimental research indicates that individuals acquire information from political advertisements. A controversy remains over which types of ads are most likely to instill knowledge among the electorate.

This dissertation examines memory differences for Positive, Negative, and Comparison political TV ads. It differs from previous research in a number of respects. First, comparison ads are included as a separate political ad type category, rather than being neglected entirely or subsumed into the larger category of negative ads. Second, extant political advertising research uses various criteria for defining positive and negative ads. Definitions within and across studies frequently conflate intended and actual emotional responses, which may account for inconsistent empirical results.

This dissertation proposes that Negative Ads and Comparison Ads should lead to greater Memory relative to Positive Ads, according to the negativity bias (Hypothesis 1 and 2, respectively). However, recognizing that humans are motivated information
processors, this dissertation tests for moderating effects between and among variables (in particular, Ad Type, Ad Sponsor, and Partisanship) that may generate divergent emotional responses to the same messages (Research Question 1). Third, some researchers have suggested that emotional arousal (rather than valence) drives information processing and memory. This dissertation examines whether the effect of Ad Type (independent or moderated) on Memory remains when emotional arousal is controlled statistically (Research Question 2).

Fourth, the measure of political knowledge used here tests for associations between candidates and issues in participants’ memory. By examining memory linkages between candidates and issues, this measure captures a critical and fundamental aspect of knowledge, and also focuses on information that citizens may find most relevant in evaluating political candidates. Lastly, this dissertation uses encephalography (EEG) recordings to study information processing of ad messages. Neurological activity in the gamma band frequency range (36-44 Hz) is suggested as indexing semantic processing, a basic component of knowledge formation. Gamma band power is proposed as a mediator between ad exposure and memory (Hypothesis 3).

Results indicated no main effect of Political Ad Type on Memory for issues presented in political TV ads. Memory for Positive Ads was not statistically different from memory for Negative Ads or Comparison Ads (H1 and H2 not supported). Results indicated a statistically significant interaction between Ad Type and Partisanship (RQ1). Compared to Positive Ads, Negative Ads led to a decrease in memory among Republicans (statistically significant conditional effect), whereas Negative Ads led to an
increase in memory among Democrats (marginally significant conditional effect). This interaction effect remained when emotional arousal was controlled in analyses (RQ2). Although no evidence was found to support a mediating role of Gamma (H3 not supported), results showed a statistically significant independent effect of Gamma on Memory.
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Fields of Study

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Chapter 1: Political Ads, a Defining Characteristic of Campaigns

Political Ad Ubiquity

Political advertisements pervade the campaign landscape, their omnipresence and distinction unmistakable during election season. Everywhere constituents turn, an avalanche of political ads waits to envelope them. Catchy slogans and confidently smiling candidates appear next to newspaper articles. The reassuring voices of confident candidates sail over radio waves. Crisp colors, vivid graphics, and patriotic symbols project from television screens as candidates provide concise summaries of their past accomplishments and future goals. Fliers, posters, billboards, brochures, and bumper stickers convey candidates’ names and slogans, and candidates’ websites provide digital versions of promotional paraphernalia and campaign propaganda (Kaid & Postelnice, 2005).

1 Campaign funds and ads buys are not evenly distributed across the country. Advertising volume is driven in large part by the competitiveness of an election, such that citizens may be “exposed to strikingly different campaigns,” (Goldstein & Freedman, 2002b). During the 2000 campaign, fewer than 2,000 ads were aired in cities such as Oklahoma City and Baltimore. On the other hand, cities with competitive presidential and congressional races attracted tens of thousands. Ads aired numbered 25,939 in Spokane, 32,456 in Detroit, and 24,987 in Philadelphia (Goldstein & Freedman, 2002b). However, although residents of Florida and Ohio will see a slew of presidential ads, while residents of Texas and California will see virtually none, political advertising occurs for races at all levels of government. Almost all citizens will see some advertisements for a local or state race. For instance, in 1996, “Los Angeles was the most heavily targeted market in the entire country,” (Goldstein & Freedman, 2002a, p. 725).
Ad bombardment is, of course, no accident. Candidates, political parties, political action groups, and other organizations spend exorbitant sums of money to ensure citizens are inundated with campaign messages promoting (or undermining) candidates, their policies, competencies, and characters. Of the $4.5 billion spent on political media during the midterm elections of 2010, 69.5 percent was devoted to advertising (Bachman, 2010).

Television advertising holds a particularly prestigious position in political campaign culture. Following the first televised political commercial aired in a 1950 state election campaign and the subsequent use of ad spots by Dwight D. Eisenhower in the 1952 presidential campaign, political TV ads quickly evolved and proliferated (Kaid, Haynes, & Rand, 1996, Kaid & Johnston, 2001). Today, TV ads easily win the battle of preferred political advertising medium. Spending on political TV advertisements comprised the largest components of campaign expenditures in the U.S. House and Senate campaigns (Ansolabehere & Gerber, 1994; Fritz & Morris, 1992). In the 2010 elections, political TV ads drew over three-fourths of total political ad expenditures ($2.3 billion) (Bachman, 2010).

Political advertising trends illustrate increasing ad buys and ad expenditures over the years. During the 1996 campaign, 162,160 TV ads aimed at the presidential campaign and 106,438 geared toward 34 Senate races were aired in the top 75 media markets in the United States (Goldstein & Freedman, 2000; Goldstein & Freedman, 2002a, 2002b). From 1998 to 2000, the number of ads for U.S. House and Senate races increased from 293,942 to 477,190 (Krasno & Goldstein, 2002). In the 2000 election, 970,410 TV ads were aired in the nation’s top 75 media markets (P. Freedman, Franz, & Goldstein, 2004).
In 2004 and 2008, between June 5 and Election Day there were over 1.5 and 1.6 million general presidential campaign ads, respectively, aired across all 210 media markets (Franz & Ridout, 2010). Between 1998 and 2000, the amount of money spent on ads for U.S. Congressional races nearly doubled (Krasno & Goldstein, 2002). Spending on TV ads in the 2000 elections totaled $771 million, increased to nearly $1 billion in 2002, and jumped to $1.6 billion in 2002 (Franz & Ridout, 2007; Memmott & Drinkard, 2004). In the 2008 elections, over $1.1 billion was spent to air 2.1 million TV ads (Wisconsin Advertising Project). In the 2010 elections, interest groups alone spent $110 million on TV ads for U.S. Congressional races in the 60 days leading up to the elections (Franz, 2010).

**Indirect Ad Exposure**

Exposure to political commercials during TV program breaks is not the only way through which individuals become privy to the content of ad spots. Other forms of campaign communication may also focus attention on political ads. Politicians criticize their competitors’ ads or defend their own ads, with quotes printed and clips played in the news. In their coverage of political advertisements, the news media often replay parts of or entire TV ads for illustrative effect. One of the most well-known political TV ads of all time is the infamous “Daisy Girl” ad from Lyndon B. Johnson’s campaign against Barry Goldwater in the 1964 presidential election (West, 1993, p. 65). During an NBC show on September 7, 1964, this ad was broadcast for its first and only time (Kaid & Johnston, 2001). However, repeated airings by the news media assured prolific viewing.
News media and journalists may attempt to provide substantive commentary on and critiques of political ads. However, by replaying ads in full-screen view during news broadcasts, news shows may simply provide candidates with free coverage of a candidate-controlled message. After watching an ad critique, viewers might remember the ad without recollection of the reporter’s commentary (Jamieson, 1992). In “adwatches,” an ad may be replayed in a smaller screen in the background. Reporters critique or provide additional context to ad claims, frequently interrupting the commercial to illustrate misleading claims (Cappella & Jamieson, 1994).

Ad spots can also be viewed online, through sites such as The Living Room Candidate or YouTube. Comments on political ads made by politicians, pundits, or laypeople appear on blogs and social networking sites. Research also indicates that an increasing number of political ads in a local media market corresponded with increased interpersonal political discussion (Cho, 2008), suggesting that political ad spots may spark political conversations among the electorate.

Ad Infamy

Perhaps because they are such a dominant force in political campaign culture, political TV ads are often met with disdain, disgust, condemnation, and contempt. This view is clearly adopted by advertising practitioner and guru David Ogilvy, who described political ads as “the most deceptive, misleading, unfair and untruthful of all advertising” (cited in Zhao & Chaffee, 1995, p. 42). Ad vilification is most apparent when it comes to political TV commercials. In *Television and political advertising*, Boiney and Paletz (1991) suggest, “There is concern that ads can and do ignore or trivialize serious issues,
helping instead to create or at least facilitate the election of candidates who are more fantasy than substance. At their worst, the ads are alleged to seduce the public and to rape democracy” (p. 11).

From a more optimistic perspective, political ads may be viewed as an integral component of our democratic system. Campaign ads are geared to influence the outcome of Election Day. In a representative democracy, the government is accountable to the people, and the people are responsible for electing officials into public office. The competition to win over the electorate is at the heart and soul of the democratic procedure, and political advertisements meant to inform and persuade the voters is a critical component of this process.

Scholars have exerted significant effort to explore how political ads influence individuals and society. Political advertising effects can be grouped into three predominant categories. First, researchers have devoted considerable attention to the topic of effectiveness (i.e., persuasive influence) of political ads. Although the ultimate goal of ads is to influence behavior (i.e., checking a box next to the candidate’s name at the voting polls), many studies and models of persuasive political ad effects explicitly or implicitly presume attitudinal persuasion precedes behavior. Second, researchers have become increasing interested in political effects that are unintentional but potentially deleterious for democracy, such as voter demobilization and cynicism. The third category of empirical research on political ad effects, dwarfed by studies on persuasive and participatory effects, focuses on the potential of ads to enhance political knowledge among the electorate. In the study of political ad effects, researchers often focus on how
different ad characteristics influence political outcomes. There are two main typologies used to categorize political ads. Advertisements may be classified as issue or image ads, and as positive or negative ads.
Chapter 2: Issue and Image Ads

Categorizing Issue and Image Ads

Political ads are often described as either image- or issue-oriented. The term image may refer to ads that literally feature a candidate’s image, meaning physical appearance in “graphic representation” (Shyles, 1984, p. 406). More generally, however, image ads refer to political ads that emphasize a candidate’s personality traits or personal characteristics. Researchers have described image ads as those that emphasize “perceived or projected cluster of personality traits,” (Shyles, p. 406) or “stress the candidate’s characteristics, personality, human qualities, etc.” (Kaid & Johnston, 1991, p. 56).

The basic elements of issue ads, on the other hand, include where candidates’ stand on various contemporary public affairs issues, past voting records, or candidates’ specific plans or remedies for issues of public concern. The substance of issue ads deal with “specific policy stands, policies tied to concerns of citizenry, topics and concerns linked to the national interest, statements of candidate positions on policy issues, or preferences on issues or problems of public concern” (Johnston & Kaid, 2002, p. 282).

The predominant concern in the “image-issue controversy” (Shyles, 1984, p. 406) is that by emphasizing a candidate’s personality characteristics, citizens may ultimately end up voting for a candidate who seems likeable, confident, strong, or competent. Issue ads, on the other hand, provide voters with substantive information. By learning what
problems candidates believe are important to tackle, the outcomes the candidates perceive as optimal, and even perhaps a general plan of action to achieve these goals, citizens can compare candidates’ belief systems against their own and vote for the candidate who will best represent their interests.

One reason for the concern about the content of political advertising as being either issue or image focused is based on the democratic belief that to make rational decisions, a voting public must be able to consider the candidates’ stands on the campaign issues. Critics of televised political ads argue that ads are filled with image construction, not issue discussion, and that televised political ads, averaging 30 seconds each, are not an appropriate forum for discussion of complex campaign issues. (Johnston & Kaid, 2002, p. 282)

The pernicious nature of political issue ads may be exaggerated, if not inaccurate. First, the logic underlying the illegitimacy of issue ads is not above reproach. Perhaps voting for an ambitious, loyal, hard-working, and responsible candidate is not tantamount to an ill-formed vote choice. As Shyles (1984) notes, some individuals “have evaluated positively the image content of political spots, arguing that the presentation of candidate image material can be more important than the presentation of campaign issues,” (p. 406). Character traits may not be illegitimate factors in determining vote choice. Still, most would agree it is desirable that political advertisements convey the issues candidates perceive as important, where they stand on these issues, and how they will approach these problems.

**Categorization Challenges**

Classifying political ad information as strictly issue- or image-based may be more challenging than it appears. Should a vague reference to concern about the economy count as a policy statement? Should the ability to work in a bi-partisan manner to pass
legislation be considered a personality trait? Similarly, one might ask, “In image ads, are comments about the candidate’s personality equivalent to comments about his or her abilities? Should both kinds of information be labeled image advertising?” (Thorson, Christ, & Caywood, 1991, p. 467, italics original). Furthermore, personality traits, such as honesty or integrity, may themselves become substantive issues during campaign season (Johnston & Kaid, 2002).

Personality traits are also difficult to separate from policy statements because an explicitly stated or implicitly insinuated trait may be, by definition, based on policy stances. The concept of personality does not have one unanimously agreed upon definition. However, trait models are perhaps the most commonly known and applied (Bouchard & Loehlin, 2001). According to these approaches, personality refers to stable—although not immutable—individual traits, which reflect and explain complex patterns of behavior across different contexts (Allport, 1937; Funder, 1992).

Characterizing a candidate as a “flip-flopper” might be construed as a personality-oriented statement (i.e., indicating a candidate is indecisive, wish-washy, weak), but the definition of this trait is based on a candidate’s proclivity to switch positions on matters of public policy. More generally, even when a personality trait is not based fundamentally on policy stances, discussing issue stances may imply something about an individual’s personality. For instance, supporting Medicare might suggest that a candidate is empathetic, compassionate, and caring. Additionally, emphasizing a candidate’s personal traits might insinuate a particular issue position. For instance, being
straight-laced or prudish might suggest a candidate is unlikely to support lowering the legal drinking age.

Furthermore, political ads often contain a mix of personality- and policy-related statements. Research indicates that issue ads are more common among political TV spots (Joslyn, 1980; Kaid & Johnston, 2001; Patterson & McClure, 1976; West, 1993). In one of the earlier content analyses of political TV ads, Joslyn (1980) examined 156 political ads from presidential, gubernatorial, and congressional campaigns. Results illustrated that 79.6 percent of ads mentioned issues, whereas 44.9 percent discussed candidate qualities. In a more recent analysis, Johnston and Kaid (2002) examined the content of 1,213 political TV ads for general presidential election campaigns from 1952 to 2000. Coders identified the “dominant” content of each advertisement as being either issue-oriented (concerns about issues, vague policy reference, or specific policy statement) or based on candidates’ personal characteristics. Nearly two-thirds of the ads (65 percent) were issue ads, whereas 35 percent were predominantly image-based. More interesting, however, was the substantial cross-fertilization between the two types of ads. Thirty-four percent of issue ads included a reference to personality characteristics, and 39 percent of image ads mentioned candidates’ issue concerns, leading the authors to suggest that “it may, in fact, be a false dichotomy to argue that issue ads are exclusively issue oriented and image ads are exclusively image oriented,” (p. Johnston & Kaid, 2002, p. 288).

On the other hand, Johnston and Kaid (2002) did find that some “stylistic elements” varied between ads that were predominantly oriented toward issues or images. The dominant appeal of image ads was source credibility (54 percent), emphasizing the
trustworthiness of a candidate, whereas emotional appeals (44 percent), or those that “attempt to use language and imagery in order to evoke certain feelings” (p. 288), were the predominant strategy in issue ads. The dominant speaker in issue ads was the candidate (45 percent), whereas an anonymous announcer was most common in image ads (45 percent). Image ads often assumed a testimonial format (26 percent), in which a citizen or public figure endorsed the candidate, whereas issue ads often used introspection formats (25 percent), in which the candidate shared his/her “campaign vision and issue concerns” (Johnston & Kaid, p. 291). More issue than image ads used slow motion (16 and 7 percent, respectively), whereas still frames were more common in image than issue ads (47 and 30 percent, respectively). Music was more likely to be included in image (46 percent) than issue (41 percent) ads. Perhaps most interesting, negative and positive political ads were not evenly distributed across issue and image ads. Seventy percent of image ads but only 56 percent of issue ads were positive.
Chapter 3: Positive, Negative, and Comparison Political Ads

Overview of Topics to Address

This brings us to the second major distinction used to classify political ads\(^2\), whether ads are positive, negative, or comparison. The potential effects of positive and negative ads have generated substantial media attention, scholarly research, and general buzz. Just as scholars have struggled over what, exactly, defines an issue versus an image ad, precise and consistent definitions of positive and negative ads also prove elusive.

Five issues will be addressed in the literature review below on positive, negative, and comparison ads. First, and most importantly, is the issue of how positive and negative ads are defined conceptually and operationally. A second issue that plagues the literature is the terminology used to define these ad types. In particular, some researchers have argued that “positive” and “negative” are misleading labels, carrying connotations that do not necessarily reflect the ads within these categories. A third issue is whether comparison ads, which include components of both positive and negative ads, are deserving of their own separate category. After reviewing the literature on these types of political advertisements, the definitions of positive, negative, and comparison ads used in

\(^2\) Distinctions between positive versus negative and issue versus image ads are not the only ad characteristics that have been studied. Other ad features of interest to scholars include the civility or incivility or the message, or the relevance of the information (Brooks & Geer, 2007; Fridkin & Kenney, 2008; Kahn & Kenny, 1999; Mutz & Reeves, 2005). However, research on these other characteristics pales in comparison to studies distinguishing between issue and image, and positive and negative ads.
this dissertation are then articulated. Finally, literature on the distribution of these types of ads is reviewed.

Criteria used to Define Positive and Negative Ads

There are three main criteria used to differentiate negative and positive ads, including (1) the candidate featured in the ad, (2) the objective of the ad (promotional or critical), and (3) the emotion elicited by the ad. Consistency in definitions across these criteria is generally assumed. However, there is reason to suspect that such assumptions are not always valid. In particular, the emotions that ad designers and campaign strategists hope an ad will generate (the ad objective), are not necessarily the emotions that will actually be elicited among viewers upon exposure to the ad. Discrepant definitions of ad types, which may variously focus on intended or evoked emotions, may be one reason for inconsistent empirical results on memory effects for positive and negative ads. (This last point is discussed in depth in a later section.)

Candidate featured. The first factor frequently used to identify positive and negative ads is whether a sponsoring or opposed candidate is featured in the ad, respectively. Positive ads focus on a favored, supported, or sponsoring candidate, whereas negative ads focus on the opposed, oppositional, or competing candidate. In positive ads, a sponsored candidate is promoted without “attacking the opponent,” (Newhagen & Reeves, 1991, p. 198). A positive ad “may not tacitly or explicitly mention the opponent” (Gunsch, Brownlow, Haynes, & Mabe, 2000, p. 28).

Negative ads feature an opposed or opposing candidate. A negative ad “identifies the opponent and explicitly refers to either the candidate’s general image or his or her
specific policies” (Basil, Schooler, & Reeves, 1991, p. 247), while “the sponsor’s image is not mentioned,” (Newhagen & Reeves, 1991, p. 198). Negative ads mention “nothing at all about the sponsor’s candidate’s attributes” (Homer & Batra, 1994, p. 164), presenting information “about a competing candidate and no information about the candidate on whose behalf it is run” (Meirick, 2002, p. 50).

Although it is tempting to define negative ads as those that include only information about an opposed candidate and nothing about a supported candidate, this definition is subject to at least one caveat. Campaign finance reform legislation requires that all TV ads, whether positive or negative, include a 5-second disclaimer. These disclaimers reveal the sponsor who paid for the ad, be it a candidate, political party, political action committee, organization, or individual. Thus, if the production and airing of a negative political ad has been paid for by the sponsoring candidate’s own campaign, it must include information about the sponsoring candidate in the disclaimer portion of the ad (e.g., “I’m Barack Obama, and I support this message”).

Excluding information in the disclaimer when defining a positive or negative ad may be a sensible decision. Although technically part of the ad, disclaimers may disrupt the overall flow or narrative of the ad, and thus be perceived as more as an addendum than an integral component of the ad itself. Johnson-Cartee and Copeland (1991) make a similar argument about the analysis of ad tags. “Frequently, the tag appears at an incongruous interruption to the negative ad story line. For this reason, tag lines should be analyzed apart from the thematic story lines that they accompany,” (Johnson-Cartee & Copeland, 1991, p. 49).
Objective: Promotional or critical. The first factor used to define positive ads is whether a supported or opposed candidate is featured in the ad. The second factor used to differentiate positive and negative ads is whether the objective of the ad is to promote and praise or criticize and derogate a candidate. Positive ads are intended to portray the candidate in a favorable light, eliciting positive emotional and cognitive responses. Negative ads are designed to cast an unfavorable light on a candidate, evincing negative emotional and cognitive responses.

Positive political ads “promote a candidate’s favorable personal attributes or issue positions,” while negative ads discuss a candidate’s image and issue positions “with the goal of creating a negative impression,” (Basil et al., 1991, p. 247). “Positive ads promote the personal characteristics of the sponsoring candidate in attempt [sic] to convince people that the candidate has strong leadership abilities and other favorable qualities,” whereas negative ads “are intended to make the opposing candidate look bad by attacking personal characteristics, political issues, or affiliated party” (Gunsch et al., 2000, p. 28).

In what Newhagen and Reeves (1991) call true negative, or attack ads, “an effort is made to diminish the image of the opponent through an outright attack,” (p. 198), whereas in hope or positive ads, “the sponsor is promoted as the solution to some problem or issue, such as drug abuse or inflation,” (p. 198). In a slight variation of this theme, Fridkin and Kenny (2004) describe negative and positive ads as those including or lacking discussion of risks, respectively. In negative messages, political candidates or their sponsors “identify, discuss, and debate the risks associated with electing their opponents,” whereas in positive messages, candidates “discuss the positive aspects of
Emotion elicited. The first two criteria used to define positive and negative political ads emphasize which candidate is featured in an ad and the objective of the ad. Much of the literature reviewed above comes from survey research. Some experimental research also uses these first two criteria to define political ads. For instance, one experiment used ads from real candidates running in two different 1986 Senate races (Breaux vs. Moore in Louisiana, Andrew vs. Conrad in North Dakota) (Basil, Schooler, & Reeves, 1991). Two judges classified the ads as positive or negative. Negative ads were those that named the opponent and “attacked the opponent on position, lying, or running an unfair campaign,” (p. 252).

More generally in experimental research, and particularly for operational definitions, positive and negative political advertisements are defined as ads that elicit positive and negative emotions, respectively. Below, definitions from five experimental studies on effects of positive and negative political TV ads are reviewed. Four of these studies use operational definitions that focus on what emotions were elicited by individuals viewing the ads. The fifth study supposedly studies effects of support (i.e., positive) and attack (i.e., negative) ads, but the operational definitions seem to more accurately describe positive and comparison ads (the latter of which is described in a later section).

Hitchon and Chang (1995) examined how candidate gender influenced memory for information presented in negative, positive, and neutral ads. Conceptual definitions of
ad types are not clearly articulated. Operational definitions emphasize the emotional appeals used in the ads as well as the objective of the ad. Real political commercials were selected from the University of Oklahoma Political Commercial Archive. An archivist was asked to select positive, negative, and neutral ads for both male and female candidates from gubernatorial races. “A negative tone was conveyed by ads that attacked the political opponent in a critical, aggressive manner; positive ads were upbeat and heartwarming; neutral ads promoted the candidate in a straightforward, informational way,” (p. 438).

S. D. Bradley et al. (2007) examined how negative political ads affect physiological responses and memory. In the selection of experimental stimuli, 28 30-second political TV spots from the 2000 general election presidential campaign between Al Gore and George Bush were recorded. In a pre-test of experimental stimuli, participants rated the ads according to “how each ad made them feel” (p. 119). Participants rated the ads using two seven-point semantic differential scales (extremely positive/not at all positive, extremely negative/not at all negative). The positive and negative ratings were almost perfectly inversely correlated. Negativity ratings were used to select 18 ads, including 6 positive (M = 3.09), 6 moderate (M = 3.71), and 6 negative ads (M = 5.70). The middle category is referred to as “moderate” rather than “neutral” because the ads “are not neutral in the sense of the word that is usually used for neutral television content, such as a boring lecture on a benign topic,” (p. 119). Conceptual definitions of positive and negative and ads also focus on evoked emotional responses. “For this study, negative ads are ads that elicited negative feelings among viewers, and
positive ads where *sic* those that elicited positive feelings,” (S. D. Bradley et al., 2007, p. 119).

A study by A. Lang (1991) also emphasized elicited emotion in selection of ad stimuli. The study examined how emotion and formal features of 30-second political TV ads influenced memory. Conceptual definitions of positive and negative ads were not provided. Experimental stimuli were selected from an initial pool of 172 political TV ads. Two coders judged the emotional content of each ad according to “whether the ads were intended to be emotional and how emotional the ads made them feel” (p. 228). Coders also coded for the presence of structural features related to emotion (music, emotional words, symbols). Based on these evaluations, the four most positive and four most negative ads were included as experimental stimuli.

Newhagen and Reeves (1991) explored how emotion influenced memory for 30-second TV ads. Conceptual definitions emphasized the objective of the ad. Negative ads attack opponents “using a variety of accusations and innuendos about issue positions or personal character,” and positive ads promote the sponsor “as the solution to some problem or issue,” (p. 198). Operational definitions, however, emphasized the emotion elicited by ads. In a pre-test, participants watched 34 political advertisements from the 1988 election, including 29 from the presidential race between Bush and Dukakis and 5 from Senate races. Participants rated each commercial according to “what emotions they thought the commercials evoked,” (p. 204). After viewing each commercial, participants rated each ad on four 6-point scales indicating positive and negative emotions, including hope, disgust, fear, and anger. Mean values for each ad were calculated separately for the
first and second half of the ads. Those that received negative ratings for both the first and second half were categorized as negative, those receiving positive ratings for both halves were labeled positive, and those with negative ratings in the first half and positive ratings in the second half were labeled as comparative.\(^3\)

Thorson et al. (1991) examined how support and attack ads, orientation toward issues or images, presence of background music, and visuals showing the candidate in family or professional settings influenced memory, attitudes toward candidates, and candidate evaluations. Conceptual definitions of support and attack ads were not provided, except to note that the researchers focused on “ads that directly attacked the opponent” (p. 469). To create experimental stimuli, four variables were manipulated. Ads were either positive or negative, and either emphasized candidate issues or images.

Four “generic scripts” (p. 472) were created and applied to four candidates. Support, issue-oriented scripts focused on four of the candidate’s issue positions,  

\(^3\) In addition to providing discrepant conceptual and operational definitions, the above descriptions seem at odds with information reported elsewhere. For instance, the authors include a table with a brief description of each of the 28 ads selected for the experiment, including the title of the ad (e.g., California environment), the sponsor of the ad (e.g., Bush), the emotion ratings for the first and second half of the ad using plus and minus signs (e.g., – –), and a summary of the content of the ad (e.g., “Attack on Dukakis environmental record”) (Newhagen & Reeves, 1991, p. 206, Table 7.1). Relying on these indicators and the descriptions of ad categories given above, the final 28 stimuli included 19 negative ads, 7 positive ads, and 2 comparison ads. However, in the analyses section, the authors report that there were “6 commercials classified as positive, 12 as true negative, and 7 as comparative.” Not only does this not conform to the category count based on emotional ratings provided in the table, but this second count only adds up to 25 total stimulus ads, while the table provides descriptions of 28 ads. Furthermore, in the analyses, the researchers exclude 6 negative ads and 1 comparison ad “to achieve a balanced design of 6 commercials per type” (p. 208). How ads were chosen for exclusion is not discussed. Thus, the description of the stimuli, how they were classified, and how they are used in analyses are somewhat unclear.
including “supporting broad-based family programs, favoring programs to ensure job security, favoring state water rights, and favoring comprehensive health care for all ages,” whereas attack, issue-oriented scripts emphasized three issues the sponsoring candidate supported that the opposing candidate did not, including “rights for the elderly, state economic growth, and greater school funding,” (p. 472). Support, image-oriented scripts featured four positive candidate qualities, including “working hard for the great people of the state, being a dedicated family man, being a law-abiding citizen, and being someone whom people can believe and trust and who reflects their values,” whereas attack, image-oriented scripts discussed positive characteristics of the candidate, including “intelligent, compassionate, family man, trustworthy,” and negative qualities of the opposing candidate, including “has cheated the people of the state, lies to his constituency, and has been deceptive about his personal life,” (p. 472-3). Although the authors label these ads as support and attack ads, the descriptions seem to more aptly characterize support and comparison ads (the latter of which is discussed in further detail later).

**Definitional discrepancies or redundant criteria?** As reviewed above, there are three main criteria used to differentiate between positive and negative political advertisements. Positive ads may be defined as those that (1) focus on a sponsoring or supported candidate; (2) promote a candidate by providing information about that candidate’s attributes and issue positions in an attempt to create a favorable impression; or (3) elicit positive emotions. Negative ads may be defined as those that (1) focus on an opposing, competing, or targeted candidate; (2) criticize, derogate, or disparage a
candidate by providing information about the candidate’s qualities and issue stances in an attempt to create an unfavorable impression; or (3) elicit negative emotions.

The first two distinctions tend to be redundant in political ads. Ads that feature a sponsoring candidate generally have the objective of promoting that candidate, whereas ads that feature an opposing candidate generally have the objective of criticizing that candidate. It would be unusual for an ad to present a favored candidate in a derogatory manner, or an opposing candidate in an overly complimentary manner. The third criterion, however, is not necessarily overlapping with the first two. Research consistently shows that humans are biased and motivated information processors. Myriad factors may contribute to whether information that is intended to promote a candidate and create favorable impressions actually elicits positive emotional responses, and whether information intended to derogate a candidate and create unfavorable impressions actually elicits negative emotional reactions. Studies tend to assume that the three criteria defined above are redundant. This neglect of intended versus induced emotion, which may account for discrepant results in the literature on the effects of positive and negative advertising, is discussed in much further detail in a later section.

Terminology

Positive and negative: Familiar but misleading terms? Journalists, political pundits, politicians, and scholars frequently refer to “negative ads” and “positive ads,”

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4 Although the practice of airing a negative ad criticizing a favored candidate would be unusual, it is not entirely implausible. A refutation or rebuttal ad might reiterate arguments attacking a favored candidate by an opposing campaign and then counter-argue or attempt to falsify these claims. However, the focus of such an ad is still on challenging these accusations and emphasizing the praiseworthy characteristics and policies of the supported candidate.
and these concepts are likely familiar to citizens. Despite the popularity of these concepts, some researchers have argued for the application of different labels to these ads types. Specifically, some researchers have argued that these terms are misleading and insinuate an unintended meaning. In reality, a negative ad (defined as an ad criticizing an opposing candidate) might include information that fairly and justly critiques an opponent, citing factual and legitimate information about a candidate’s past voting record, identifying a lack of political experience, or discussing shortcomings in character.

The term negative, however, might have an implicit connotation, such that negative ads are expected to include faulty, inaccurate, and misleading statements about traits or behaviors irrelevant to the campaign at stake (Bartels et al., 1998).

Imprecise use of the word “negative” is problematic because it combines types of discourse that are actually distinct. The standard use of “negative” in reference to ads also assumes that any attack is illegitimate, when, instead, attack-based differentiation is an important way to determine that one candidate is better qualified than others. Finally, “negative” implies that attack ads are more deceptive than ads that simply make a case for a candidate when, it should be noted, the level of inaccuracy in advocacy ads is usually higher. (Jamieson, 2000, p. 99)

**Alternative labels.** Instead of using labels of negative and positive, researchers may refer to promotion, support, or advocacy ads, on the one hand, and attack ads, on the other. Despite differences in terminology, definitions of attack and promotion/advocacy ads are typically identical to definitions provided for negative and positive ads, respectively. Interestingly, many studies that use the terms promotion and attack neglect to provide conceptual definitions of these ad categories (e.g., Christ, Thorson, & Caywood, 1994; Finkle & Geer, 1998; Geer & Geer, 2003; Goldstein & Freedman, 2002b; Thorson et al., 1991). However, operational definitions of attack and promotion
ads also tend to conform to the conceptual definitions of positive and negative ads reviewed above.

The Campaign Media Analysis Group (CMAG) collects data on televised political ads. Their data comprises the most comprehensive contemporary collection of televised political advertisements. CMAG uses satellite tracking technology to monitor political advertising on the national broadcast networks (ABC, CBS, NBC, and Fox), the top 25 national cable networks (e.g., CNN, TNT, ESPN, CBS), and the country’s top 75 media markets. For each political ad aired, a storyboard is created. The storyboard includes the full audio transcription of the ad as well as video frame snapshots taken every four seconds. From the storyboards provided by CMAG, ads in this extensive collection are coded as attack or promotion. The coding instructions used to classify political TV ads are shown below.

In your judgment, is the primary purpose of the ad to promote a specific candidate (“In his distinguished career, Senator Jones has brought millions of dollars home. We need Senators Jones”), to attack a candidate (“In his long years in Washington, Senator Jones has raised your taxes over and over. We can't afford 6 more years of Jones,”) or to contrast the candidates (“While Senator Jones has been raising your taxes, Representative Smith has been cutting them”). (Holman & McLoughlin, 2001, p. 99; Krasno & Seltz, 2000, p. 193, *italics added*)

Data from CMAG have been used extensively in survey research on political advertising (Fowler & Ridout, 2010; Franz, Freedman, Goldstein, & Ridout, 2008; Franz & Ridout, 2007, 2010; P. Freedman, Franz, & Goldstein, 2004; P. Freedman & Goldstein, 1999; Goldstein & Freedman, 2000, 2002a, 2002b; Goldstein & Ridout, 2004; Krasno & Goldstein, 2002; Krasno & Green, 2008). Nearly identical coding schemes for attack and promotion/positive have been used elsewhere (Fridkin & Kenney, 2004).
Researchers also use operational definitions of positive and negative ads that are consistent with operational definitions of promotion and attack ads, respectively. Below is a description of the coding instructions used to classify ads from the 1996 elections as positive or negative.

A negative ad may concentrate on impugning the character of the opposing candidate (by focusing on greediness, a checkered personal life, or lack of ethics), or may criticize the position on an issue favored by the opponent (by asserting, for example, that the opponent does not care about the environment). Positive ads focus on the sponsoring candidate's record or on campaign issues, never mention a specific opponent, and usually feature the sponsoring candidate in person. (Gunsch et al., 2000, p. 31).

**Solving or exacerbating the problem?** To summarize the terminology issue, some researchers have advocated for a change in terminology from positive and negative ads to promotion/advocacy and attack ads. The literature shows some consistency in definitions across these labels. The suggested change in terminology is meant to clarify the nature of the information presented in these types of political ads. In particular, some researchers propose that by avoiding the label “negative,” the perhaps inaccurate assumption that these types of ads contain illegitimate, inflammatory, or immoral information is also avoided.

However, if the word “negative” carries with it an implicit, if unintended, connotation suggesting a malevolent and malicious nature, it is unclear and an untested assumption that the word “attack” overcomes this problem. Indeed, this latter term brings to mind scathing and unfair aspersions, or an overly aggressive assault against a candidate. As it is presumptive to suppose that attack is a less misleading concept than
negative, and the latter is a more widespread and well-known term, the labels positive and negative will be used in this dissertation.

**Comparison Ads**

**A mix of positive and negative.** Just as political ads may include both image- and issue-oriented content, so too may political ads include both sponsor-promotional and opponent-critical information. That is, some ads are “sponsor-positive/opponent-negative” (Hill, 1989, p. 15), combining elements of both positive and negative ad formats. These ads are often referred to as mixed, comparison, comparative, or contrast ads. “Some political ads may contain elements of both positive and negative ads in order to promote the sponsor while denigrating the target… These comparative or mixed-format ads are designed to hurt the opponent… and to engender positive feelings about the sponsor,” (Gunsch et al., 2000, p. 28).

**Conceptually: To integrate or separate?** There is general agreement that comparison ads try to bolster perceptions of the supported candidate while depressing evaluations of the opposing candidate. However, the placement of comparison ads relative to positive and negative ads is less certain. Some consider comparative ads as a subtype of negative ads (Johnson-Cartee & Copeland, 1991; Pinkleton, 1997). Others define negative ads as a variation of comparative ads (Merritt, 1984). Still others remain agnostic as to whether comparison and negative is the superordinate category. Rather, researchers may ask whether comparison advertising and negative advertising can be reasonably differentiated (Meirick, 2002) or whether comparison ads are deserving of their own category (Kaid & Johnston, 2001).
Regardless of which category subsumes which, negative and comparison ads are often grouped together, distinguished from positive ads. The reason for this practice relates to the previously mentioned distinction between ads that focus on a supported or opposed candidate. In an oft cited quote, Merritt (1984) suggests that comparison ads mention the competitor “for the purpose of claiming superiority,” while negative ads focus on the competitor “for the purpose of imputing inferiority” (p. 27). According to Merritt, negative ads should be considered a particular form of comparison advertising because both negative and comparison ads identify the opposing candidate, but negative ads need not identify the sponsor. Indeed, some researchers group negative and comparison ads together because both forms mention the opposing candidate and/or include information intended to denigrate that candidate (Hill, 1989; Jamieson, 2000; Merritt, 1984; Pinkleton, 1997). However, by this same logic, one could just as easily claim that comparison and positive ads should be grouped together because both include statements intended to promote a supported candidate.

Other researchers suggest that comparison ads might be considered a form of negative advertising because of inherent bias or prejudice. Johnson-Cartee and Copeland (1991) argue that comparison ads are truly negative because “the candidate (party or PAC) who sponsors the ad controls the content of the ad, and as such, it is virtually guaranteed that the opposition’s record or policy positions will not be presented in an impartial manner” (Johnson-Cartee & Copeland, 1991, p. 43). However, the criterion of impartiality again seems to lack the capacity to distinguish negative and comparison from positive advertisements. All political ads are in fact political, meaning they are
strategically designed to produce a particular outcome, in this case, persuasion. Thus, one might suspect that positive ads also fail to paint an unbiased portrait of candidates. Indeed, recall that Jamieson (2000) found that levels of inaccuracy were higher in advocacy/positive relative to attack/negative ads.

Finally, some researchers argue that negative and comparison ads might be profitably grouped together because they have similar effects. “In general, we have argued that it is most fruitful to combine ‘pure negative’ and ‘contrast’ ads into a single category… We think combining pure negative and contrast ads into one category makes particular sense when one is making causal inferences about the impact of an ad” (Franz et al., 2008, p. 265). The corollary of this statement would suggest that negative and comparison ads represent separate and distinct categories if they evoke different rather than similar responses. “If these two types of ads prompt different types of thoughts, it would be logical to conclude that they are, in fact, different,” (Meirick, 2002, p. 49). The question of combining or separating negative and comparison ads according to similar or divergent effects, however, reveals no obvious answer, as some research finds that comparison ads function similarly to negative ads (Hill, 1989), and other research indicates that the effects of comparison ads and negative ads differ (Franz et al., 2008; Krasno & Green, 2008).

**Operationally: Other third category labels.** In addition to positive/promotion and negative/attack categories, coding instructions for CMAG data include a separate category for comparison ads. “In your judgment, is the primary purpose of the ad to… contrast the candidates (“While Senator Jones has been raising your taxes, Representative
Smith has been cutting them”,” (Holman & McLoughlin, 2001, p. 99; Krasno & Seltz, 2000, p. 193).

Some survey researchers have included three separate ad code categories, but do not label the third category (defined as ads with a minor emphasis on negativity) as comparison (Kahn & Kenney, 1999). Others have avoided a third category of comparison ads by using the ratio of positive and negative appeals to categorize ads as positive or negative in advertising tone (Finkel & Geer, 1998). Still others forego the comparison category by coding the main emphasis of ads as either advocacy or attack (Kaid & Johnston, 1991, 2001). “A spot that contained some positive and some negative information was classified according to the dominant aspect of the spot” (Kaid & Johnston, 2001, p. 109, italics original). Another approach calculates an attack score for each ad, calculated by dividing the number of words in the ad related to criticisms of a candidate by the total number of words in the ad (Jamieson, 2000). Still others include codes for all three categories, but combine negative and contrast ads in analyses (Franz et al., 2008).

Researchers have also created comparison ad stimuli for use in experimental designs. Hill (1989) created advocacy, attack, and comparison print ads for both major party candidates in the 1988 presidential election. To ensure the ads were matched for complexity and content, the statements criticizing a candidate were the same in the attack and comparison versions, and the promotion statements were the same in the advocacy and comparison versions. A similar approach was used by Pinkleton (1997), who developed ads about fictitious candidates ostensibly running for a state senate seat. The
“least negative” stimulus included six statements about a candidate’s issue positions or personal qualities, pre-tested for their perceived desirability for political candidates. The “most negative” stimuli included the same six positions of the sponsoring candidate along with six opposition positions held by the targeted candidate. The “moderately negative” stimuli included the six desirable sponsoring candidate statements and four opposite positions held by the opposing candidate.

S. D. Bradley et al.’s (2007) study included a category of “moderate” political ads. However, these ads were chosen based on their moderate emotional valence ratings compared to positive and negative ad stimuli, and thus are unlikely to be comparison in the sense that they provide informational content about both candidates. In A. Lang’s (1991) study, coders judged political ads based on “whether the ads were intended to be emotional and how emotional the ads made them feel,” (p. 228). Although it is unclear if comparison ads may have been included, ads receiving the most negative and positive ratings were selected for experimental stimuli. As comparison ads are likely to receive both positive and negative ratings, averaged across the ad this would likely produce a “neutral” emotional response, and thus were probably not included in the study.

Newhagen and Reeves (1991) included a separate category of comparison ads. Hitchon and Chang (1995) included a category of neutral ads, described as promoting “the candidate in a straightforward, informational way,” (p. 438). Based on this

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5 The term “neutral” used in this sense is a misnomer. Messages that elicit both positive and negative emotions should more aptly be characterized as mixed-message formats rather than neutral.

6 However, as described earlier, there are discrepancies in discussion of how these ads were selected and used in analyses, making the results difficult to interpret.
description, it does not appear that comparison ads were included. Thorson et al. (1991) proposed to examine differences in positive and negative ads. However (as described earlier), the descriptions of the scripts created by the researchers suggest that the ads categorized as “negative” were in fact comparison (because they included information about two candidates rather than just an opposing candidate).

**Ad Types as Defined by Present Study**

In this dissertation, positive and negative ads are defined as ads *intended* to present positive and negative information and instill positive and negative responses, rather than ads that actually elicit positive and negative emotional reactions. Ultimately, this perspective is not “right” while the other “wrong.” The emphasis on intended rather than evoked emotion is preferred here because focusing on the objective of the message rather than the viewer response allows researchers to address and examine what components, combinations, and complexities of *communication* create reactions (including emotional responses) among message consumers. On the other hand, defining and operationalizing message types according to what responses they *produce* deprives researchers of the challenge of discovering what aspects and facets of messages generate these emotional responses, and how these emotional responses subsequently drive information processing and various message effects.

Defined here, positive political candidate ads are ads intended to gain or secure votes for a sponsor or supported candidate by promoting that candidate’s positive personal qualities, describing his/her background and experience, and associating him/her with particular issues in an attempt to create positive feelings toward the candidate (or
less negative feelings than those toward the opponent). Positive ads provide information in an attempt to place a candidate in a favorable light, emphasizing his or her normatively desirable traits and issue positions. These ads attempt to paint a picture of a candidate as competent, conscientious, moral, trustworthy, likable, charismatic, and a skillful and effective leader. Positive ads may provide information highlighting abstract issues for which a candidate stands and/or specific policies, proposals, past actions, and voting behavior demonstrating the candidate’s motivation and ability to attain desired objectives. The intended tone of positive ads is complimentary, approving, and praising.

Negative political candidate ads intend to gain or secure votes for a sponsor or supported candidate by criticizing the opposing or targeted candidate’s negative personal qualities, describing his/her background and (lack of) experience, and associating him/her with particular issues in an attempt to instill or reinforce negative feelings toward the targeted candidate. Negative ads provide information that attempts to criticize a candidate, emphasizing faults and shortcomings in the candidate’s personal character and/or policy stances. Negative ads indicate that a candidate is unfit for elected office, illustrating that his/her past personal behavior, issue stances, and voting record amount to an undesirable leader. Negative ads highlight unappealing stances a candidate has taken or offensive legislation the candidate has supported. These ads attempt to paint a picture of a candidate as incompetent, immoral, threatening, and untrustworthy. The intended tone of negative ads is derisive, derogatory, condemning, and critical.

Comparison ads combine the elements of negative and positive ads. Comparison ads juxtapose a candidate’s issue stances and character traits against another candidate’s
policy preferences and personality, in attempt to present the opposed candidate in an unfavorable light and the supported or sponsoring candidate in a favorable light. The intention of comparison ads is to demonstrate the ills and harms caused by an opposed candidate and the deleterious consequences of electing that candidate into office, and then describing the benefits to be derived by electing the supported candidate.

**Distribution of Ad Types**

The types of ads that are produced and broadcast depend on a number of factors. Using CMAG data, Goldstein and Freedman (2002b) examined the tone, timing, and sponsorship of advertising in the 2000 election. Results revealed that less than half (46 percent) of campaign election ads were positive, while 29 percent were negative, and 25 percent were contrast (i.e., comparison). These numbers, however, do not coincide with those reported by Johnston and Kaid (2002), in which 70 percent of image ads and 56 percent of issue ads were positive. “So, although both types of ads were more frequently positive than negative, there were more issue ads than image ads that denigrated the opponent,” (Johnston & Kaid, 2002, p. 286).

A number of factors could be responsible for these results. For instance, the analysis by Johnston and Kaid (2002) does not include a category for comparison ad spots and only examines presidential ads. However, the difference in results between these two studies is most likely attributable to whether one is interested in the political ads that have been *produced*, versus those that have been *aired*. For instance, Goldstein and Freedman (2002b) found that ads produced by or for the Bush campaign were mostly positive (43 percent), followed by negative (30 percent), and lastly comparison (27 percent).
percent). However, when considering the ads that were actually aired on television, there were a comparable number of negative and contrast spots (40 percent), and a much lower percentage of positive ads (20 percent). In addition to discrepancies within and across studies in the definition of positive and negative ads, the different measures of “exposure” to these ads may also account for divergent empirical results (discussed in more detail below) on political ad effects. For a more thorough discussion on analyses and potentially various results based on political ads produced versus aired, refer to one of the many publications by P. Freedman, Goldstein, Franz, Ridout, or other authors involved in the Wisconsin Advertising Project (most of these studies are listed above in the description of CMAG data).

When considering ads aired, Goldstein and Freedman (2002b) found that most ads by the candidate’s own campaign were positive (55 percent), followed by comparison ads (29 percent), and negative ads (16 percent). Political parties and interest groups were much more likely to favor negative ads. Nearly half of party ads were negative (45 percent), and interest group ads were overwhelmingly negative (72 percent). The competitiveness of electoral races also influences advertising tone. In competitive Senate races (identified using Cook Political Report), there were a rather even mix of positive (35 percent), negative (31 percent), and comparison (34 percent) TV spots aired. In Senate races which were defined as noncompetitive, most ads were positive (64 percent), followed by negative (20 percent), and contrast (11 percent).
Chapter 4: Political Ad Effects

Three Categories of Ad Effects

Substantial attention has been devoted to understanding the effects political advertisements on the electorate. Studies on the effects of positive and negative political ads can be grouped into three broad categories, including (1) persuasive influence, (2) participation and political engagement, and (3) memory and knowledge. The ultimate intention of political ads is to persuade the electorate, behaviorally and presumably attitudinally. Researchers have also been devoting increased attention to exploring unintentional, and potentially detrimental, consequences of political ads. This group of ad effects includes studies of depressed voter turnout and cynicism toward political leaders, institutions, and processes. Finally, researchers have studied how political ads impact learning, knowledge, and memory. This last topic has received much less attention than the first two.

Whether focusing on persuasion, participation, or knowledge, the empirical research on negative and positive political ad effects reveals mixed findings. These discordant results are likely caused by inconsistent conceptual and operational definitions of positive and negative ads, which may refer to the objective of the ad or the emotions elicited by ads, and also perhaps by inconsistent definitions of exposure (particularly in survey research).
Persuasion

The overarching objective of political advertising is persuasion. Researchers interested in persuasive effects of political ads examine actual election results, intended vote choice, and individuals’ attitudes, feelings, and thoughts about candidates. Although some research has examined how the negativity of a campaign corresponds to actual election results (e.g., Tinkham & Weaver-Lariscy, 1991), studies more frequently focus on affect or evaluations of ad sponsors and targets.

Some research indicates that negative ads lead to negative affect, depressed evaluations, or decreased liking toward the sponsoring candidate (Hitchon & Chang, 1995; Houston, Doan, & Roskos-Ewoldsen, 1999; Kahn & Geer, 1994; Thorson et al., 1991), the targeted candidate (Ansolabehere, Iyengar, & Valentino, 1994; Kaid & Boydston, 1987), or both candidates (Basil, Schooler, & Reeves, 1991; Houson & Doan, 1999; Kaid, 1997; Merritt, 1984; Pinkleton, 1997, 1998; Shapiro & Rieger, 1992; Shen & Wu, 2002; Weaver-Lariscy & Tinkham, 1999). Other research finds that negative ads hurt the sponsoring candidate while increasing liking of the targeted candidate (Haddock & Zanna, 1997; Hill, 1989; Martinez & Delegal, 1990). Still other research indicates that negative compared to positive ads may increase liking for the sponsoring candidate (Brader, 2005). Research also suggests that comparison advertising can avoid the backlash effect of negative political ads while still lowering evaluations of the targeted candidate (Pinkleton, 1997). Beyond affect and evaluations of candidates, scholars have also studied the impact of positive and negative ads on thoughts about the candidates.
(Chang, 2001) and vote choice intention (Ansolabehere & Iyengar, 1995; Shapiro & Rieger, 1992).

Political candidates, consultants, and strategists consider political ads successful when the sponsoring candidate wins the election and is voted into office, which generally entails receiving more votes on Election Day than the opposing candidate. This objective may be achieved by various attitudinal and behavioral responses to ads. First, the attitudes of the sponsoring candidates’ supporters may be reinforced or strengthened, leading these individuals to vote for the candidate at the polls. Second, indifferent or undecided voters may develop an affinity for the sponsoring candidate and demonstrate support at the polls. Third, initial supporters of the opposing candidate may change allegiances and vote for the sponsor at the polls. Lastly, initial supporters of the opposing candidate may become discouraged and refrain from going to the voting polls altogether. This last option (i.e., winning by default) is certainly not the most desirable outcome according to the standards of participatory democracy. In a representative democracy, participation lies at the heart of the political system.

**Participation**

Democracy implies responsiveness by governing elites to the needs and preferences of the citizenry. More than that, it implies equal responsiveness; in the democratic ideal, elected officials should give equal consideration to the needs and preferences of all citizens. This equal consideration is embodied most clearly in the principle of one person, one vote. (Verba, 1996, p. 1).

Although voting is the most “important act of political participation in any democracy,” (Aldrich, 1993, p. 246), the percentage of eligible voters who cast ballots on Election Day in the United States is far lower than in other industrialized democratic
nations (Powell, 1986). When political ads discourage voters from turning out on Election Day, this strategy may be advantageous for particular candidates, but unhealthy for democracy overall. Furthermore, political ads may not only lead the intended audience from abstaining from the polls (i.e., supporters of an opposing candidate), but may depress turnout among the electorate as a whole. Critics point to political advertisements, particularly negative ads, as a potentially demobilizing force. “We would even go so far as to say that negative advertisements may pose a serious antidemocratic threat,” (Ansolabehere & Iyengar, 1995, p. 9).

Despite the overwhelming research devoted to this subject, a definitive answer to whether ads demobilize the electorate is not easily offered. Some research indicates that negative advertising does indeed lead to depressed voter turnout (Ansolabehere & Iyengar, 1995; Asolabehere, Iyengar, Simon, & Valentino, 1994; Houston, Doan, & Roskos-Ewoldsen, 1999; Kaid, Chanslor, & Hovind, 1992; Lemert, Wanta, & Lee, 1999). However, other researchers have found that negative ads are unrelated to vote turnout (Garramone et al., 1990; Leshner & Thorson, 2000; Thorson, Ognianova, Coyle, & Denton, 2000). Still other scholars propose that negativity actually stimulates voting and increases turnout at the polls (Brader, 2005; Clinton & Lapinski, 2004; Djupe & Peterson, 2002; Finkel & Geer, 1998; P. Freedman & Goldstein, 1999; Geer & Lau, 2006; Kahn & Kenney, 2004; Pinkleton & Garramone, 1992; Wattenberg & Brians, 1999). The reasons for these divergent findings are myriad and complex.

To be sure, the evidence linking negative campaigning with turnout is, like the arguments themselves, contradictory and depends on the research setting (laboratory experiments or actual campaigns), on the types of data (responses to surveys or aggregate election returns), on the campaign setting (presidential or
subpresidential), and on the sources of the negative messages (candidates’ commercials or media summaries of the campaign). (Kahn & Kenney, 1999, p. 887)

A detailed discussion of conflicting findings on the effects of negative ads on political participation will not be provided here, as political participation is not the main emphasis of this dissertation. However, many of the methodological and analytical decisions that have helped produce these varying results have contributed to divergent findings elsewhere, and these will be discussed later.

Just as interesting as whether political ads demobilize the electorate is how and why this might occur. Ansolabehere and Iyengar (1995), whose seminal work demonstrating the depressive effect of negative ads on turnout initially generated much of the debate and research on this topic, argue that demobilization could be the result of at least three causes. First, negative ads might convince attacked candidates’ original supporters that the candidate is no longer worthy of their vote. Second, negative ads could generate negative affect and evaluations of both candidates, leading voters to stay home on Election Day. Third, negative ads could engender antipathy toward and alienation from the political system more generally. “Negative advertising may affect voting intent by conveying cues not about the candidates but about the nature of political campaigns and the political influence of ordinary citizens. Perhaps the act of attacking another candidate in a 30-second advertisement denigrates the entire process,” (Ansolabehere et al., 1994, p. 835).

Scholars have explored the relationship between negative political advertising and cynicism or trust in government (Brader, 2005; Geer, 2006; Leshner & Thorson, 2000;
Martinez & Delegal, 1990), Pinkleton, Um, & Austin, 2002; Thorson et al., 2000), internal and external political efficacy (Ansolabehere & Iyengar, 1995; Brader, 2005; P. Freedman & Goldstein, 1999; Pinkleton et al., 2002; Wattenberg & Brians, 1996), and interest in political campaigns (Brader, 2005; Pinkleton & Garramone, 1992).

**Knowledge**

Somewhere between intended (e.g., purposive persuasion) and inadvertent (e.g., voter mobilization/demobilization) political advertising effects is the promotion of political knowledge among the electorate. Although the potential for political ads to stimulate knowledge gain has not escaped the notice of scholars, this relationship has been neglected relative to the impressive bodies of research on persuasive and participatory effects. “Over the last several decades the information needs of the American citizen have been subsidized by an important but overlooked source: the thirty-second television campaign advertisement,” (P. Freedman et al., 2004, p. 723). Given the critical role of an informed citizenry in democratic theory, combined with the massive body of empirical evidence illustrating the low levels of political knowledge characterizing the public, the potential for ads to stimulate knowledge is worthy of much further consideration.
Chapter 5: Political Knowledge

An Informed Public: A Boon for Democracy

In many formulations of democracy, an informed citizenry is a key ingredient. Dewey (1927) and Lippmann (1922) are two of the more oft-cited theorists espousing this perspective, although “theorists of democracy from Aristotle to Bryce have stressed that democracies are maintained by active citizen participation in civic affairs, by a high level of information about public affairs, and by a widespread sense of civic responsibility,” (Almond & Verba, 1963, p. 10). Political knowledge is a key means of empowerment for the people, and an informed public lends legitimacy to the political system (Almond & Verba, 1963; Delli Carpini & Keeter, 1994; Donohue, Olien, & Tichenor, 1987).

Unfortunately for democracy, a vast body of empirical research spanning many years time has overwhelmingly and consistently revealed the citizenry to be unaware, unknowledgeable, uninterested, and otherwise disengaged from the world of politics (Kinder & Sanders, 1985; Neuman, 1986).

The democratic citizen is expected to be interested and… to be well informed about political affairs. He is supposed to know what the issues are, what their history is, what the relevant facts are, what alternatives are proposed, what the party stands for, what the likely consequences are. By such standards the voter falls short. (Berelson, Lazarsfeld, & McPhee, 1954, p. 308)
How much political knowledge, exactly, is required for a functioning democracy is by no means a resolved issue. Althaus (2006) provides a thought-provoking critique of why an “ill-informed” public (p. 10) is not the downfall of democracy, and questions whether any classical theorists really ever expected or desired that citizens be all-knowing political participants. However, even those who suggest that citizens need not be particularly aware, engaged, or interested for democracy to flourish, would probably agree that more knowledge is better than less. Although democracy need not require every citizen to be informed about all things political, knowledge is still important. “It is clear that polities benefit when political knowledge is high and evenly distributed. Many shortcomings and inefficiencies in political systems could be remedied if ordinary citizens were more attentive to public affairs and, as a consequence, more aware of their political interests,” (Althaus, p. 10).

What is Political Knowledge?

In addition to a lack of consensus over how much knowledge citizens should possess to contribute to an effective democracy, researchers have also pondered over the meaning of the concept of political knowledge. Political sophistication, expertise, and knowledge are elusive concepts over which scholars have ruminated and debated for many years. Unanimous consensus over the meaning and measurement of concepts such as political awareness, knowledge, and sophistication is unlikely, as “one researcher's sophistication is another's simplistic thinking,” (Neuman, 1981, p. 1236-7).

**Three integral and interrelated components of knowledge.** In the conceptualization of knowledge or sophistication, political or otherwise, there are three
main factors to consider. It is important to keep in mind that these factors are intimately connected with one another, and thus, the boundaries are not always easy to define. The first factor pertains to an individual’s possession of internal or cognitive representations of concepts. The more “idea units” of information an individual has, the more knowledge we might consider her to possess. The second factor includes the structure or organization of this information. The most basic level includes simple associations between and among the information bits, idea units, or concepts that comprise the first factor of knowledge. The more numerous and stronger connections that exist among stored concepts, the more complex an individual’s internal knowledge network. Beyond simple one-to-one associations between and among concepts, cognitive organizational structures may entail a more complex structuring of knowledge or information. This would include, for instance, if and how concepts are categorized, classified, or hierarchically organized. The third factor of knowledge, perhaps more aptly termed as expertise or sophistication, pertains to how previously stored information is used to comprehend and interpret new information, or how individuals use prior information to make decisions, judgments, and evaluations.

**Semantic knowledge networks.** The first two factors are explicitly addressed in semantic knowledge or memory network models. In these models, concepts are stored as nodes within a network, connected by links that vary in strength (Bower, 1981; Collins & Loftus, 1975). For instance, Obama may be a concept node stored in memory. The Obama node would be linked to other concept nodes, such as “President of the United
States,” “former Senator of Illinois,” “health care reform,” “Gulf oil spill,” “African-American,” and “Libya.”

In a similar model, the adaptive control of thought (ACT) theory (J. R. Anderson, 1976, 1983) suggests that concepts reside in nodes, and links indicate relations. Conceptual nodes are organized or connected in memory through propositions, or the smallest units of meaning for which truth or falsehood may be proclaimed. “Obama is the president of the United States” is a proposition. The agent, “Obama,” is linked to the relation, “is president,” as well as to the relation “passed health care reform,” “is an African-American,” etc.

**Knowledge structure density.** The importance of political concepts and how they are linked together is accounted for in Eveland and colleagues’ (Eveland, Marton, & Seo, 2004) concept of knowledge structure density (KSD). KSD is proposed as an operational measure of the integration of political information. KSD measures the density of an individual’s political knowledge structure, or the number and strength of connections that an individual makes across various political concepts. More numerous and stronger connections correspond to a more dense or more sophisticated political knowledge network.

KSD is measured by asking individuals to indicate whether, and to what extent, various concepts are related to one another. For instance, participants might be asked to indicate how strongly each of the following concepts are related to one another: environmental protection, international relations, gasoline prices, tax cuts, George W. Bush, Alan Greenspan, energy production, stock market, unemployment, and the Kyoto
treaty (Eveland et al., 2004, p. 96). Dichotomous and valued measures of density can then be calculated from this information.

**Knowing the facts.** For some scholars, political knowledge is best represented as the retention of factual political information. “A common conclusion in an increasing number of studies is that factual knowledge is the best single indicator of sophistication and its related concepts of ‘expertise,’ ‘awareness,’ ‘political engagement,’ and even ‘media exposure’” (Delli Carpini & Keeter, 1993, p. 1180). A straightforward, well-known, and widely employed measure of factual political knowledge is the five-item national political knowledge index devised by Delli Carpini and Keeter (1993).

The five items comprising the index, shown to have high reliability and validity, ascertain respondents’ awareness of current affairs and basic civics knowledge. More specifically, respondents are asked to identify the current vice president, the branch of government responsible for determining the constitutionality of a law, the percentage of U.S. Senate and House votes needed to override a presidential veto, the party with the current majority in the U.S. House, and which of the two major parties is more conservative. Retention of this type of political information could also be placed in a framework of semantic or knowledge memory networks. That is, knowing that Joe Biden is the U.S. Vice President would be described as possessing cognitive representations of the concept “Joe Biden” and “Vice President” and an association between these two concepts.

**Organizational structures and the use of information.** Other conceptualizations of political knowledge emphasize the information an individual has
acquired and how that information is cognitively organized, but more complex knowledge structures entail more than an increasing number of simple linkages between and among concepts.

**Political sophistication.** Neuman (1981) explored the concept of political sophistication through in-depth interviews. In these hour-long interviews, respondents discussed a variety of issues, including the economy, education, crime, and race relations. Detailed analysis of the interview transcripts led Neuman to identify two dimensions of political thinking, conceptual differentiation and conceptual integration. Differentiation refers to the ability to differentiate among “various political issues, actors, and events” (p. 1237), whereas integration refers to the organization of these differentiated elements through the use of abstract constructs, such as ideology. Each interview was coded for the number of different references to political issues, government bodies or institutions, political groups, constituencies, and political figures. The total number of references comprised the operationalization of conceptual differentiation. Conceptual integration was operationalized similar to Converse’s (1964) typology (described further below). Coders made overall assessments of each interview according to “the predominant pattern by which respondents organized, linked, contrasted, or put in context” (Neuman, 1981, p. 1248) the differentiated conceptual units.

The “information bits” described above could easily be translated into memory or knowledge nodes. However, the operational measure of conceptual integration includes, but is also more complex than, simple associations between concepts. Rather, conceptual integration involves a higher-order classification system and/or hierarchical organization
of concepts. Additionally, Neuman’s definition of political knowledge focuses on the third factor of knowledge, that is, the application of this information in concurrent thinking. In fact, Neuman (1981) suggests that conceptual differentiation may be aptly characterized as “knowledge-in-use” (p. 1241).

**Integrative complexity.** Similarly, the concept of integrative complexity (Suedfeld & Tetlock, 1977) is purported to measure sophistication of information processing rather than prior information storage, per se. In integrative complexity, differentiation refers to recognition of various dimensions or characteristics of a stimulus, whereas integration indicates the complexity of connections made between these differentiated pieces of information.

An integrated complexity coding scheme can be applied to almost any verbal text but has been used most extensively to study the political sophistication of political leaders. Although political sophistication is generally studied as an individual difference variable, situations or message contexts may also influence memory for and use of information. The concept of integrative complexity was proposed to emphasize the role of environment in information processing complexity. “The term ‘integrative complexity’ will be used to distinguish between the dependent variable of information processing in this approach and the more traditional measures of conceptual complexity as a personality characteristic,” (Suedfelt & Tetlock, 1977, p. 176).

**Belief system constraint.** A review of literature on political sophistication would be remiss to overlook Converse’s (1964/2006) seminal work on ideological or belief system constraint. Belief system constraint suggests that by knowing an individual’s
opinion on a particular issue, one should be able to infer that individual’s opinions on a vast array of other issues. “If a person is opposed to the expansion of Social Security, he is probably a conservative and is probably opposed as well to any nationalization of private industries, federal aid to education, sharply progressive income taxation, and so forth,” (Converse, 1964/2006, p. 3).

Converse’s empirical work demonstrated that while constraint characterized the belief systems of the political elites, it was noticeably absent among the mass public. The mass public was represented by a national sample of the electorate, whereas the elite sample included Congressional candidates for the 1958 mid-term elections. Converse noted that the same results would be expected “if the elite sample had been a set of newspaper editors, political writers, or any other group that takes an interest in politics,” (p. 30).

Both samples of survey respondents provided opinions on a variety of domestic (employment, aid to education, federal housing) and foreign (military aid, isolationism) issues. Constraint was measured using inter-item correlation coefficients. Stronger associations were demonstrated among the elite compared to the general electorate sample. Longitudinal data also showed that attitudes of the mass public exhibited remarkable instability over time. Converse’s work is largely a critique of claims that changes in mass voting (e.g., election of Dwight Eisenhower to replace Harry Truman) indicate ideological shifts among the public (from liberal to conservative). However, his work is often touted as an early illustration of the woefully ignorant electorate.
Like Neuman’s (1981) work (in fact, as mentioned above, Neuman’s operational definition of conceptual integration is based on the levels of belief system constraint proposed by Converse), Converse’s work on political knowledge/system constraint/sophistication seems to entail more than simple representation of concepts and links between them. We could, perhaps, place this model into the more simplistic semantic network model. For instance, “liberal” and “conservative” might be two nodes, and liberal and conservative issue stances might be separate nodes linked to each ideological node. More likely, however, the possession of a belief system, as defined by Converse, suggests a more complex hierarchy or classification of information. Additionally, belief system constraint presumably focuses on using rules from belief system knowledge (e.g., fundamental values, priorities of liberals and conservatives) in the application of specific issues (e.g., who supports social welfare programs).

**Connections among components.** In reviewing theories of political knowledge and models of semantic knowledge or memory, is clear that there are three predominant components to knowledge, including (1) knowledge bits, concepts, and items; (2) associations between and among concepts and larger cognitive organizational structures; and (3) the use of previously acquired knowledge and information in concurrent thinking. Common to integrated and differentiated political knowledge (Neuman, 1981), knowledge structure density, and integrative complexity (Suedfeld & Tetlock, 1977; Tetlock, 1985) is the argument that the definition and measurement of political knowledge, sophistication, or expertise need not only account for an individual’s awareness of particular bits of information, but also how those information bits are
organized or connected to one another. The last factor (use of acquired knowledge) may be labeled more appropriately as complexity or sophistication in thinking, although previously stored information and the structure of that information are paramount to this process.

**Where are the boundaries of nodes, and what’s inside?** The first two factors are also, of course, intimately intertwined. One cannot have a cognitive structure without first possessing something to be structured. Models proposing knowledge as a function of idea units and associations between and among these items provide a useful conceptual model for understanding memory and the storage of knowledge. However, they suffer from an important limitation. A pervasive obstacle these conceptualizations and models face is what, exactly, comprises an information unit from which associations are made? What, exactly, constitutes the “idea-elements,” (Converse, 1964, p. 3) “discrete elements” (Neuman, p. 1236), “nodes of human memory” (Eveland et al., 2004, p. 87), and “characteristics or dimensions of stimuli” (Suedfeldt & Tetlock, 1977, p. 171), among which more and stronger associations represent enhanced political sophistication?

As proposed in many of the models reviewed, the information presumed to reside in the concept nodes provides a useful heuristic for understanding memory and knowledge. In network models of memory “Biden” and “Vice President” might be considered separate conceptual nodes. Similarly, KSD measures the number and strength of connections between concepts, such as “gasoline prices” and “tax cuts.” In conceptual complexity, “a differentiated characteristic may be regarded as an independent attribute perceived by the observer, along which the stimulus can be scaled” (Suedfeldt & Tetlock,
Attributes of Biden (level of competence, sociability, hair color, vice president) might be considered dimensions or nodes, all of which are connected to the concept node “Biden.”

However, how is this concept defined except in relation to all of these other nodes? Is there anything “within” the concept node itself? Additionally, is Biden a higher-order concept defined by these attributes? Or is Vice President the higher order concept, and Biden just one example? For Converse, “idea-elements” include “socialists,” “the working man,” and “the rich” (p. 15), whereas for others, concepts such as “George Bush, Republican, election, and rich person” might represent individual schemas (Kuklinski, Luskin, & Bollard, 1991, p. 1342), which themselves are defined as organized cognitive structures (Fiske & Linville, 1980).

**Chunking.** The difficulty in drawing lines around the boundaries of “concepts” and “idea units” is also illustrated by research on short-term memory and the concept of chunking. In a seminal review paper on short-term memory and storage capacity limits, G. A. Miller (1956) suggested that humans have the capacity to hold in short memory approximately seven items (e.g., digits, letters, words), hence the title of his famous paper “the magical number seven, plus or minus two.” Short-term storage is greatly enhanced by the compression or integration of smaller units of information into chunks. For instance, if the words individuals are asked to remember form a meaningful sentence, memory span can increase to 16 or more words (Baddeley, 2000). However, drawing meaningful distinctions about what comprises an “item” versus a “chunk” is not an easy task.
The contrast of the terms *bit* and *chunk* also serves to highlight the fact that we are not very definite about what constitutes a chunk of information. For example, the memory span of five words that Hayes obtained when each word was drawn at random from a set of 1000 English monosyllables might just as appropriately have been called a memory span of 15 phonemes, since each word had about three phonemes in it. Intuitively, it is clear that the subjects were recalling five words, not 15 phonemes, but the logical distinction is not immediately apparent. We are dealing here with a process of organizing or grouping the input into familiar units or chunks, and a great deal of learning has gone into the formation of these familiar units. (G. A. Miller, 1956, p. 92)
Chapter 6: Political Ads and Knowledge

What Can We Learn from Ads?

Models and theories of knowledge tend to emphasize that individuals have internal representations for information bits, units, or concepts, and these units are connected to form a larger cognitive network structure. However, the exact nature and boundaries of these concept nodes, and how they are combined into larger categories or hierarchies, is an infinitely complex issue. After reviewing conceptual models of memory, semantic knowledge, and various definitions of political knowledge, let us now turn our attention to how political ads have been shown to instill political information among the electorate.

Our ability to explore learning from political ads is, of course, somewhat constrained by our methodology and research questions. While plausible perhaps, it does not seem particularly likely that exposure to campaign ads would increase our grasp of basic civics knowledge, such as the ability to name the three branches of government. In the context of survey research, a reasonable measure of knowledge is recognition or recall of candidates running for offices, candidates’ political ideology, or their stances on various issues. Experimental research, on the other hand, generally examines how various types of political ads influence memory, or recognition or recall of the specific information presented to research participants during experimental sessions.
As described earlier, content analyses indicate that political ads offer voters information about candidates’ personal qualities as well as issue stances. Although the research linking political advertising to knowledge acquisition is scant compared to studies examining persuasive and participatory effects, the former question has not been completely ignored. In reference to negative political advertising in particular, Craig et al. (2005) suggest, “While the literature on negative advertising has expanded exponentially in recent years… relatively little attention has been given to the question of how advertising tone affects campaign learning,” (p. 486).

**Knowledge Gain: Results from Survey Research**

**Campaign spending.** Research indicates that campaign spending (much of which, as discussed above, is devoted to political advertising) can increase political knowledge (Coleman, 2001; Coleman & Manna, 2000; Pattie & Johnston, 2004; Wolak, 2009). Coleman and Manna (2000) examined how campaign spending influences political knowledge based on data from the American National Election Studies (ANES) and the Federal Election Commission (FEC). A number of dependent variables tapping political knowledge were employed, including recall of candidates’ names, awareness that the incumbent was running, willingness to place candidates on a 7-point political ideology scale, certainty about those placements, willingness to place candidates on three specific issue scales, willingness to provide any likes and dislikes of candidates, and accuracy of respondents’ placements of incumbents on the political ideology scale.⁷

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⁷ To measure the last variable, the authors converted the incumbent’s average Americans for Democratic Action (ADA) score into a comparable 7-point scale.
Wolak (2009) explored how campaign spending at the gubernatorial, House, and Senate level influenced recognition and recall of U.S. House candidates, and placement of candidates on ideology scales. Candidate recognition was measured as whether respondents were willing to rate U.S. House candidates on feeling thermometer scales. One measure of recall was based on whether respondents reported that they could name the candidates running in the House race in their district, whereas another gauged whether these responses were correct. Knowledge of candidate ideology was measured by whether respondents indicated the Democratic candidate was more liberal than the Republican candidate. A final measure of knowledge included the number of likes and dislikes mentioned about the two candidates.

**Political ad exposure.** Although the impact of campaign spending on political learning is intriguing, understanding how political ads, in particular, increase political knowledge requires a closer examination of this particular form of political communication. Content analyses of large collections of political ads demonstrate that ads offer factual and substantive information to voters (Jamieson, 1984; West, 2005).

Much of the research examining the effect of political ads on knowledge gain, particularly in comparison to other forms of political communication, rely on survey measures. Similar to all research methodologies, survey research has its strengths and weaknesses. Media and campaign information exposure are notoriously difficult to capture using survey measures. Additionally, measures of learning must focus on rather broad knowledge about candidates rather than specific measures of what was conveyed in
actual political ads to which respondents may have been exposed. Furthermore, cross-sectional survey data limits abilities to make causal inferences.

Acquiring knowledge portrayed in ads. Perhaps the most widely known research on learning from political ads focuses on how political ads measure up to other forms of political communication in instilling political knowledge among the electorate. Most well known in the literature on knowledge gain from political TV ads is Patterson and McClure’s (1976) seminal study. These authors demonstrated that televised political ads facilitated a greater degree of learning than did television news. Exposure to political TV ads increased accuracy in perceptions of candidates’ stances on issues frequently mentioned in campaign ads. “On every single issue emphasized in presidential commercials, persons with high exposure to television advertising showed a greater increase in knowledge than persons with low exposure” (Patterson & McClure, 1976, p. 116-117).

The finding that voters learn more from political ads than news flies in the face of conventional wisdom. Research has examined political knowledge gain from political ads compared to TV news, newspapers, interpersonal political communication, and political debates (Atkin & Herald, 1976; Brians & Wattenberg, 1996; Just et al., 1990; Zhao & Chaffee, 1995). While some research substantiates the superiority of political ads compared to other forms of political communication for knowledge acquisition (Atkin & Herald, 1976; Brians & Wattenberg, 1996), others find a distinct advantage of news over ads (Zhao & Chaffee, 1995).
McClure and Patterson (1974) used a three-wave panel survey to explore how television news and political TV ads influenced learning about candidates’ issues. Measures of media exposure were obtained from television logs completed by the respondents. Respondents who indicated they watched prime-time television programs slightly more than one hour each evening, on average, were categorized as “high exposure” to political ads, and those below this threshold were categorized as “low exposure” to political ads. Similarly, respondents who indicated watching network news at least four nights a week were categorized as “high exposure” to news, and those who fell below this threshold were categorized as “low exposure” to TV news.

Political learning, or what the authors call “voter belief change” (McClure & Patterson, 1974, p. 3) was based on changes in respondents’ perceptions of candidates’ issue stances. In the first and third wave of the survey, respondents were asked how likely each of the two presidential candidates in the 1972 presidential election were to favor particular issue positions. Learning was gauged by measuring the percentage of respondents who changed the direction of their answer in a manner consistent with the information conveyed in the media.

For instance, respondents were asked to locate each candidate on a 7-point semantic differential scale (1 = likely, 7 = unlikely) for a statement such as “George McGovern favors spending less money on the military,” (McClure & Patterson, 1974, p. 15). A campaign ad aired during election season emphasized that McGovern would cut personnel in the Marines, Air Force, and Navy. Learning was measured by subtracting the percentage of respondents whose placement of McGovern on this issue shifted toward
the “unlikely” end of the scale (incorrect) from the percentage of respondents whose answers shifted in the “likely” direction (correct).

Learning among those with high exposure to ads was greater than those with low exposure to ads, while the differences between high and low television news viewers was less apparent. “Exposure to television news affected voter belief change less directly, less consistently, and less strongly than exposure to television advertising” (McClure & Patterson, 1974, p. 21).

Although one of the earliest studies on learning from political advertising, the study by McClure and Patterson has a number of strengths. The authors examined actual information presented in political ads and TV news broadcasts, tailoring measures of knowledge toward candidates’ positions that were discussed in ads and news. The authors also used panel data to examine how respondents’ perceptions of candidates’ stances changed over time. However, using a median split of prime time TV viewing to divide those with high and low exposure to political ads obviously has some limitations. Data collection was also constrained to a stratified sample of voters living in the Syracuse, New York, metropolitan area.

**Knowing candidates’ issue stances.** Brians and Wattenberg (1996) also examined campaign learning from various media sources using survey data. The authors used data from the American National Election Study (ANES), which included both a pre-election and post-election wave. However, questions pertaining to political information from campaign were only ascertained in the first wave. Thus, changes in political knowledge could not be explored. Respondents were asked to report both their frequency of use and
attention to newspapers and TV news. Exposure and attention were combined to create separate measures of TV news watching and newspaper reading. Respondents were also asked whether they could recall seeing any TV ads about the presidential campaign. A dichotomous variable indicated whether individuals had been exposed to political ads.

Knowledge about candidates’ stances on issues was measured using an additive scale ranging from 0 to 8. Respondents were asked to place each of the two major party candidates (George Bush and Bill Clinton) on 7-point scales pertaining to four different issues. For instance, respondents were asked, “Some people believe that we should spend much less money for defense. Others feel that defense spending should be greatly increased. Where would you place George Bush (Bill Clinton) on this scale?” (1 = greatly decrease spending, 7 = greatly increase spending). For this question, a response of 1, 2, or 3 was coded as correct for Clinton, and a response of 3 or 4 was coded as correct for Bush. The total number of correct responses for the two candidates on four issues comprised each respondent’s political knowledge score.

Newspaper reading and TV news watching was positively and significantly related to campaign knowledge. However, the authors argue, “recalling political ads is more significantly associated with knowledge of candidates’ issue positions” (p. 185). The results of Brians and Wattenberg’s (1996) study are certainly interesting. However, cross-sectional data limits inferences of causality. Furthermore, it is unclear whether the ads produced during the election actually corresponded with the measures of candidate knowledge, and recall as a measure of exposure to political ads suffers from a number of limitations.
Who supports whom? Craig et al. (2005) studied media exposure and campaign learning using a three-wave panel study of a sample of voters in southern Florida. Self-reported frequency and attention were combined to form separate measures of newspaper and TV news exposure. Respondents were also asked whether they recalled seeing or hearing any ads about the two gubernatorial candidates (Jeb Bush and Buddy MacKay) on TV or radio, and if so, how much attention they paid to these ads. Responses to the latter were used to form a measure of overall exposure to campaign ads.

Two measures of knowledge were used. Respondents were asked which of the two gubernatorial candidates would support five different issues (think we don’t need any more gun control laws, supports vouchers for students in underperforming schools, wants to guarantee that 40 percent of the state budget goes to education, believes that a woman should have the right to have an abortion in most instances, wants patients to have the right to sue their HMO when they are denied proper care). The correct number of responses for these five issues was used as a measure of issue awareness. An index of group awareness was based on the number of correct responses asking respondents to indicate which candidate five different groups supported (law enforcement, teacher organizations, environmentalists, the Christian Coalition and other religious groups, and tobacco companies). The negative relationship between newspaper exposure and both issue and group knowledge was the only significant relationship between media at Time 1 and knowledge at Time 2.

Pinpointing ad exposure. By combining CMAG data on when ads were aired with individual-level survey data revealing the particular programs and times of day
during which individuals watch television, P. Freedman et al. (2004) developed an unusually sophisticated measure of political TV ad exposure. Exposure to congressional political TV ads was positively related to an individual’s willingness to claim they could recall the candidates running for the U.S. House of Representatives in their district. Importantly, exposure to congressional ads was also positively associated with the accuracy of this name recall. “Thus, exposure to congressional advertising leads people to feel more informed (and therefore more likely to claim to know the candidates running), and to actually be more informed about their House candidates,” (P. Freedman et al., 2004, p. 730, italics original).

Exposure to presidential TV spots was positively related to knowledge about the presidential candidates. The presidential knowledge score relied on questions that asked respondents to place each of the two presidential candidates on eight issues (abortion, gun control, environment vs. jobs, environmental regulation, government spending and services, defense spending, aid to African Americans, and jobs). A correct answer was scored when the respondent placed Al Gore (the Democratic candidate) to the left of George Bush (the Republican candidate).

**Exposure to negative political ads.** Some research suggests that negative political ads may be particularly effective in advancing political knowledge among viewers. In the study by Brians and Wattenberg (1996) described earlier, for those answering in the affirmative to whether they could recall any presidential campaign ads, respondents were subsequently asked what they could remember about any of the ads they had seen. A
dichotomous variable for exposure to negative political advertising captured whether respondents had recalled a specific negative ad.

Models were run again including the negative ad exposure variable. In these models, the influence of newspaper reading and TV watching were no longer significant. “Thus, negative ads—though so often decried as harmful to democracy—may play an important role in promoting knowledge of issues and active use of them in evaluation of presidential candidates,” (p. 184-185). Craig et al. (2005) found that respondents’ perceptions of Bush campaign negativity were positively related to issue knowledge at Time 2 and Time 3, and group knowledge at Time 2. Perceptions of MacKay’s campaign negativity were unrelated to measures of knowledge.

**Learning from Political Ads: A Summary of Survey Research**

Survey research indicates that political advertising, and perhaps negative political advertising in particular, may foster knowledge among the electorate about candidates running for office. Studies have used a variety of measures directly or indirectly gauging exposure to political advertisements, including campaign spending (Coleman, 2001; Coleman & Manna, 2000; Wolak, 2009), approximations of ad viewing based on TV watching habits (Patteron & McClure, 1976), recall of political ads (Brians & Wattenberg), self-reported attention to campaign ads (Craig et al., 2005), and a rather sophisticated measure combining data on political ad airings with survey data on individuals’ media use (P. Freedman et al., 2004).

A variety of political knowledge measures have been employed in these studies, including self-reported ability to recall candidates’ names (Wolak, 2009), correct recall of
candidates’ names (Coleman & Manna, 2001; Wolak, 2009), willingness to place candidates on a political ideology scale (Coleman & Manna, 2001), self-reported certainty of that placement (Coleman & Manna, 2001), accuracy of candidate placements on ideology scales (Coleman & Manna, 2001), locating a Democratic candidate as more liberal on a political ideology scale (Wolak, 2009) or on specific policy issue scales (P. Freedman et al., 2004), identifying candidates’ specific positions on various policy issues (Brians & Wattenberg, 1996; Craig et al., 2005), identifying which candidate is supported by various groups (Craig et al., 2005), the number of listed likes and dislikes about candidates (Coleman & Manna, 2001), and the willingness to rate candidates on feeling thermometers (Wolak, 2009).

These studies have indicated that voters appear to learn about candidates from political advertisements. While insightful, however, survey research suffers a number of limitations when examining what information viewers actually learn from ads. Survey researchers generally have little insight about, and limited ability to control, the ads to which viewers are exposed (the work by those involved in the Wisconsin Advertising Project may be an exception). Because of this, measures of knowledge must remain rough approximations of candidate knowledge viewers might acquire from ads. Referring to their measure of knowledge based on placement of the Democratic presidential candidate to the left (i.e., more liberal) than the Republican candidate on eight issues, P. Freedman et al. (2004) note, “This is admittedly a crude measure of campaign information. Conceivably, candidates could take positions inconsistent with their party
and general ideology. More likely, they may move toward the center and/or seek to blur distinctions with their opponent,” (p. 731).

A closer examination of the exact information individuals learn from political advertisements may be better pursued through experimental research. “Much of the work on political advertising focuses on candidate images and learning about campaign issues… rather than memory or other cognitive responses that are specific to the advertisement,” (Newhagen & Reeves, 1991, p. 199, italics original). In contrast to survey research, experimental studies offer scholars the ability to control the information to which individuals are exposed.

**Remembering Information from Ads: Results from Experimental Research**

**Ads versus other forms of communication.** Experimental studies have also focused on whether political advertisements are more or less effective in advancing political knowledge compared to other forms of political communication. Exploring how political ads fare relative to other avenues of communication is still tricky in experimental research, particularly because presenting the exact same information via different media is a complex task.

Just et al. (1990) used an experiment to examine how debate viewing and ad watching influenced knowledge about political candidates. Participants in the debate viewing condition watched the first half of a debate previously aired on public television, in which the two candidates for a Connecticut congressional race (Bruce Morrison and Lawrence Denardis) discussed issues such as Social Security, Central America, and nuclear arms limitations, among others. Those in the ad watching condition viewed a
situation comedy, with four political ads inserted at appropriately timed commercial breaks. The four ads were produced for Morrison, which featured his position on Social Security, service to his constituents, and a criticism of the opposing candidate’s stance on the MX missile (an intercontinental ballistic missile system).

Three measures were used to assess learning about the candidate. These included recognizing the candidate’s physical appearance, identifying the candidate’s political party affiliation, and indicating where the candidate stood on campaign issues. For each of these dimensions of knowledge, participants were presented with a list of traits and topics and asked to indicate all that applied. Eight topics were discussed in the debate. Morrison’s commercials focused on three topics. Only one ad actually stated his position on an issue (favoring Social Security), and it was a rather uncontroversial issue.

The study found that ad watching and debate viewing had similar effects on recognition of a candidate’s name, physical appearance, political party affiliation, and office for which the candidate was running. Overall, respondents could identify a smaller proportion of issues mentioned in the ads than the debate. However, compared to debate watching, political ad viewing led to a substantially higher likelihood that an individual knew the candidate’s stance on a policy issue (Social Security). “Political advertisements are less ambitious but more successful in conveying candidate information; debates help viewers learn who the candidates are but teach them little information that they can use in deciding how to vote,” (Just et al., p. 120).

**Learning from positive and negative ads.** More common in the experimental research on political ads and knowledge are studies that explore how different types of
political ads, particularly positive and negative ads, differentially impact memory. A number of studies have examined differential effects of positive and negative advertising on memory for information conveyed in political ads. The influence of positive and negative ads on memory has been examined for print ads (Chang, 2001), radio ads (Geer & Geer, 2003; Shapiro & Rieger, 1992), and TV ads (Basil, Schooler, & Reeves, 1991; Brader, 2005; S. D. Bradley et al., 2007; A. Lang, 1991; Newhagen & Reeves, 1991; Thorson et al., 1991). Results from these studies are mixed. While some research shows a memory advantage for negative ads (S. D. Bradley et al., 2007; Chang, 2001; A. Lang, 1991; Newhagen & Reeves, 1991; Shapiro & Rieger, 1992), other research demonstrates an advantage for positive ads (Basil, Schooler, & Reeves, 1991; Kaid, Chanslor, & Hovind, 1992; Thorson et al., 1991), and still other studies find no difference in memory for the two types of ads (Geer & Geer, 2003; Hitchon & Chang, 1995).

In addition to examining whether participants remember information from ads, researchers have also been interested in “incorrect” memories. That is, study participants may indicate they have seen or heard material that was not in fact presented during media exposure. In memory studies using recall measures, incorrect memories may be coded in the analysis of written recall protocols. In recognition studies, researchers may study errors in memories by calculating the percentage of incorrectly identified information.

Although data collected for this dissertation allow for the examination of memory errors (i.e., the recognition memory test includes foils as well as target items), analyses and results focus only on memory accuracy (rather than memory errors). However, in the literature review provided below, when studies emphasize memory errors as well as
accuracy, both types of results are discussed. This is done to further underscore that the literature on the effects of positive and negative political TV on memory is filled with complexities, nuances, and mixed results.

As reviewed earlier, definitions of positive and negative political advertisements generally focus on three the following three criteria: (1) whether a supported/sponsoring or opposed/targeted candidate is featured; (2) whether the objective of the ad is to promote a candidate, instill positive reactions, and boost evaluations of the candidate, or to criticize a candidate, instill negative responses, and lower evaluations of the candidate; and (3) whether the ad elicits positive or negative emotions among message consumers.

As discussed above (and considered more thoroughly later), ads meant to promote a sponsoring candidate will not necessarily elicit positive emotions, and ads intended to derogate an opposing candidate will not necessarily elicit negative emotions. Hence, varying conceptual and operational definitions of positive and negative ads within and across studies could account for some of the divergent empirical results in the political advertising literature. In the studies reviewed below, particular attention is also paid to whether participants’ emotional responses to ad messages were gauged, either in pre-tests as a means to select experimental stimuli or in the focal experiments as manipulation checks. Six studies examining differences in memory for positive and negative ads are reviewed below. The review includes some of the more frequently cited studies on political ads and memory. Furthermore, the selection provides a nice overview of various manipulations, procedures, memory measures, and the inconsistent results found in the literature.
**Negative ads: Increased memory.** A. Lang (1991) studied how emotion and formal features of 30-second political TV ads influenced memory. As reviewed earlier, experimental stimuli were selected from an initial pool of 172 political ads based on coders’ ratings of the emotionality of the ads. Based on these evaluations, the four most positive and four most negative ads were included as experimental stimuli.

Participants watched the political ads in groups of four. All participants viewed the same eight political commercials (four positive, four negative), shown between distractor stimuli (e.g., Wheel of Fortune, World Series, USA Today, Johnny Carson, Rocky and Bullwinkle). Four orders were created. Distractor items appeared in the same position, but the ads were presented in different sequences. Immediately after viewing the ads, participants performed memory measures about the material presented. Emotional responses to the ads from the actual experiment were either not measured or not reported.

Memory measures included free recall, cued recall, and multiple choice recognition tests. In free recall, participants were asked to write everything down that they could remember about the commercials they viewed. In cued recall, participants were shown a list of the candidates in the commercials. If the names of the candidates prompted participants to remember any commercials they had not remembered in the free recall, they were told to write down everything they remembered about those commercials. However, participants were told to *not* include anything else about commercials they had already described in the free recall task.

Two coders examined the data from the free and cued recall, counting the number of visual and verbal ideas recalled. “Visual ideas were defined as any single image
recalled from the commercial or any global visual description of the commercial. Verbal ideas were defined as any single thought including names, states, office the candidate was running for, or global audio descriptions,” (A. Lang, 1991, p. 229).

The multiple-choice recognition test included 12 questions about each commercial. The information from half of these questions came from only the audio portion of the commercial, whereas the other half pertained to information conveyed only through the visual portion of the commercial. For both the audio and visual information questions, three of the questions occurred at the same time (or nearly the same time) as a scene change in the commercial, whereas three questions were about information portrayed at a time not concurrent with a scene change. Two audio and two visual questions were asked about each 10-second segment of each political ad.

For both free recall and multiple-choice questions, results indicated that participants remembered more from negative ads compared to positive ads. The average number of ideas about negative ads from free recall was approximately 1.8, whereas approximately 1.6 ideas were listed for the positive ads. The percentage of correctly answered multiple-choice questions was approximately 57 percent for negative ads and 53 percent for positive ads. Additionally, a significant interaction for free recall and multiple-choice recognition was found between ad type and audio-visual information. Visual memory was enhanced for negative compared to positive commercials, while audio memory was similar for both positive and negative ads.

**Negative ads: More accurate memory and faster responses.** Newhagen and Reeves (1991) explored how different ad types influenced memory for 30-second TV ads
from the 1988 presidential election. As reviewed above, positive, negative, and comparison ads were selected from pre-test emotion ratings about the ads. Those that received negative ratings for both the first and second half of the ad were categorized as negative, those receiving positive ratings for both halves were labeled positive, and ads receiving negative ratings in the first half and positive ratings in the second half were labeled as comparison. All participants saw the same 28 ads. Three stimulus tapes were created. The order of the ads was rotated in blocks to create the three different tapes.

During ad viewing, participants gave continuous “online” ratings of their liking for the ads using a hand held game paddle. Moving the paddle to the left indicated liking the ad, whereas moving the paddle to the right indicated not liking the material being viewed. Although “liking” is not synonymous with elicited emotion, the results may be worth noting as a pseudo-manipulation check. There was a main effect of ad type on the “liking” ratings. For positive ads, liking increased for the first 20 seconds of the ad and then decreased slightly in the last seconds of the ad. The reverse pattern was true for negative ads, with liking decreasing for the first 20 seconds, and then increasingly slightly toward the end of the ad. In comparison ads, liking decreased for the first half of the ad and then increased in the second half. The rating of liking in comparison ads was never as high as the liking ratings in the positive ads and was never as low as liking ratings from the negative ads.

After ad viewing, participants filled out a questionnaire indicating their political party affiliation, attention paid to the presidential election, which candidate they preferred, and demographic information. Participants were then shown another videotape.
that included memory recognition stimuli. Memory measures included dichotomous recognition of video and audio clips presented in the ads. Recognition material was divided into audio and visual segments. Visual recognition included 112 one-second video presentations. Half of these (56) were clips from the ads presented, with one clip from the first half of each message and one clip from the second half of each ad. The other half of the video clips included segments from ads not actually presented to participants. Audio recognition included 28 two-second audio presentations from each commercial. Latency (time to respond) data were also recorded.

Results indicated a main effect of ad type on visual recognition accuracy (percent correctly recognized). Visual recognition accuracy was higher for negative ads (90 percent accuracy for the first half of the message, 91 percent for the second half of the message) compared to comparison ads (83 percent accuracy in the first half, 73 percent in the second half) and positive ads (79 percent accuracy in the first half, 74 percent in the second half).

Responses were also faster for material presented in negative ads. For information presented in the first half of the message, visual recognition latency was 64 milliseconds (ms) faster for negative ads compared to positive and comparison ads. For information presented in the second half of the message, recognition latency was 266 ms faster for negative compared to positive and comparison ads. Latency for positive and comparison commercials was similar, differing by 41 ms for video clips from the first half of the ad, and 31 ms for clips from the second half of the message.
There was also a main effect of ad type on audio recognition accuracy and response latency. Audio recognition accuracy was 84 percent for negative ads, 68 percent for positive ads, and 64 percent for comparison ads. Audio material for negative ads was identified 189 and 142 ms faster than material from positive ads and comparison ads, respectively. Recognition latency for positive and comparative messages differed by 47 msec.

**Negative ads: Greater correct and incorrect recognition.** S. D. Bradley et al. (2007) examined how negative political ads affect physiological responses and memory. As discussed earlier, experimental stimuli were TV spots from the 2000 general presidential election campaign between Al Gore and George Bush. Experimental ad stimuli were selected based on pre-test ratings of negativity. Experimental stimuli included 18 ads, including six positive (M = 3.09), six moderate (M = 3.71), and six negative ads (M = 5.70), with three from each category pertaining to each of the two candidates. Participants in the experimental session viewed 29 ads in total, including an initial practice ad, the 18 experimental ads, and 10 other ads not reported in the analyses. Four different counterbalanced orders were created, such that no more than two ads for any ad category or candidate occurred sequentially. All participants viewed the same 18 experimental ads but in a different order.

The experiment was run in tandem with an experiment using sports clips. Half of the participants watched the political ads first, followed by the sports clips, the recognition questions for the political ads, and the recognition questions about the sports clips. The other half of participants viewed the sports clips first, followed by political ad
viewing, sports clips questions, and political ad questions. After viewing each ad, participants rated the emotional content of the ad using two seven-point semantic differential scales (from extremely positive/not at all positive and extremely negative/not at all negative). The results of the emotional response ratings were not reported in the study.

S. D. Bradley et al.’s (2007) study used dichotomous recognition measures. Participants were presented with paraphrased verbal material from the ads. For instance, participants were shown statements such as, “A narrator said that ‘As a politician, Al Gore helped in attempting to solve the impending danger of global warming’ in one of the ads you saw,” (S. D. Bradley et al., 2007, p. 120). Participants were asked to indicate whether they had or had not seen that material in an ad.

Results indicated that negative ads led to better memory than moderate or positive ads. No difference in memory was found for positive or moderate ads. “Thus, as one would expect from the effectiveness of negative ads, these participants had better discrimination for information from the negative ads.” (S. D. Bradley et al., 2007, p. 123). However, while negative ads led to better memory compared to moderate and positive ads, negative ads also prompted more incorrect recognition of ad information. “Thus, participants were not only more sensitive to information in negative ads, but they also required less mental evidence to claim that they had seen a statement in a negative or moderate ad,” (S. D. Bradley et al., 2007, p. 123).

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8 S. D. Bradley et al. (2007) used signal detection theory to examine memory sensitivity and criterion bias in recognition of information presented in negative and positive ads. Signal detection will not be used in analyses here, and thus is not addressed in the body.
Negative ads: No difference in memory but more errors. Hitchon and Chang (1995) examined how candidate gender influenced memory for information presented in negative, positive, and neutral ads. As reviewed earlier, an archivist selected the TV ads used in the experiment. The archivist was asked to select positive, negative, and neutral political ads for both male and female candidates from the same gubernatorial race.

Six orders of six political ads were created. Five “filler” ads were placed between target political ads. To prevent serial position effects, filler ads were included at the beginning and at the end of the tape. Filler ad order was randomized across the orders. Counterbalancing of the six target ads was used, such that an ad was never located in the same position, nor came before or after the same ad. All respondents viewed the same 11 ads, including six target ads and five filler ads, but ads were presented in different orders. After ad viewing, participants completed memory measures.

Participants rated each ad on six 7-point bipolar scales to assess message tone (emotional/unemotional, happy/sad, warm/cold, fearful/not fearful, full of feeling/empty of feeling, entertained/not entertained). A summary measure of these items revealed that positive ads were rated significantly more positive (M = 4.63) than neutral ads (M = 4.44), and negative ads were perceived as more negative (M = 3.43) than neutral ads.

Hitchon and Chang (1995) used free recall to assess memory of candidate’s names. Participants were then prompted with each candidate’s name and asked to write
down everything they could remember about the ad and any thoughts and feelings they had about each of the ads. Two coders coded the written responses. Coding categories included mentions of the candidate’s physical appearance (e.g., “she wore a lot of make-up”), family (e.g., “he danced with his wife”), campaign activities (e.g., “candidate shaking hands with constituents”), attacks/mudslinging (e.g., “attacking his/her opponent,”) and issues (e.g., “legalization of marijuana, property tax rates, renovation of historic buildings”) (p. 440).

There was no main effect of ad type on total recall (sum of recall across all content categories). However, there were differences for the specific coded dimensions of memory. Positive ads resulted in the greatest number of memories about campaign activities. There were more memories about candidate appearance in neutral ads than positive and negative ads. Positive ads elicited more memories for family. Issue recall was greatest in neutral ads, followed by positive ads, and lastly negative ads.

Hitchon and Chang (1995) examined memory errors using cued recall. Recall that participants were first asked to freely recall candidate’s names. Subsequently, participants were asked to write down what they remembered about the ads. Incorrect memories were counted as “attributing the content of an ad to the wrong candidate,” (p. 443). Negative ads produced more recall errors than positive and neutral ads.

**Positive ads: Greater memory.** Basil, Schooler, and Reeves (1991) examined the influence of positive and negative political TV ads and the context of ad viewing (positive or negative ad preceding target ad) on memory. As described earlier, two judges classified ads produced by real candidates running in two different 1986 Senate races
(Breaux vs. Moore in Louisiana, Andrew vs. Conrad in North Dakota). Negative ads were defined as those that named the opponent and “attacked the opponent on position, lying, or running an unfair campaign,” (p. 252).

The 24 experimental ads included three positive and three negative for each of four candidates in each of the two “campaigns” for Andrews/Conrad and Breaux/Moore). Six different tapes were created. Each participant viewed a total of 12 ads, six ads from each campaign and three for each candidate. All ads for each candidate seen by a participant were either positive or negative, and ads alternated between candidates. Thus, all participants saw both positive and negative ads, and viewed ads in positive or negative contexts (defined as whether the preceding ad was positive or negative). However, the messages participants saw varied. The order of the campaigns, the order of the candidates, and the order of the ads for each candidate (and within each valence category) were counterbalanced in a Latin square design.

Participants first watched two practice ads from the 1988 presidential election, one for Bush and one for Dukakis. After watching each ad, the participants were asked toward which candidate the ad made them lean. After the practice trials, participants watched the first campaign of six ads. After each ad, respondents indicated which candidate the ad made them favor. After the first campaign, participants were asked to recall as much as possible about each ad. They then watched the second campaign and completed a free recall task for these ads. Emotional reactions to ads were either not measured or simply not reported.
Ad recall protocols were coded for whether ads were remembered or not (dichotomous measure). Logistic regression was used to examine the influence of ad type on percent of recall. Results indicated that positive ads were more likely to be remembered than were negative ads. An interaction between ad valence and context was also found. Following negative ads, positive ads were more likely to be remembered, whereas percent recalled for negative and positive ads was not significantly different after viewing positive ads.

**Positive ads: Greater memory and fewer errors.** Thorson et al. (1991) examined how positive and negative ads, orientation toward issues or images, presence of background music, and visuals showing the candidate in family or professional settings influenced memory, as well as attitudes toward and evaluations of the candidates. Four generic scripts (support-image, support-issue, attack-image, attack-issue) were created and applied to four different candidates (Phil Gramm, Gordon Humphrey, Ray Shamie, John Warner).

The researchers measured two dimensions of emotions elicited by the ads. Valence was measured using six 9-point bipolar adjective scales (hopeful/despairing, pleased/annoyed, happy/unhappy, relaxed/bored, satisfied/unsatisfied, contented/melancholic). Arousal (defined in more detail in a later section) was also measured using six 9-point bipolar adjective scales (stimulated/relaxed, wide awake/sleeping, excited/calm, frenzied/sluggish, jittery/dull, aroused/unaroused). Results indicated that positive ads were perceived as more positive ($M = .13$) than negative ads ($M = -.24$) and also less arousing ($M = -.83$) than negative ads ($M = -.63$).
Memory was assessed with recognition measures for each of the four target commercials. The correct answers depended on which commercial was seen for each candidate. Participants were presented with a list of items and asked to indicate which had been seen in the ad. “For example, we listed six issues (or image) qualities, and people were to mark which ones they had actually heard,” (Thorson et al., 1991, p. 474). Results indicated that the proportion of correctly recognized information was higher for positive ads (45.86 percent) than in negative ads (35.34 percent). Although the researchers did not use measures of memory sensitivity and criterion bias, they did analyze the percentage of “hits” and “false alarms” (see Footnote 8 on signal detection theory). Positive ads led to fewer incorrect recognitions (11.74 percent) compared to negative ads (14.34 percent).

**Remembering Positive and Negative Ads: A Summary of Experimental Research**

Results suggesting an advantage of positive or negative ads for information retention has produced mixed findings. Results from various studies have found more freely recalled ideas from negative compared to positive ads (A. Lang, 1991), a higher percentage of multiple-choice recognition from negative compared to positive ads (A. Lang, 1991), higher accuracy and faster recognition responses for negative ads (Reeves & Newhagen, 1991), greater memory sensitivity for information from negative ads (S. D. Bradley et al., 2007), greater recall for positive ads (Basil et al., 1991), and a greater proportion of information recognized from positive compared to negative ads (Thorson et al., 1991). Results concerning errors in memory seem somewhat more consistent, with findings demonstrating that negative ads lead to a more liberal criterion bias (S. D.)
Bradley et al., 2007), more recall errors (Hitchon & Chang, 1995), and more incorrect recognitions (Thorson et al., 1991).

Inconsistent results in the literature on positive and negative ad effects might be produced, in part, by inconsistent conceptual and operational definitions within and across studies, particularly in experimental research. Conceptual definitions of positive and negative ads frequently emphasize whether information in an ad focuses on a supported or opposed candidate and whether the objective of the ad is intended to promote or deride a candidate. Positive ads attempt to promote a supported candidate, instill positive feelings toward the candidate, and increase favorability and evaluations of the candidate by featuring information intended to demonstrate the candidate’s strength in character and issue positions. Negative ads attempt to derogate an opposing candidate, infuse negative feelings toward the candidate, and lower evaluations of the candidate by presenting information intended to illustrate that candidate’s weakness in character and policy stances. As mentioned earlier (and discussed in much more detail later), intended emotional responses toward a candidate are not necessarily the responses that will be elicited among viewers while watching ads.

In research on political ads and memory, selection of ad stimuli has tended to focus on elicited emotion by an ad (rather than which candidate is featured and/or the objective of the ad). Researchers have selected ads based on coders’ ratings of ad emotionality (A. Lang, 1991), participants’ ratings of positivity and negativity (S. D. Bradley et al., 2007; Newhagen & Reeves, 1991), an archivist’s selection of ads based on a combination of emotional tone and information (Hitchon & Chang, 1995), and coding
based on whether information attacked an opponent (Basil et al., 1991). Another study
created experimental stimuli by creating verbal scripts for positive and negative ads by
featuring normatively desirable and undesirable candidate qualities and support or
opposition to issues that were “chosen so as not to be highly controversial,” (Thorson et

Some studies did not include manipulation checks for ad-elicited emotion in the
actual experimental session (Basil et al., 1991; A. Lang, 1991; Newhagen & Reeves,
1991), while others did (Hitchon & Chang, 1995; Thorson et al., 1991). Another study
seemed to include manipulation checks but did not report the results (S. D. Bradley et al.,
2007). It is interesting to note that of the two studies that found enhanced memory for
positive compared to negative ads, one is the only study (out of those reviewed above) to
use an operational definition consistent with its conceptual definition (Basil et al., 1991),
while the other seems to have actually used comparison rather than negative ads (Thorson
et al., 1991).
Chapter 7: Memory, Knowledge, and Information Processing

Measures of Memory and Knowledge

Researchers have used both surveys and experiments to examine the influence of political ad exposure, or exposure to positive and negative ads in particular, on the acquisition of political information. As should be expected, measures of knowledge and memory have varied across studies. How do these measures compare to the definition of political knowledge provided above? Recall that definitions of political knowledge include three interrelated components, including (1) having internal representations of information units, bits, and concepts, (2) forming associations between and among concepts and the acquisition of more complex cognitive organizational structures, and (3) using previously procured knowledge in information processing. Furthermore, what information can or should individuals be expected to learn or retain from political ads?

Measuring knowledge in survey research. Researchers using surveys to study learning from political advertisements frequently lack knowledge of the exact information to which individuals are exposed through political ads. Measures of political knowledge gain in survey research tends to focus on measures such as recall of candidates’ names (Coleman & Manna; 2001; Wolak, 2009), placement of candidates on political ideology scales (Coleman & Manna, 2009) or specific issue scales (P. Freedman
et al., 2004), or identifying candidates’ specific stances on issues (Brians & Wattenberg, 1996).

Knowing which candidates are running for office is certainly a concept or unit of information that candidates hope individuals acquire from ad exposure. Of course, citizens could also attain this information from other types of media exposure or through interpersonal discussion. Correct placement of candidates on political ideology scales or issue scales is also a testament of political knowledge. However, it is difficult to infer whether the individual answering such a question has learned about a candidate and his/her party affiliation through another form of political communication, and subsequently extrapolates to ideology and issue positions, or whether information from an ad has alerted the individual as to the candidate’s ideological positioning.

If researchers are privy to what issues have been presented in a particular advertising campaign and how candidates portrayed their stances (McClure & Patterson, 1976), identification or recognition of a candidate’s specific issue stances may ultimately be the optimal measure of political knowledge. Candidate issue stances are theoretically and empirically important in citizens’ decisions to vote for a candidate. Of course, it is once again difficult to determine whether ad viewing itself, or some other form of media or interpersonal communication, has bestowed this knowledge upon respondents.

**Measures of memory in experimental research.** Experimental research has used a variety of memory measures to gauge learning from political TV advertisements. These memory measures include free recall coded for whether an ad was remembered or not (Basil et al., 1991), recall protocols coded for the amount of information remembered
(Hitchon & Chang, 1995), free and cued recall analyzed for verbal and visual ideas remembered (A. Lang, 1991), written multiple choice recognition testing separately for information remembered from the audio and video portion of an ad (A. Lang, 1991), recognition of audio and video clips (Newhagen & Reeves, 1991), recognition of specific images and items presented in ads (Thorson et al., 1991), and recognition of paraphrased verbal material from political ads (S. D. Bradley et al., 2007).

All of these are valid measures of memory. However, their practical importance for what might be considered political knowledge is less certain. Is it democratically important (and do candidates care) whether individuals recall that a political ad featured images of decrepit buildings in a run-down neighborhood? Memory for that information may be important, for instance, if exposure led to the formation of a cognitive association between a political candidate and ineffectiveness in preventing economic demise. On the other hand, recognition of the image itself may not be particularly important.

**An advantageous measure of information acquisition.** Awareness of candidates and their issue stances (links between concepts) is perhaps the most theoretically and practically important facet of knowledge gain that citizens might acquire from political ads during campaigns. Thorson et al. (1991)’s recognition tactic might be the most profitable for providing insight into what individuals learn about candidates. Recall that Thorson et al. used a recognition measure, in which participants were given a list of issues (and image, or personality traits). Presumably prompted with the candidate’s name, or at least the ad to which this information pertained, participants were asked to mark which issues (and images) had been presented in an ad.
Scholars might desire that citizens are aware of candidates’ specific issue stances, which would then be used (automatically or deliberatively) when individuals evaluate candidates and cast their vote at the polls. However, the cognitive association of a candidate with an issue is perhaps the most intuitive and basic level of concept association that is fundamental to the structure of semantic knowledge networks.

In this dissertation, memory (a building block of political knowledge gain) is operationally measured using a recognition tactic similar to Thorson et al. (1991). Participants were shown a profile picture of a candidate featured in a particular ad viewed by the participants. Recognition tests for comparison ads (which featured two candidates) showed pictures of both candidates. Next to the picture(s) of the candidate(s) was a list of six issues, three of which appeared in the actual ad. Participants were asked to identify which of the six issues were mentioned in the ad featuring the candidate shown. Analyses focused on the percent of correctly recognized issues out of the six target items.

**Episodic and Semantic Memory/Knowledge**

The discussion of memory and knowledge thus far has employed the term “semantic” on a number of occasions (e.g., semantic memory models). It seems appropriate to describe a distinction often made in psychology and cognitive neuroscience between episodic and semantic memory/knowledge. The argument proposed here is that the measure of memory employed in this dissertation captures semantic knowledge formation. However, if episodic memory plays a role in this process, it in no way undermines the general premise of the research or results presented.
Generally, semantic memory can be thought of as memories for facts, whereas episodic memory is considered memory of experiences. One may “know” that George Washington was the first president of the United States (semantic), or one may remember the experience of sitting in civics class when the teacher wrote “George Washington—first president” on the blackboard. Tulving (2002) suggested that episodic memory is a type of memory unique to human beings, which requires conceptions of the self, subjective time, and autonoetic awareness. “Episodic memory is about happenings in particular places at particular times, or about ‘what,’ ‘where,’ and ‘when,’” (Tulving, 2002, p. 3).

**Distinct systems?** The most compelling evidence of distinct episodic and semantic memory is based on neurological studies of individuals with brain lesions. Famous patient K.C. suffered extensive brain lesions following a motorcycle accident, causing both anterograde (ability to learn new information/form new memories) and retrograde amnesia (memory of past information and events). K.C.’s anterograde amnesia applies to both semantic information (leaning new facts) and episodic memory (his ability to remember ongoing personal experiences). His retrograde amnesia, on the other hand, is asymmetrical. K.C. can remember semantic knowledge, including knowledge about his own life (e.g., date of birth, childhood home address), but not personal experiences (Tulving, 2002).

Other neurological evidence indicating a potential separation of episodic and semantic memory systems is suggested by the memory abilities of three individuals studied by Vargha-Khadem and colleagues (Vargha-Khadem et al., 1997). These young
individuals suffer from amnesia caused by atrophy of bilateral hippocampal areas.
Interestingly, although they do not possess the ability to encode or recall personal experiences, these individuals have acquired semantic knowledge that is normal or nearly normal for individuals their age.

**Interconnected systems.** Although this neurological evidence suggests that different areas of the brain may be involved in episodic and semantic memory, these systems are obviously intertwined. How does one “know” that George Washington was the first president without having had one or more personal experiences during which this information was conveyed?

Tulving (Tulving & Markowitsch, 1998) suggests that episodic memory is as an extension of semantic memory. The Serial Parallel Independent (SPI) model proposes that encoding of new semantic information can occur without episodic memory processes, but encoding episodic events relies upon the semantic memory system. This leads to a single dissociation at the encoding process. Memory retrieval, however, can rely on either of the two systems, leading to the possibility of single or double dissociations at the retrieval stage.

Encoding of information into the episodic system depends critically on the semantic system whereas encoding of information into the semantic system could not operate without it. In retrieval of stored information, on the other hand, the basic operations of the two systems are independent of each other: retrieval can be supported by either of the two systems, or both of them. (Tulving & Markowitsch, 1998, p. 200).

The SPI model suggests that we can “learn” that George Washington was the first president of the United States even if we cannot fully encode and remember the actual experience during which this information was presented. Retrieval of this information
(As would be needed to answer the question, “Who was the first president of the United States?), however, could rely on previously encoded episodic or semantic memory.

Another interesting proposal relating episodic and semantic memory is based on activity of hippocampal neuronal assemblies, brain rhythms (particularly theta oscillations), path integration, and landmark navigation (Buzaski, 2005). A more thorough discussion of neurons, neuronal activation, and neural oscillations is discussed in a later section. However, given the emphasis present on the link between semantic and episodic memory, Buzaski’s theory is worth describing here.

When rats are trained to run in 1-dimensional tasks, hippocampal “place cells” are uni-directional, meaning that neuronal assemblies discharge in sequence, and different assemblies are activated when the rat runs in the opposite direction. Consider a straight line with invisible markers indicating Position A, B, C, D, E, F, G along this line. When walking from Position A to Position G, neuronal assemblies representing each position fire in sequence, such that Neuron Assembly A fires as one moves through Position A, Neuronal Assembly B fires as one moves through Position B, etc. However, walking from Position G to Position A activates different neuronal populations.

On the other hand, neuron assemblies representing 2-dimensional spaces tend to be omni-directional, similar to a map. Neuronal Population representing Juncture X discharges more strongly as one approaches Juncture X, regardless of the direction of approach. These cognitive maps are formed as rats explore 2-dimensional environments through dead reckoning (random walking), crossing the same place or juncture through multiple navigational explorations. Thus, Buzaski suggests that omni-directional cells
may be formed through omni-directional (2-dimensional) exploration, or the conversion of single episodes of passing by common junctions into a cognitive, omni-directional map.

Buzaski suggests that neuronal encoding of physical places in 1-dimensional routes and acquisition of cognitive maps based on crossing the same junctions on different exploration routes correspond to mnemonic space of episodic and semantic memory. Encoding a series of physical places in a 1-dimensional map is comparable to the learning of sequential items presented in an episodic memory task, whereas “semantic memories are gradually formed from multiple overlapping episodes with common items (junctions) among the episodes, through which the temporal context attenuates or disappears,” (p. 832).

**Which are we measuring?** In experimental contexts, it is not always clear whether recalled or recognized information has been encoded and/or retrieved via episodic or semantic memory. To reiterate, although some brain lesion evidence suggests two distinct systems, episodic and semantic memory are intimately related, and retrieval may occur through either process (Tulving & Markowitsch, 1998).

This dissertation argues that the operational definition of knowledge employed here (recognition of issues presented in different political ads), is a measure of semantic knowledge (fundamental associations between cognitive concepts) rather than episodic memory, although an individual might rely on episodic memory to answer the question. Differences in episodic versus semantic memory is certainly an interesting question for political communication researchers. However, this distinction is not of central
importance to the research presented here. Although it is useful to understand how information presented in messages gets stored in both short- and long-term memory, and whether different measures of memory assess different information processing components, this question is left to future research on memory of and learning from political advertisements.

**Working Memory**

Attention, storage, rumination, and repackaging of information are modulated by working memory, which may serve as the buffer between current information exposure and the formation of long-term memories (Baddeley & Logie, 1999). Working memory is responsible for the temporary storage and manipulation of information as well as the coordination of resources (Baddeley, 1992). There are three main components of working memory, including the visuospatial sketch pad, the phonological loop, and the central executive.

The visuospatial sketchpad includes distinct visual and spatial components. The visual component is involved in the cognitive representation of patterns (e.g., visualizing a baseball), whereas the spatial component is more attuned to location, navigation, and movement (e.g., a baseball sailing over the outfield fence). The phonological loop also includes two features, the phonological store and the articulatory control process. The phonological store can hold acoustic and verbal auditory information for approximately one to two seconds, whereas the articulatory control process is comparable to inner speech. The central executive facilitates control over the two “more slave systems” (Baddeley, 1992, p. 557), the visuospatial sketch pad and the phonological loop. A more
recent version of working memory suggests a fourth component, the episodic buffer, which integrates information from the sketch pad, phonological loop, and information from long term memory to form a “unitary episodic representation,” (Baddeley, 2000, p. 417).

Working memory is crucial to conscious perception of, and attention to, stimuli, messages, and events, and perhaps integration of auditory and visual inputs. Beyond simple cognitive representation, rehearsal, and temporary storage of this information, working memory also draws upon information from long-term memory to comprehend, interpret, and understand current informational inputs. In other words, working memory provides a workspace for the use, integration, and manipulation of information.

I could, for instance, ask you to consider the idea of an ice-hockey-playing elephant, something which you have presumably not encountered too frequently in the past. This would raise the question of how he would hold the stick, and what would be his best position; he could no doubt deliver a formidable body check, but might be even better in goal. In order to solve this team-selection problem, it is necessary to maintain and manipulate the relevant knowledge of elephants and ice hockey. (Baddley, 2000, p. 420)

**Limited Capacity Model**

Another important theory for understanding the processing of mediated messages is A. Lang’s (2000) limited capacity model of information processing. This model has two assumptions. First, people are information processors, perceiving stimuli, producing mental representations, and performing work on those mental representations. Second, humans have limited information processing capabilities because we have a limited pool of mental resources. Information processing involves a number of simultaneously concurrent sub-processes, including encoding, storage, and retrieval. These processes
may be automatic (occurring without intention), or controlled (occurring with conscious volition).

**Encoding.** Encoding refers to the selection of information from sensory stores into working memory. This generates a mental representation of the stimulus object. Three processes are involved in translating a sensory perception into a mental representation. First, a message activates sensory receptors. Each sense has its own respective store, and the stores are unlimited. However, the sensory perceptual information resides in the stores for a very brief time. The second step of encoding occurs as specific bits of information from the sensory store are selected. The third step refers to the conversion or translation of that information into a mental representation in working memory.

The process of selecting information from sensory stores is controlled by both controlled and automatic mechanisms. Controlled selection reflects the viewer’s goals. A. Lang (2000) gives the example of an individual deciding to notice the color of shirts people are wearing. Shirt color will thus be selected during encoding. Two types of stimuli activate automatic selection. These include stimuli that carry information relevant to the needs and goals of an individual (signal) and information that represents a change in the environment (novel). Encoding of a message is not an exact and veridical process of representation. “The encoded message is neither an exact nor a complete replica of the original message,” (A. Lang, 2000, p. 49).

**Storage.** Storage refers to associations made between the encoded mental representation and previous knowledge or information. The limited capacity model relies
on an associative network model of memory, in which memories (or information) are related to other memories (and information) through links. When a particular memory is activated, this activation spreads through these linkages, activating other related memories.

When encountered for the first time, a message becomes encoded, existing in memory in connection only with other information currently activated in short-term memory. However, as an individual contemplates the message, more and more associations are formed. The process whereby newly encoded information becomes linked to previously stored information is called storage. The more associations made, the better stored the newly encoded message. “The result of the storage process is a continuum from poorly stored (few associations and links) to thoroughly stored (many associations and links),” (A. Lang, 2000, p. 50).

Retrieval. Retrieval describes the process in which stored mental representations are re-activated, or brought back into working memory. There are two types of retrieval, which occur during and after media exposure. Post-exposure retrieval occurs when, after exposure to a message, an individual attempts to recall or retrieve that information from memory. Post-exposure retrieval represents the process in which the memory network is searched for a particular piece of information.

Concurrent retrieval happens when the message to which we are currently being exposed leads to the simultaneous activation of other information. In other words, while perceiving a message, individuals are simultaneously drawing upon previously stored
information to understand and comprehend the message. Concurrent retrieval is an important part of the storage process.

**Sub-process distinctions.** Although an interesting model to facilitate understanding of how individuals process messages, A. Lang’s (2000) limited capacity model is not without its limitations. First, the boundaries of encoding, storage, and concurrent retrieval are not particularly clear. Encoding describes the process by which information is selected from sensory stores into working memory. However, unless a stimulus is completely novel and unrelated to anything an individual has ever heard, seen, smelled, touched, or tasted before, encoding of new information relies heavily upon retrieval of previously stored concepts and information.

Storage refers to the process by which incoming information is associated with previously stored information. However, information that is brought into working memory is not necessarily stored in its original form. Information may be compressed into “chunks” (G. A. Miller, 1956) in working memory. A. Lang’s model does not explicitly account for how encoded information may be altered or manipulated for storage. Concurrent retrieval, as A. Lang acknowledges, occurs simultaneously with storage. However, if storage depends on making associations between old and new information, it is unclear, exactly, how concurrent retrieval is a separate process from storage.

**Memory measures as indicators of processing components.** According to A. Lang’s (2000) model, all of these sub-processes draw from the same limited resource pool. When resources allocated to one sub-process, fewer resources are available for
allocation to the other sub-processes. According to A. Lang (2000), encoding, storage, and retrieval are indexed by memory recognition, cued recall, and free recall, respectively.

Recognition is the most sensitive measure of memory because it includes multiple cues that an individual can use to retrieve information. Recognition is interpreted as reflecting information encoding. Cued recall is the next most sensitive measure of memory. In cued recall, an individual is presented with a single cue and must use that cue to retrieve an item from memory. Cued recall is interpreted as a measure of storage. Free recall is the least sensitive measure of memory because it provides no clues to the participant to aid in the retrieval of information. Free recall reflects memory retrieval.

Defining recognition, cued recall, and free recall as measures of encoding, storage, and retrieval may seem intuitively appealing. However, this paints an overly simplistic picture. All memory tasks require that an individual match or retrieve information from memory. Encoding may facilitate recognition. However, depending on the modality of the recognition task (e.g., recognition of auditory verbal information stated by an announcer in a television ad), recognition could also be enhanced by storage (recall the links between episodic and semantic memory described earlier).

A. Lang’s (2000) limited capacity model is generally used to study how different message features influence allocation of resources to the various sub-processes that comprise information processing. However, the theory seems to make inferences of information processing, cognitive capacity, and resource allocation based on empirical measures of memory. Based on measures of recognition, cued recall, and free recall, one
infers what has occurred with respect to processing resources. This tactic seems to make the theory non-falsifiable. For instance, if information is recognized but not recalled, one infers that resources have been diverted to encoding, with not enough resources available for storage. This shortage of resources available or allocated to storage has produced the empirical results and indicates that information overload has occurred.

The purpose of this dissertation is not to test whether resources have been devoted to encoding, storage, or retrieval. A. Lang’s (2000) model would suggest that the measure of memory used here (recognition of issues discussed in political TV ads) indicates encoding. However, it is suggested here that the formation of associative links between candidates and issues is a measure of how semantic information has been stored in memory, although “encoding” certainly plays a role in this process.
Chapter 8: Emotion and Memory

The preceding review has discussed concepts and models related to memory, knowledge, and information processing. Below, emphasis is focused on the theoretical underpinnings that suggest a link between emotion and memory. Particular attention is devoted to why negative and positive messages may elicit differences in information retention. Research examining memory differences for positive and negative messages draws heavily on theories of emotion. This theoretical emphasis again underscores the frequently neglected distinction between intended and evoked emotion in the political advertising literature.

What is Emotion?

Emotions are included under the umbrella term affect. In contrast to moods, emotions are generally considered to be of strong intensity, short in duration, and the result of a known cause (Beedie, Terry, & Lane, 2005). Emotions include affective, cognitive, behavioral, and physiological/biological components (Cacioppo & Gardner, 1999; P. J. Lang, 1995; Ortony, Clore, & Collins, 1988). “It is generally accepted that emotional processes have many attributes including motor-expressive, sensory-perceptual, autonomic-hormonal, cognitive-attentional, and affective-feeling aspects,” (Panksepp, 2003, p. 4).
**Emotion moves us.** According to many theoretical conceptions of emotion, a direct link exists between emotion and behavior. This relationship is even evident in the linguistic origins of the word emotion, which derives from the Latin word movere, meaning to move. “Part of the complexity in studying emotion is defining it: There are almost as many definitions as there are investigators… An aspect of emotion upon which most agree, however, is that in emotional situations, the body acts,” (M. M. Bradley & P. J. Lang, 2007, p. 581).

The observed relationship between emotion and behavior suggests an intimate connection between emotion and physiology. Behavior, or action, is produced by, reflected in, or otherwise associated with our biological composition and physiological responses. The association between emotions and physiology can be traced back to the writing of James (1890) and Lange (1885/1992), whose eponymous theory conceptualized emotion in direct relation to the cardiovascular system. Work by Lacey (1958) also suggested that emotions are directly accompanying autonomic responses.

**A biological imperative.** If emotions are related to action, an evolutionary perspective suggests that emotions serve an adaptive purpose. Emotions evolved over time to enhance humans’ ability to survive, thrive, and reproduce, and more generally to adapt to their surroundings. “Emotional acts and their affects are considered to be measurable biological phenomena that reflect an evolutionary inheritance…[E]motions evolved from functional behaviors that facilitated the survival of individuals and species,” (M. M. Bradley & P. J. Lang, 2000, p. 242). Driven by biological predispositions and evolutionary incentives, emotions drew our ancestors out of their
respective shelters in search of food and mates. Similarly, emotions helped our ancestors avoid predators prowling for their own sustenance, with the potent smell of a predator eliciting a hasty retreat to the safety of one’s lair.

A guide to action. Emotions inform, direct, and guide behavior. At the most basic level of behavior, emotions are involved in reflexive actions. In some of the most primitive species, intense stimuli can automatically evoke withdrawal, whereas food may automatically elicit approach behavior (Schneirla, 1959). “Emotions evolved from simple reflexive actions, many of which are still part of the human response repertoire. Among the most primitive and general of these responses are movements toward positive, appetitive things and movements away from negative, unpleasant things,” (M. M. Bradley & P. J. Lang, 2000, p. 242). Automatic behavioral responses to emotional events and stimuli are also observed in high-order species, including humans. For instance, a hot stove will prompt a quick removal of one’s hand from the burner before the thought that “burning my hand is bad,” comes into conscious awareness.

The basic biological and physiological structures linking emotion to overt action remain intact in humans. However, humans have developed remarkable capacities to delay, inhibit, or fully suppress actions upon exposure to emotional stimuli. Failure of emotional cues to produce automatic overt responses is evident in much of our everyday behavior. Many of us get out of bed in the morning even though our bodies protest, go to work even though we may dislike our jobs, and resist temptations (e.g., food, sex, drugs) even though we might like to partake in them.
This enhanced ability to inhibit or delay action confers an evolutionary advantage through increased behavioral control and flexibility. Inhibiting one’s propensity to reach for a tasting-look berry, the previous consumption of which led to unpleasant consequences, enhances survival chances. Similarly, persevering through a currently aversive action to obtain a desirable outcome increases our survival likelihood. Because emotions in humans do not always manifest in overt behavior, they may be most aptly defined as dispositions toward action (M. M. Bradley & P. J. Lang, 2000).

In addition to the capacity to inhibit or delay behavioral responses to emotional experiences, humans can imagine hypothetical future situations or recall past emotion-evoking contexts to induce emotional reactions or plan appropriate behavioral responses. These cognitive capacities can occur without the presence of emotion-laden content in the immediate and observable environment. “[C]ues can be reviewed, reevaluated, and alternative behaviors formulated to fit changing circumstances,” (M. M. Bradley & P. J. Lang, 2000, p. 243).

Despite enhancements in cognitive capacities and behavioral flexibility, emotions in humans still fundamentally represent signals for potential rewards to be gleaned and consequences to be suffered from the environment. This evolutionary perspective shares significant overlap with theories proposing that emotions result from evaluations of the extent to which interactions with the environment are successfully meeting one’s goals (Ortony, Clore, & Collins, 1988) and cognitive appraisal theories of emotion (C. A. Smith & Ellsworth, 1985; C. A. Smith & Lazarus, 1993).
**Discrete approaches to emotion.** There are two dominant paradigms for studying emotions, including discrete and dimensional approaches to emotion. Discrete, or categorical, approaches to emotion propose that affect exists as distinct and separate monopolar states. The total number of these differentiated emotional states varies between six and twelve according to different scholars (Elkman & Friesen, 1971; Ekman, Friesen, & Ellsworth, 1982; Izard, 1971, 1972, 1977, 1992; Lorr, Datson, & Smith, 1967; Ryman, Biersner, & La Rocco, 1974; Tomkin, 1962, 1963, 1982).

Discrete perspectives of emotion can be traced back hundreds, if not thousands, of years. William James (1890) described what he called “coarser emotions,” including fear, rage, and love. Descartes (cited in Panksepp, 1982) proposed that desire, love, joy, wonder, hate, and sadness were fundamental emotions. Watson (1924) listed fear, rage, and sexual activity as basic emotions.

Contemporary research continues to employ discrete approaches to emotions. Izard (1972) describes anger, contempt, disgust, distress, enjoyment, fear, interest, shame, and surprise. Plutchik (1980) proposes acceptance, desire, disgust, fear, panic, rage, and surprise as basic emotions. Keltner and Elkman (2000) have suggested that there are distinct facial expressions for anger, sadness, happiness, fear, disgust, surprise, contempt, and embarrassment. Discrete approaches to emotion suggest that affect can be adequately described according to these independent, monopolar factors of emotion.

**Dimensional approaches to emotion.** In contrast to independent and discrete emotion models, dimensional models of emotion suggest that monopolar factors more accurately represent bipolar pairs, anchoring opposite ends of a continuum. For instance,
Plutchik (1994) suggests that there are eight basic emotions, forming polar opposite pairs, including joy/sadness, affection/disgust, anger/fear, and expectations/surprise. By definition, increased joy necessitates decreased sadness.

Dimensional perspectives of emotion propose that all affective states can be effectively plotted or represented by two bipolar dimensions. The most widely known two-dimensional approach to emotion focuses on factors or dimensions of valence and arousal\(^9\) (M. M. Bradley, 1994; P. J. Lang, 1978, 1994; P. J. Lang, M. M. Bradley, & Cuthbert, 1992, 1997; Osgood, 1966; Osgood, May, & Miron, 1975; Russell, 1978). Valence indicates the direction of the emotion (i.e., positive or negative), and arousal indicates the intensity or extent of activation (M. M. Bradley, Codispoti, Cuthbert, & P. J. Lang, 2001; Osgood, Suci, & Tannenbaum, 1957; C. A. Smith & Ellsworth, 1985).

Empirical research has consistently found that most variance in emotion can be accounted for by these two predominant factors (Mehrabian & Russell, 1974).

Although discrete and dimensional approaches to emotion may seem disconnected, these views of emotion are not necessarily contradictory and incompatible. Discrete and dimensional models of emotion may actually be complementary (Mehrabian & Russell, 1974; C. A. Smith & Ellsworth, 1985). For instance, one might imagine that all discrete emotional states can be effectively plotted along dimensions of valence and arousal. “Not only can a specific state such as fear be categorized along a dimension of

\(^9\) A third dimension of dominance is also proposed in some models (M. M. Bradley, Greenwald, Petry, & P. J. Lang, 1992; M. K. Greenwald, Cook, & P. J. Lang, 1989; P. J. Lang, 1979; P. J. Lang, M. M. Bradley, & Cuthbert, 1992). However, emphasis on dimensions of valence and arousal are more commonly used and are more relevant for the present purposes.
aversiveness, but a particular aversive event can be described as involving fear,” (M. M. Bradley & P. J. Lang, 2007, p. 602).

**Emotions Enhance Memory**

In discussing the effects of emotion on memory, a logical starting point is whether emotional compared to non-emotional stimuli, messages, or events lead to better memory. Much of the literature on emotion and memory focuses precisely on this question. The objective of this dissertation is to examine whether positive and negative political TV advertisements generate differences in memory. However, while the primary emphasis of this study focuses on positive or negative political TV ads, rather than arousal or level of emotionality, the impact of emotional versus neutral events on memory is reviewed here for two reasons.

First, as mentioned to above, the bulk of research on emotion and memory focuses on whether and how emotional versus neutral (or less emotional) information and events impact memory. Omitting this sizable body of research in the present review on emotion and memory would seem negligent, failing to provide a complete picture of emotion and memory. Furthermore, understanding the role of emotion in information processing and memory lays the groundwork for comprehending later sections on the role of emotional valence on memory. Second, some researchers have argued that it is emotional arousal (rather than, or above and beyond) emotional valence that drives message processing and memory. The role of emotional arousal in information processing is addressed explicitly in Research Question 2 (described in a later section),
which also makes relevant the current review on the role of emotional arousal on memory.

**Emotions indicate relevance.** Emotions provide an indication that objects, events, or stimuli in the environment are significant, important, or meaningful to the self. By definition, emotional stimuli are “motivationally relevant” (A. Lang, 2006, p. S60). Emotions indicate that stimuli may require a response by an individual, and thus are relevant to survival (or at least hedonistic objectives of maximizing pleasure and minimizing pain).

Because of their motivational relevance, emotional stimuli should also have a memory advantage over emotionally neutral stimuli. Just as emotions direct behavior by guiding us toward and away from desirable and undesirable stimuli, respectively, memory for emotional episodes provides a crucial guide for current and future action. Recalling the noxiousness of particular stimuli from previous exposure can lead to avoidance of potentially harmful objects. Recalling an enjoyable experience may prompt us to pursue similar courses of action in the future. Memory for emotional episodes facilitates survival, serving an adaptive function for individuals and species.

**Enhanced processing.** Research indicates that memory for emotionally arousing information and events is modulated by faster, more efficient, and more thorough processing at both early and late information processing stages. “Research indicates that emotional and non-emotional information differ with respect to how quickly they are detected, how long they remain the focus of attention, how long they are retained, and how likely they are to be retrieved,” (Levine & Edelstein, 2002, p. 837). In the early
stages of information processing, emotional stimuli elicit faster responses than neutral stimuli (Kissler, Herbert, Peyk, & Junghofer), and emotional stimuli are more likely to reach conscious awareness (A. K. Anderson & Phelps, 2001).

Emotional stimuli may enhance cognitive attentional capacity. Theories of information processing acknowledge that humans have limited cognitive capacities (A. Lang, 2000; Kahneman, 1974). Kahneman’s (1974) limited capacity model of attention suggests that cognitive attentional capacities are limited, but vary according to levels of arousal. More arousal leads to greater attentional resources. In later stages of processing, emotional events are more likely to be ruminated, rehearsed, replayed, or discussed, which also enhance memory for these experiences (Finkenauer et al., 1998; Rime, Mesquita, Philippot, & Boca, 1991). Working memory capacity may also be enhanced for emotional stimuli (Edelstein, 2006).

**The literature.** Empirical research indicates that arousing information and experiences lead to enhanced memory. “Although the emotion–memory literature is replete with contradictory findings, there is considerable consensus in both the field and laboratory studies that emotional arousal leads to enhanced memory for the most salient aspects of the to-be-remembered (TBR) stimuli” (R. P. Kern, Libkuman, & Otani, 2005, p. 408).

Another consistently found phenomenon, referred to as memory narrowing, tunnel memory, or the memory trade-off effect, is that while the central elements of emotional experiences or events tend to be well-remembered, memory for peripheral
detail may suffer (Levine & Edselstein, 2002). Determination of what constitutes the central elements versus peripheral details is a complex task.

Research on emotion-evoking media messages also suggest increased storage and memory for emotional compared to unemotional, neutral stimuli (M. M. Bradley, Greenwald, Petry, & P. J. Lang, 1992; Christianson, 1992; A. Lang, 1991; A. Lang, Dhillon, & Dong, 1995; A. Lang & Friedstad, 1993; A. Lang, Newhagen, & Reeves, 1996; Newhagen & Reeves, 1995; Reeves, A. Lang, Thorson, & Rothschild, 1988; Reeves, Newhagen, Maibach, Basil, & Kurz, 1991). One study examined how emotional arousal and valence influence information processing capacity and memory for television messages (A. Lang et al., 1995). Recall from the earlier discussion that valence indicates the direction of the emotion (i.e., positive or negative), and arousal indicates the intensity or extent of activation (M. M. Bradley et al., 2001).

Participants were shown 12 video segments. The video segments, each two to three minutes in length, were taken from situation comedies, prime-time dramas, prime-time docudramas, news shows, and a soap opera. Three video segments were devoted to each of the following categories: (1) high arousal negative, (2) high arousal positive, (3) low arousal negative, and (4) low arousal positive. After presentation of all video segments, participants completed free recall and cued recall memory measures. During free recall, participants were asked to write down as many segments as they could remember. In cued recall, participants were given a cue (e.g., the wedding segment, the rodeo segment) and asked to write as much as they could about each specific segment.
Six measures were coded from the recall measures, including “number of words, number of sentences, number of audio sentences, number of visual sentences, number of global sentences, and number of local sentences” (A. Lang et al., 1995, p. 320). Total memory scores reflected a sum across the six measures. Results indicated that arousing compared to calm messages elicited higher memory scores for number of sentences ($M = 11.02$ versus $M = 6.23$), number of words ($M = 42.53$ versus $M = 26.04$), and total memory ($M = 67.63$ versus $M = 43.31$).

**Emotions and Motivational Systems**

In theory, memory for emotional events provides an evolutionary advantage. This seems to be borne out in empirical research, with arousing messages facilitating enhanced memory compared to calm, non-arousing, or neutral messages. As motivationally significant events, emotional stimuli cause motivation system arousal or activation, subsequently enhancing post-exposure memory. However, does memory depend on the valence (i.e., positive or negative) of emotion activation?

**Motivational subsystems.** Recall that dimensional theories of emotion propose two continuums along which emotion varies, including valence (i.e., positive or negative) and arousal (i.e., intensity). According to these conceptions, positivity and negativity are inherently and reciprocally related. As your reaction to a stimulus becomes more positive, it must simultaneously become less negative. Such a perspective suggests that emotion is elicited from a single underlying motivational system. This singular system varies along a spectrum of approach (positive) and avoidance (negative).
Indeed, emotion is related to behavior, and at the response output or overt behavioral stage, an individual must choose between approach and avoidance behavior (or staying stationary). Ultimately, the output of our motivational systems necessitates a trade-off between approach and avoidance behavior. However, initial system inputs need not follow suit. A single response output could be computed from the activation of two functionally distinct positive and negative motivational systems.

That is, the fact that approach and withdrawal tend to be reciprocally activated behavioral manifestations does not mean that they were derived from a single bipolar evaluative channel; it only means that the outputs of all of the evaluative processors comprising the affect system are combined in order to compute preference and organize action. Various theorists have posited that the module in the affect system that computes attitudes, preferences, and actions derives input from at least two specialized evaluative channels that process information in parallel—one in which threat-related (i.e. negative) information is derived from the flow of sensation and a second in which safety and appetitive (i.e. positive) information is derived. (Cacioppo & Gardner, 1999, p. 201)

A number of researchers have proposed two separate motivational subsystems underlying emotional responses. The labels applied to these subsystems vary, but a common underlying theme is the conceptual distinction between positive and negative responses. The two motivational systems involved in emotion have been referred to as the appetitive/attractive and aversive systems (Dickinson & Dearing, 1979), promotion and prevention systems (Molden, Lee, & Higgins, 2008), approach and avoidance/withdrawal systems, positivity and negativity systems, appetitive and aversive/defensive systems (Berntson & Cacioppo, 2008; M. M. Bradley et al., 2001; Cacioppo & Gardner, 1999), and behavioral inhibition and behavioral activation systems (J. A. Gray, 1987a, 1987b; Marcus, Neuman, & MacKuen, 2000).
Activation of these motivational systems generates subsequent behavioral dispositions and response actions. Emotions elicited through the activation of our motivational subsystems determine the direction and intensity of behavior (Hebb, 1949). Activation of the appetitive system leads to approach behavior, as the promotion of survival compels us toward a stimulus. The aversive system is related to the avoidance of threat, leading to withdrawal or escape from danger.

Cacioppo and colleagues (e.g., Cacioppo and Berntson, 1994) have suggested that the relationship between appetitive and aversive motivational systems can take any of three forms: (1) mutually coupled reciprocal activation, (2) non-reciprocal coupled activation (co-active or co-inhibitory), or (3) un-coupled, independent activation.

First, a tradeoff may exist between approach and avoidance activation, such that as negativity increases, positivity decreases, and vice versa. Much literature reveals this type of inverse relationship between positivity and negativity (e.g., S. D. Bradley et al., 2007). Second, the two motivational systems can be activated simultaneously, such that we feel compelled toward a stimulus at the same time that we harbor feelings of trepidation. For instance, the desire for food may activate an individual’s appetitive system while s/he simultaneously is fearful of the dangers involved in securing or consuming this food. Empirical research supports this non-reciprocal activation model, in which stimuli may be both positive and negative (e.g., A. Lang, Shin, & Lee, 2005). Third, the appetitive and aversive systems may function independently, such that approach activation may remain constant while aversive activation fluctuates, and vice
versa. Research also supports the premise of uncoupled motivational systems activation (e.g., M. Goldstein & Strube, 1994).

**The negativity bias and the positivity offset.** The proposition that overt responses could emanate from two separate motivational systems or evaluative channels—one attuned to positivity and the other negativity—finds substantiation in research demonstrating different transfer or activation functions in response to positive and negative stimuli. Researchers examining motivation system activation have identified two operating characteristics that differ in response to positivity and negativity. These are known as the *positivity offset* and the *negativity bias* (Berntson, Boysen, & Cacioppo, 1993; Cacioppo & Berntson, 1994; Cacioppo & Gardner, 1999; Cacioppo, Gardner, & Berntson, 1997, 1999), and are illustrated through overt behavioral as well as self-report responses.

**Behavior.** An early case in point is N. E. Miller’s (1951, 1959, 1961) conflict theory and experimental work studying rodents’ behavior. N. E. Miller suggested that the nearer one is to a goal, the stronger the approach tendency (the approach gradient). Similarly, the nearer one is to an undesirable stimulus, the stronger the avoidance tendency (the avoidance gradient). Experimental work by N. E. Miller as well as J. S. Brown (1942, 1948) confirmed this expectation. To examine potential activation function differences for the approach and avoidance gradient, the researchers calculated rats’ strength of approach or withdrawal as a function of nearness to a goal. A recording device connected to a harness worn by the rat measured the strength of the animal’s pull
in grams. Nearness was measured as distance from a goal box, associated with either a positive (food) or negative (shock) outcome.

Strength of approach/avoidance as a function of distance from the goal box was calculated. Results indicated that as distance from the box increased, the approach gradient became higher than the avoidance gradient. This is known as the positivity offset, and suggests that the initial or base motivational state is one of weak appetitive activation. At low levels of arousal or motivation, the appetitive or behavioral approach system is slightly engaged. From an evolutionary adaptive perspective, this positivity offset provides a survival advantage by encouraging exploratory behavior in times of relative calm. When the environment provides little cause for concern, a predisposition toward exploratory behavior encourages curious investigation of surroundings.

The positivity offset is the tendency for there to be a weak positive (approach) motivational output at zero input, an intercept difference in the affective system… Without a positivity offset, an organism in a neutral environment may be unmotivated to approach novel objects, stimuli, or contexts. Such organisms would learn little about novel or neutral-appearing environments and their potential value or threat. With a positivity offset, however, an organism facing neutral or unfamiliar stimuli would be weakly motivated to engage in exploratory behavior. Such a tendency may have important survival value, at least at the level of a species. (Cacioppo & Gardner, 1999, p. 205).

While the approach gradient seems to have a higher starting or initial value, the relationship between motivation strength and goal distance is steeper for the avoidance gradient compared to the approach gradient. At an increasingly closer distance to the stimulus, the strength of avoidance tendency increases at a faster rate than the approach tendency. This is the negativity bias.
If nearness is defined as motivational system input, and motivation strength as extent of approach/avoidance system activation, a one unit input increase to the avoidance motivation system leads to a greater response output than a comparable one unit increase to the approach motivation system. “[T]he increase in motivational output per quantum of activation tends to be greater for negativity than for positivity,” (Ito et al., 1998 p. 872). The negativity bias also confers an evolutionary advantage. Avoiding something hazardous or fatal is more important than approaching something that may reap positive benefits. Escaping the bear to survive another day is more crucial than catching a rabbit, which could always be caught the next day.

Exploratory behavior can provide useful information about an organism’s environment, but exploration can also place an organism in proximity to hostile stimuli. Because it is more difficult to reverse the consequence of an injurious or fatal assault than those of an opportunity unpursued, the process of natural selection may also have resulted in the propensity to react more strongly to negative than to positive stimuli (Cacioppo & Gardner, 1999, p. 206).

**Emotion ratings.** Different baseline levels and activation functions for the approach and avoidance gradients provide some evidence of distinct and separate underlying motivational substrates for the processing of positive and negative information. The positivity offset and negativity bias can also be demonstrated by using aggregate emotional ratings of stimuli on a 2-dimensional affective space.

Researchers have asked respondents to rate various types of stimuli, such as pictures (P. J. Lang et al., 2005), sounds (M. M. Bradley & P. J. Lang, 1999a), and words (M. M. Bradley & P. J. Lang, 1999b) on different dimensions of emotion, such as valence and arousal. By aggregating ratings across individuals, mean levels of valence and arousal are provided for all stimuli. These measures can be used to plot each stimulus on
a 2-dimensional space and calculate the correlation between valence and arousal separately for positive and negative stimuli. Results show a higher intercept for positive stimuli, but a steeper slope for negative stimuli (see M. M. Bradley & P. J. Lang, 2007, p. 585).

Similarly, the positivity offset and negativity bias can be demonstrated by examining intercepts and coefficients from regression analyses. Ito, Cacioppo, and P. J. Lang (1998) collected emotion ratings for 256 positive and 216 negative slides from the IAPS picture collection. The positivity offset and negativity bias are demonstrated by using regression analyses to separately predict mean positivity and mean negativity ratings from mean arousal ratings. The regression line for positive stimuli produces a higher intercept value (i.e., the positivity offset), whereas the regression line for negative stimuli reveals a larger slope (i.e., the negativity bias).

**Hypotheses: Memory for Positive, Negative, and Comparison Ads**

Different types of coupled or uncoupled motivational system activation and different activation functions for these systems provide support for separate and distinct positive and negative motivational systems. These differences in system baseline activation and rates of activation provide a foundation for suggesting memory differences for positive and negative messages.

The positivity offset suggests that positive emotional stimuli should elicit better memory when the environment or motivational system activation is one of low arousal. When environmental circumstances provide zero (or a small amount) of system input, the approach motivational system is slightly active, providing a memory advantage for
positive information. On the other hand, the negativity bias suggests that at moderate levels of arousal, negative information should facilitate memory more so than positive information.

At very high levels of arousal (e.g., chasing a rabbit, running away from a bear), motivational systems may be overloaded, leading to diminished memory. At very high levels of arousal, memory for both negative and positive information may suffer, as system activation may diminish memory processes, such as encoding. The limited capacity model of information processing (A. Lang, 2000) suggests that at high levels of arousal, cognitive capacities may be maxed out, leading to information overload and a subsequent decrease in memory.

If negative and positive ads have their intended emotional effect (creating negative and positive emotions, respectively), then at moderate levels of arousal, negative political TV ads should facilitate greater memory than positive political TV ads.

**H1: Memory will be greater for negative relative to positive ads.**

As discussed in the immediately preceding section, the level of emotional arousal of experiences or stimuli should impact whether positive or negative information has a memory advantage. However, most studies of memory for positive and negative political advertisements focus solely on valence or ad type and neglect arousal levels. This failure to control for levels of arousal may contribute to the mixed empirical results on memory effects of positive and negative ads. This study uses experimental ad stimuli selected for moderate levels of arousal. (The selection of ad stimuli, and the coding procedure for low, moderate, and high levels of arousal is discussed in a later section.)
Unlikely purely positive or negative ads, comparison ads should elicit activation of both motivational systems (appetitive/positive and aversive/negative). The study of mixed-emotion message formats is relatively understudied (Carrera, Munoz, & Caballero, 2010), although there is evidence that these mixed-emotion formats do generate mixed emotional responses (Larsen & McGraw, 2011). The negativity bias would suggest that a mix of positive and negative information should lead to greater memory than a message containing only positive information.

H2: Memory will be greater for comparison relative to positive ads.

Hypothesis 1 and 2 predict that negative and comparison ads will lead to greater memory retention than positive ads, respectively. However, comparison ads (and mixed-emotion or mixed-format messages more generally) are significantly less studied than positive and negative messages. To the extent that information is separately linked to positive and negative emotional memory network nodes (Bower, 1981), mixed emotional formats might enhance memory due to the formation of more associative memory links. That is, if an ad states that Candidate A is for Supported Issue X (link candidate A and Issue X to positive emotion node), whereas Candidate B is against Issue X (link Candidate B and Issue X to negative emotion node), this could theoretically facilitate how recognition of Issue X can be retrieved from memory. Also, by switching emotional valence in the message, comparison political ads may essentially encourage individuals to “tune back into” an ad.

From a more cognitive standpoint as well, comparison ads might be thought to promote memory to a greater extent than positive and negative ads. Comparison ads
integrate information about candidates into a larger point-counterpoint framework, which may encourage viewers to juxtapose the policy positions or character traits of one candidate against the other. Meirick (2002) examined cognitive responses to negative and comparison political ads. Participants viewed two comparison or two negative ads aired by each of the two candidates running for a state congressional seat. After viewing the ads, participants were asked to list any thoughts they had about the ads. Relying on the cognitive response tradition, participants’ listed thoughts were coded for source derogations, source bolstering, counterarguments, support arguments, negative affect, and positive affect, among others. Contrary to expectations, results indicated that comparison ads prompted more counterarguments than negative ads. “It may be that point-by-point contrasts between alternatives prompt viewers to engage in more mental activity and elaboration… than do noncomparative ads (positive and negative), and counterargument is the most effortful type of cognitive response,” (Meirick, 2002, p. 56-57).

The theoretical premise of this dissertation is based on differential motivational system activation and the enhanced information processing of negative stimuli at moderate levels of arousal. Thus, Hypothesis 2 suggests that comparison ads (if they do indeed elicit mixed emotions) should facilitate memory to a greater extent than positive ads. Although this is proposed as a hypothesis, there are other reasons to suggest that comparison ads might, at least under some circumstances, lead to better memory than negative messages. However, the limited theoretical and empirical work on mixed-message formats has led to the grounding of hypotheses in this dissertation on the negativity bias.
Intended vs. Elicited Emotion

As discussed earlier, there are three main criteria typically used to differentiate negative and positive ads, including (1) the candidate featured in the ad, (2) the nature of the information presented about that candidate and the cognitive, evaluative, and emotional objectives of the ad, and (3) the emotion(s) elicited by the ad. The first two factors tend to be redundant. However, the third criterion does not necessarily overlap with the first two.

At first glance the statement “A negative ad is one that presents negative *information* about a competing candidate” (Meirick, 2002, p. 50, *italics added*) may seem identical to the statement “Negative ads are *intended* to provide negative information about the target” (Shapiro & Rieger, 1992, p. 36, *italics added*). However, information that is intended to paint a candidate in an unfavorable light may not have the intended consequences. Research on the effects of positive and negative political ads has tended to neglect this distinction. “‘Attack’ style ads and political ads that use a negative message tone that often elicits negative emotions have not been distinguished well in the literature,” (Hitchon, Chang, & Harris, 1997, p. 52). Failure to differentiate or account for intended versus induced emotional responses may account for inconsistencies in the literature on memory effects of positive and negative ads.

**Emotions in political ads.** Content analyses reveal that emotional appeals are quite common in political ads (Kaid & Tedesco, 1999). In a content analysis of 830 political TV ads from the eight general presidential elections from 1960 to 1988, Kaid and Johnston (1991) found that 89 percent of all negative ads and 86 percent of all
positive ads included emotional appeals. Emotional appeals were described as “designed to evoke particular feelings or emotions in viewers, such as happiness, good will, pride, patriotism, anger, and hope,” (p. 55). Emotions common in positive ads include hope, pride, compassion, empathy, and trust, whereas those commonly found in negative ads include anger, fear, and uncertainty (Kaid & Johnston, 1991; M. Kern, 1989).

The use of emotion in political advertisements is best understood by considering the ultimate objective of political advertisements. Political ads are designed for the purpose of persuasion. Candidates and campaign strategists hope that the hefty sums of money devoted to political advertising translate to votes on Election Day.

Although the final goal of political ads is to elicit a particular behavior (i.e., checking a box next to the candidate’s name at the voting polls), researchers and practitioners generally presume attitudinal persuasion as a mediator in this process. The decision to vote for a candidate is assumed to casually precede actually voting for that candidate. The decision to vote for a candidate is based on a number of considerations. Major factors influencing vote decision include prior knowledge about candidates, assessment of candidate image, issue positions, political party affiliation, and emotion (Boiney & Paletz, 1991; Tedesco, 2002).

A number of vote decision models suggest that candidate evaluations, such as likes and dislikes, play an important role in determining vote choice (Cambell, Converse, Miller, & Stokes, 1960; Goldberg, 1966; Kelley & Mirer, 1974; Pomper, 1975). Rahn and colleagues (Rahn, Aldrich, Borgida, & Sullivan, 1990) found that half of the variance in vote could be attributed to affect toward candidates.
It is a logical consequence, then, that positive ads are designed to persuade individuals to like a sponsored candidate more than, or dislike the candidate less than, a competing candidate. Similarly, negative ads are designed to make individuals dislike an opposing candidate more than, or like the candidate less than, a supported candidate. Emotional responses have been found to influence candidate evaluations, both directly and indirectly (Ladd & Lenz, 2008; Marcus & MacKuen, 1993; Marcus, Neumann, & MacKuen, 2000). Research indicates that emotions elicited by political advertising are related to ratings of candidate images and evaluations (Chang, 2001; Kaid & Chanslor, 1995; Kaid & Tedesco, 1999).

**What’s a positive and negative message?** One might rightly ask, what is negative information if not information that elicits a negative emotional response? That positive information evokes positive responses and negative information produces negative responses seems a logical enough conclusion. Emotional information and stimuli used in many empirical studies are often based precisely on this definition.

Researchers have amassed an extensive set of affective stimuli, including the International Affective Picture System (IAPS; P. J. Lang, M. M. Bradley, & Cuthbert, 2005), the International Affective Digitized Sound system (IADS; M. M. Bradley & P. J. Lang, 1999a), and the Affective Lexicon of English Words (ANEW, M. M. Bradley & P. J. Lang, 1999b). Levels of emotion of these stimuli are measured by asking respondents to indicate their emotional reactions to each stimulus using the Self-Assessment Manikin (SAM; P. J. Lang, 1980), a pictorial scale for affective responses. For instance, for the
IAPS stimuli, respondents are asked to indicate how they “felt while viewing each picture” (P. J. Lang, M. M. Bradley, & Cuthbert, 2005, p. 4).

Defining messages according to the emotion they elicit is neither inaccurate nor based on faulty logic. However, this method deprives researchers of the challenge of asking, exploring, and understanding what individual, message, and contextual features create or generate these emotional responses. Identifying message characteristics, media features, individual traits, personal qualities, social circumstances, and environmental contexts that directly or indirectly impact emotional responses to messages is paramount to explaining, predicting, and understanding the comprehensive process of communication. This is particularly true if the emotional responses are proposed as mediators driving information processing mechanisms and final communication outcomes.

In this dissertation, positive and negative political ads are defined as ads that are designed, produced, and aired in an effort to promote a supported candidate and condemn an opposing candidate, respectively. The particular audio, visual, and video features employed by ad creators to achieve these objectives are not the emphasis of this dissertation. This study does not investigate how advertisement designers implement particular pictorial graphics and symbols, voice tone and pitch, video of living beings and inanimate objects, nor complexity or simplicity of visual and audio information in an effort to enhance evaluations of supported candidates and diminish evaluations of targeted candidates. Such questions are also imperative to understanding communication processes, but currently left to the attention of future researchers and studies.
**Should different emotional reactions be expected?** Political ads are intended to elicit positive emotions in general, and also in particular toward the sponsoring candidate. Negative ads are intended to evoke negative emotional responses in general and also in particular toward the opposing candidate. The operative word here, of course, is “intended.” An intended emotion is not tantamount to an evoked emotion. This may be particularly true when it comes to the verbal information presented in a political TV ad.

An extensive body of empirical research underscores that humans are biased information processors. Predispositions and motivations can bias perception, attention, emotional responses, and reasoning (Balcetis & Dunning, 2005; Barsch, Appel, & Storch, 2010; B. P. Bradley, Mogg, Wright, & Field, 2003; Kunda, 1990). Proclivities, personality, and motivations can also bias or influence cognitive and emotional responses to political candidates, concepts, and information (Lodge & Taber, 2000; Morris, Squires, Taber, & Lodge, 2003; Redlawsk, Civettini, & Emmerson, 2010; Taber, Cann, & Kucsova, 2009).

Are political advertisements promoting a supported candidate likely to elicit positive emotions among viewers, while ads criticizing an opposed candidate elicit negative emotions, regardless of other ad characteristics and individual predispositions? Or might message components, individual differences, or combinations between ad and individual characteristics, thwart ad intentions to elicit particular emotions? To reflect upon this issue, the predominant types of statements in political ads should be considered, including statements about a candidate’s personality traits and issue stances.
**Candidate image and traits.** Many political ads are image-oriented, or at least include some image-oriented information. These ads present information about a candidate’s personality characteristics. Information pertaining to candidate personality traits are perhaps most likely to evoke the intended response. For instance, individuals presumably desire elected officials who are competent, honest, hard-working, and conscientious, and find aversive those who are dishonest and unreliable. While ads suggesting a candidate is trustworthy should elicit positive emotions, ads insinuating a candidate is deceitful should elicit negative emotions. This might suggest that regardless of other message characteristics and individual differences, political ads might evoke similar emotional responses among all viewers.

On the other hand, the desirability of other personality traits may be more subjective. Kaid and Johnston (2001) found that personality attributes frequently mentioned in political ads include aggressiveness, competence/performance, success, and honest. Certainly citizens are more likely to support competent candidates. Competency is one of the main criteria by which individuals evaluate their political leaders (Abelson, Kinder, Peters, & Fiske, 1982), and research indicates that mere perceptions of competency, based solely on profile photos of candidates, can predict election outcomes (Todorov, Mandisodza, Goren, & Hall, 2005). A candidate perceived as aggressive, on the other hand, may elicit favorable responses by some and unfavorable responses by others. Research indicates that individuals are most likely to vote for politicians whose personality traits are perceived as similar to their own (Caprara, Veccione, Barbaranelli, & Fraley, 2007). If the normative desirability of personality traits is at least to some
extent subjective, then emotional responses to image-related information in political ads may vary among individuals.

**Issues.** Information presented about a candidate’s issue stances and past voting record may be even more likely to elicit different emotional responses among different individuals. The issue public hypothesis suggests that individuals develop and hold a handful of personally important attitudes about public policy issues. The issues perceived as most personally important vary considerably among individuals (Converse, 1964; Krosnick, 1990). This may suggest that individuals will have varying emotional responses to particular candidate issue stances.

Information in a positive ad stating that a sponsoring candidate favors stem cell research should elicit positive reactions among those who favor stem cell research. However, this same positive ad might evoke negative responses among those who oppose stem cell research. Information in a negative ad stating that an opposing candidate supports the death penalty may elicit negative responses by those who oppose capital punishment, while this same negative ad might create a more positive response among those who also support the death penalty.

On the other hand, when it comes to controversial issues, candidates might assume more moderate positions, at least in highly visible forums such as political TV ads. The median voter theory proposes a voting model in which voters vote for the candidate whose issue positions match most closely with their own (Black, 1948, 1958). To maximize the number of votes they receive, candidates in a two-party system move toward the center, or median voter, position. If political ads provide information
suggesting a candidate’s moderate or centrist positions rather than a clearly ideological, partisan, or extreme stance, emotional responses may be more consistent among the public.

Or, candidates may not take clear issue stances at all. Content analyses indicate that while issues may be frequently mentioned in political ads, clear candidate stances are not. In Joslyn’s (1980) analysis of 156 political ads from presidential, gubernatorial, and congressional campaigns, 79.6 percent of ads mentioned issues. “However, much of this issue content involves either mentioning an issue without revealing anything about the issue position of the candidate… or revealing only a vague issue position,” (Joslyn, 1980, p. 94).

However, even a vague issue position may elicit various emotional responses among constituents. Kaid and Johnston (2001) found that issues frequently mentioned in political ads included the economy, taxes, international relations, and military spending. Most citizens favor healthy economic conditions, economic growth, and financial prosperity. However, if ads include even vague references to how these means will be achieved, favorability of stances and emotional reactions may differ among message viewers. Similarly, references to increasing or decreasing taxes for the wealthy, or increasing or decreasing military spending, will also appeal more or less to different constituents.

**Non-verbal information.** Information about candidate issue stances and personality traits may be presented in written or spoken form, that is, as verbal
information. However, non-verbal cues also comprise an important component of political ad messages.

[T]he power of these appeals... lies in the ways the ads tap and use emotions nonverbally. Particularly through visual images, sound tracks, camera angles, editing, and colors, advertisers consciously attempt to paint a picture, tell a story, create a feeling with which many viewers can resonate or, even better, identify. (Boiney & Paletz, 1991, p. 22).

Compared to their verbal counterparts, non-verbal information may be more likely to elicit similar emotional responses among viewers. Verbal information may require more cognitive processing, during which motivational biases may be most effective in evoking differential responses. On the other hand, nonverbal information may rely on more automatic sensory and perceptual processing, which may override motivational effects. In their study of positive and negative ads from the 2000 presidential election, featuring the two well-known candidates Bush and Gore, S. D. Bradley et al. (2007) found no effect of partisanship on emotion ratings of ads.

It is not entirely surprising that there were no effects of partisanship in these low-level responses. Although candidate preference would affect subsequent elaboration, these effects occur quickly. For example, if a dog were to turn, show its teeth, and growl at its owner, we would expect reflexive responses even though the owner is presumably quite fond of the dog. (S. D. Bradley et al., 2007, p. 125).

**Intentionally evoking a contrary emotional response.** Positive ads may not always evoke positive emotions among all viewers, and negative ads may not always generate negative emotions among message consumers. Individual differences and ad characteristics may instill varied emotional responses among viewers watching or listening to the same issue- and image-oriented statements in a political advertisement.
Additionally, the emotional cues or informational content of ads may be strategically designed to elicit seemingly discordant emotional responses.

Positive ads are meant to instill positive emotions in general, and in particular toward the supported or sponsoring candidate. However, this objective may be achieved by attempting to elicit negative emotions during ad viewing. An ad intending to promote a sponsoring or supported candidate (i.e., a positive ad) may begin by articulating a number of problems facing the district, state, or nation, and then offer the supported candidate as a solution to the country’s ailments. A narrator’s ominous voice may assert that unemployment plagues the nation, crime permeates our neighborhoods, high taxes are destroying the middle class, the elderly are being neglected by the state, and American values are being obliterated. The narrator insists that the country cannot keep going down this road, and pronounces that Candidate X must be voted into office to save the fate of our nation. If elected to office, the ad implies, this other candidate will surely only exacerbate the issues currently facing the country.

Negative ads are meant to instill negative emotions in general, and in particular toward the opposing or targeted candidate. However, an ad intended to criticize or denounce an opposing candidate may use humor or comedy (generally considered a positive emotional experience) to ultimately undermine that candidate. One advertisement included in the initial pool of ads for this dissertation (but not selected for the final experiment) used fast-paced, peppy, game show type music in the background of

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10 Some researchers have described such an ad as an implied comparative ad (Pinkleton, 1997) in that the opposing candidate is not explicitly mentioned, but it is implicit that the other candidate has created these problems.
a negative ad. A picture of the opposing candidate’s face is superimposed on a cartoonish body. Sitting on a beach wearing a Hawaiian lei, this caricatured candidate smiles and tips his sunhat as a narrator describes how the candidate has spent $80,000 on plane tickets, “lavish” meals, and other extravagances using taxpayer money. Thus, positive and negative ads may not only elicit varying emotional responses among viewers because of individual differences and motivational biases, but these ads may be intentionally designed to elicit reverse emotional responses (i.e., positive ads meant to elicit negative responses and negative ads intended to instill positive reactions)\(^{11}\).

**Research Question: Potential Moderating Factors**

As discussed throughout the literature review, studies proposing a difference in memory for positive and negative messages draw primarily on theories of emotion (e.g., the negativity bias). However, researchers studying these potential message memory differences often neglect to distinguish between intended and induced emotion. Ad producers, campaign strategists, and candidate sponsors certainly strive to create particular emotional experiences among audience members. However, the abundance of research indicating that humans are motivated and biased information processors suggests that intended emotional objectives are not always fulfilled among all ad viewers.

Certain candidate qualities, non-controversial issue stances, and non-verbal and emotional cues may elicit similar affective responses among political TV ad viewers.

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\(^{11}\) For this experiment, final experimental stimuli did not include ad messages that employed this strategy of attempting to induce opposing emotional responses. That is, the verbal and non-verbal information in negative ads was intended to elicit negative responses, and the verbal and non-verbal information in positive ads was intended to elicit positive responses.
However, there is still reason to suspect that individual differences (such as partisanship) and ad characteristics (such as ad sponsorship) could moderate the effect of ad type (positive, negative, comparison) on emotional responses and subsequent memory effects¹². In this study, three 2-way interactions (Ad Type X Ad Sponsor, Ad Sponsor X Partisanship, Ad Type X Partisanship) and a 3-way interaction (Ad Type X Ad Sponsor X Partisanship) are examined as potentially moderating memory effects.

As these interactions have not been thoroughly examined in previous research, they are exploratory in nature. “Previous research has focused exclusively on the main or autonomous effects of political advertisements. As a result, there is little if any evidence about the tandem or combinatory effects of between advertising, other types of campaign information, and voters’ political predispositions,” (Ansolabehere & Iyengar, 1994, p. 337-8). The followings sections describe why 2- and 3-way interactions between and among Ad Type, Ad Sponsor, and Partisanship might be observed in emotional responses to and memory for political ads. As no hard evidence speaks directly so some of the proposed potential interactions, much of what follows is speculative in nature. However, inconsistent results in the literature on memory for Positive and Negative ads suggests that a thorough consideration of potential interaction effects is warranted, even if such a consideration cannot be staunchly grounded in the results of previous research.

**Ad Type and Ad Sponsor.** Ad Type and Ad Sponsor may interact to influence memory effects (perhaps via varying emotional responses). Republican and Democratic

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¹² Although understanding how emotional responses differ among individuals exposed to the same ad is certainly deserving of further attention, this question is left for future research.
candidates, or supporters producing and airing advertisements for these candidates, may focus on different issues in their political ads, which may resonate with different groups of partisans.

**Issue ownership theory.** The issue ownership theory (Petrocik, 1996; Petrocik, Benoit, & Hansen, 2003/2004) suggests that each of the two major political parties “own” certain issues. A particular party is seen as more competent and able to “handle” certain issues, such as crime, education, poverty, or the economy.

‘Handling’ is the ability to resolve a problem of concern to voters. It is a reputation for policy and program interests, produced by a history of attention, initiative, and innovation toward these problems, which leads voters to believe that one of the parties (and its candidates) is more sincere and committed to doing something about them (Petrocik, 1996, p. 826).

In election campaigns, candidates emphasize the issues at which their party excels. The other party is seen as inferior or less adept at managing these issues. The issue ownership theory suggests that candidates do not attempt to change voters’ preferences for specific policies, but rather convince voters that particular issues are important and in need of fixing. “The key fact for this voter is not what policies candidates promise to pursue, but what problems (medical care needs, high taxes) will be resolved,” (Petrocik, 1996, p. 830, *italics original*). By discussing particular issues during the campaign, candidates make these issues salient. The public then votes for the party seen as best suited for handling these issues.

Party constituencies and the record of the current incumbent create issue ownership. The record of the incumbent can create short-term ownership over a performance issue. If a particular party or candidate can be blamed for an issue (usually
the incumbent, who is perceived as responsible for the current state of affairs), the opposing candidate and his/her party (usually the challenger) gain ownership of the issue. Issues ownership through party constituency witnesses fluctuations as well, but tends to be rather stable over time. A political party tends to attract people with certain social characteristics, social identifies, beliefs, and values because the party is seen as representing the interests of these groups.

**Republican and Democratic issues.** According to Petrocik’s (1996) analysis, the Republican Party owns foreign policy and defense issues, such as dealing with international terrorism, maintaining a strong defense, national defense, increasing U.S. influence, and conducting foreign affairs (Democrats are advantaged when it comes to keeping the U.S. out of war). Republicans also generally own economic issues, such as reducing the country’s deficit, keeping taxes low, controlling government spending, American industry, and inflation (Democrats are perceived as having an advantage on the issue of reducing unemployment). The Democratic Party owns most social welfare issues, such as protecting Social Security, improving public school education, improving health care, and helping the middle class, homeless, elderly, and poor. Democrats are perceived as more competent in handling the environment, while Republicans own issues such as promoting moral values, reducing the drug problem, and crime.

The issue ownership theory suggests that advertisements for Republican and Democratic candidates should feature different issues. Emphasis on different issues within each party’s negative and positive ads could create an interaction effect between Ad Type and Ad Sponsor on emotional responses, information processing, and memory.
Unfortunately, although original research on the issue ownership theory shows that Democratic and Republican messages tend to emphasize different issues (Petrocik, 1996; Petrocik et al., 2003/4), an examination of whether issue emphasis varied as a function of ad type (Positive, Negative, Comparison) was not conducted.

**Issue variability by party and ad type?** If the issues mentioned in Democratic and Republican ads vary by Ad Type, this could create an interaction between Ad Sponsor and Ad Type on emotional responses and memory. For instance, in a particular campaign cycle, Democrats may focus on Republicans’ forcing the country into unnecessary international conflict in their Negative Ads, while focusing on clean energy in their Positive ads. Republicans may focus on being tough on crime in their Positive ads, and criticize Democrats for their support of welfare policies in Negative ads. As war and crime may be more emotionally laden than welfare and energy, this could produce interaction effects between Ad Sponsor and Ad Type on memory. In the example provided above, Positive ads may be better remembered than Negative ads for Republican-backed advertisements, whereas Negative ads may be better remembered than Positive ads for Democratic supportive ads.

This dissertation uses TV ads from the 2010 U.S. House elections as experimental stimuli. Although an attempt was made to select ads addressing a range of social and political issues, there did appear to be themes that carried across ads for candidates of a particular party. In particular, Negative ads sponsored by Republican affiliates tended to criticize Democratic candidates for alignment with House Speaker Nancy Pelosi.
Ad Sponsor and Partisanship. An endless list of individual predispositions and interactions between dispositions and ad characteristics could bias emotional responses to ads, including candidates’ traits, issue stances, personal backgrounds, or life experiences. In real life contexts, previously established candidate evaluations are the most likely suspects for biasing emotional responses to candidate ads. While some experimental political ad research features candidates familiar to participants (e.g., S. D. Bradley et al., 2007; Newhagen & Reeves, 1991), other studies use ads in which featured candidates are fictitious (e.g., Chang, 2001; Chang & Hitchon, 2004; Shapiro & Rieger, 1992), or real but unknown to viewers (e.g., Basil et al., 1991; Christ et al., 1994; Hitchon & Chang, 1995; Thorson et al., 1991). These latter two options attenuate concerns that previous candidate evaluations could bias emotional responses to the ads.

This study uses ads about real but unfamiliar political candidates, eliminating the potential for prior candidate preferences to generate variable emotional responses among viewers. Without previously acquired information about or affective responses toward candidates, viewers’ political party identification may be the most important factor in potentially producing divergent emotional responses among viewers. Ad Sponsor and Partisanship may interact to influence memory for political advertisements.

Emotional responses to candidates of the same versus opposing political party. First, there may be an interaction between Ad Sponsor and Partisanship on emotional responses, which may then drive variations in memory effects. Previous knowledge of and affective feelings toward a candidate should influence emotion evoked by political ads that promote as well as critique that candidate. Research indicates that candidate
evaluations influence emotions (Ladd & Lenz, 2008), and also that partisan identification influences liking of political ads (Chang, 2003).

Furthermore, research suggests that viewing pictures of a candidate elicits more positive emotional responses among respondents who identify with the same party as that candidate compared to respondents who identify with the opposing party, and more negative responses among individuals who identify with the opposing party compared to respondents who identify with the same party as the candidate (Kaplan, Freedman, & Iacoboni, 2007). The same study found that viewing the opposing candidate (compared to viewing a candidate affiliated with the same party as the respondent) led to greater neurological activation in the dorsolateral prefrontal cortex (DLPFC) and the anterior cingulate cortex (ACC). The authors suggest that these findings could indicate an up-regulation of negative emotions in response to the opposing candidate.

An Obama ad promoting Obama’s experience, personal qualities, and issue positions may have the intended emotional effect among Obama supporters, eliciting positive emotions among these message consumers. However, emotional responses by those who dislike Obama or prefer another candidate (McCain in the 2008 general presidential election or Romney in 2012) are less certain. Perhaps they evoke little to no emotional responses, or, if perceived as dishonest, misleading, or distorted, these ads may be received with negative emotional reactions.

The opposite might be true of negative ads intended to derogate an opponent. A negative ad critiquing Obama might elicit the intended negative emotions among supporters of the opposing candidate (e.g., “Obama’s presidency is contributing to the
demise of the country!”). Or, if these ads are perceived as identifying important shortcomings in Obama’s character or policy stances, supporters of the opposition might have a positive emotional response (e.g., “Thank goodness, someone is pointing out Obama’s weaknesses!”). On the other hand, when derogatory claims are made about Obama, Obama supporters might dismiss these ads (e.g., little to no emotional response), perceive them as humorously and outlandishly inaccurate and unlikely to deceive the public (e.g., positive emotional response), or perceive them as illegitimate and unfair attacks (e.g., anger).

This obstacle of well-known candidates eliciting varying emotional responses among viewers is averted in research studies by using fictitious candidates or real candidates who are unknown to the research participants. In these cases, individuals do not have prior knowledge of or affective reactions toward candidates that could influence emotional responses to ad messages. However, even without prior knowledge of candidates featured in advertisements, mentions of the candidate’s political party affiliation could evoke varying emotional responses\(^{13}\).

Even ads that do not mention a known candidate and do not explicitly mention the candidate’s party affiliation will contain information that is likely to resonate more and less strongly with different segments of the public. Remember the issue ownership theory suggests that campaign messages (including political advertisements) for Republican and Democratic candidates will emphasize different issues (Petrocik, 1996; Petrocik et al.,

\(^{13}\) On the other hand, ads paid for by a candidate’s campaign are unlikely to mention political party affiliation. In a content analysis of over 1,000 ads aired by 290 candidates in the 1998 elections, results indicated that only 25 percent of all candidates produced at least one ad that mentioned their party affiliation (Spiliotes & Vavreck, 2002).
The issue public hypothesis suggests that individuals develop and hold a handful of personally important attitudes about public policy issues (Converse, 1964; Krosnick, 1990). Thus, Republicans and Democrats may respond to and process Republican and Democratic differently.

**The congeniality effect.** A number of researchers and theories have proposed that stimuli, information, and messages that are attitude-consistent or congruent are remembered better than those that are attitude-inconsistent or incongruent. That is, individuals are more apt to remember information that coincides rather than conflicts with their personally held attitudes, opinions, and beliefs.

Historically, psychologists have proposed a *congeniality effect* on memory—the hypothesis that people have better memory for information that supports, confirms, or reinforces their evaluations of social, political, and personal issues than for information that undermines or challenges these attitudes. This issue of whether attitudes influence memory has endured since the beginning of experimental research in social psychology. (Eagly, Chen, Chaiken, & Shaw-Barnes, 1999, p. 64)

The congeniality effect suggests that memory should be heightened for attitude-consistent information. The reasoning underlying this effect is based largely on defensive attitudinal motivations, suggesting that individuals are motivated to defend their currently held opinions and beliefs.

Better memory for attitude-congruent information may occur through a number of mechanisms. First, individuals may avoid information that contradicts their beliefs. This idea is closely linked to the theory of selective exposure, which suggests that people have a tendency to expose themselves to messages that reinforce their currently held attitudes and avoid information that challenges their pre-existing beliefs (J. L. Freedman & Sears,
Individuals may have better memory for attitude-consistent information because they seek out these belief-confirming messages, while avoiding information that disagrees, disconfirms, or challenges their pre-existing attitudes.

Even when exposed to counter-attitudinal information, pro-attitudinal information may still have an advantage in memory. In active defense of their currently held beliefs, people may discount or distort incoming information. Information that contradicts firmly held beliefs may be quickly and easily dismissed and subjected to little, if any, further processing. Or, the mechanism may be more incidental than intentional. Inconsistent information may fit poorly with already acquired information and cognitive schemas, or cognitive organizational frameworks for storing, interpreting, and understanding information. Think back to models of memory and knowledge described earlier. If an individual has an extensive and well-organized semantic knowledge network for a particular issue position, information to the contrary may be difficult to integrate into this current memory network, impeding learning of this new information.

**Attitude-inconsistency effects.** On the other hand, attitude structures may not only include information reinforcing and supporting an individual’s attitudes. Individuals may be attitudinally bipolar (Pratkanis, 1989). Contradictory information may be just as strongly related to an individual’s opinion as confirmatory information. Newly acquired inconsistent information, then, should fit nicely into current attitude and knowledge structures. Furthermore, the desire to defend currently held attitudes could lead individuals to have heightened attention to, rumination of, and memory for inconsistent information. Careful analysis and elaboration of a counter-attitudinal statement in an
effort to refute that information may enhance memory for attitude-inconsistent information (Chaiken, Pomerantz, & Giner-Sorolla, 1995).

The empirical research on the congeniality effect in memory is mixed. Eagly et al. (1999) report the results of a meta-analysis of 70 studies from 60 documents (including journal articles, dissertations, theses) examining the congeniality effect. This analysis demonstrated a small but statistically significant effect size across 65 studies (effect sizes could not be calculated for five of the studies). The mean weighted effect size was .23, the mean unweighted effect size was .33, and the median effect size was .10. Evidence of the congeniality effect appeared in 60 percent of the studies.

The congeniality effect may hold true for political TV ads. If so, there would be an interaction effect between Ad Sponsor and Partisanship on memory, with Republicans remembering more from Republican-sponsored ads (attitude-consistent), and Democrats remembering more from Democratic-sponsored ads. Chang’s (2003) study of the 1998 mayor election in Taipei found that partisan affiliations moderated individuals’ responses to political ads. Ads sponsored by a candidate associated with an individual’s supported party were perceived as more persuasive and likeable than ads sponsored by a candidate affiliated with a competing party.

14 The researchers did not directly measure familiarity with the two candidates (Chen Shui-bian of the Democratic Progressive Party (DPP) and Ma Ying-jeou of the Kuomintang (KMT)) featured in the stimulus ads. Although prior exposure to Ma and Chen ads was assessed, the researcher only notes, “partisans and independents did not differ in their prior exposure to Ma’s and Chen’s ads” (Chang, 2003, p. 61). However, given that analyses focused on individuals who self-identified with the DPP or KMT, and “eighty-one percent of eligible voters” (p. 56) cast votes in the election, it may be safe to assume that participants were somewhat familiar with the two candidates featured in the experimental ads.
If individuals exert significant cognitive resources refuting arguments made in counter-attitudinal messages, then the reverse would occur, such that Republicans remember more from Democratic ads, and Democrats remember more from Republican-sponsored ads. Or, if attitudes are bipolar, and confirming and disconfirming information are equally elaborate and well-connected in attitude knowledge structures, then there may be no interaction between Ad Sponsor and Partisanship on memory.

**Ad Type and Partisanship.** There may be an interaction between Ad Type and Partisanship on memory for political ads. If different partisans are more or less responsive to particular types of emotions or emotional cues, this could create differences in information processing and subsequent memory for information presented in ads.

Theories and research suggest that those with different political ideological orientations (and/or those who endorse particular ideological attitudes) might have different underlying emotional predispositions. These emotional predispositions make individuals more or less sensitive to certain emotional stimuli (e.g., responses to threat), more or less prone to particular psychological states (e.g., anxiety, depression), and more or less apt to detect and display certain emotions.

Political party identification is closely tied to political ideology (Carmines & Berman, 1994; Schiffer, 2000). Conservatives are more likely to identify with the Republican Party, and liberals are more likely to identify with the Democratic Party. By biasing responses to certain emotional stimuli, emotional propensity differences among conservative and liberal ideologues might suggest that Republicans and Democrats respond differently to emotional political ad appeals.
**Ideological differences and precursors.** Scholars have devoted substantial attention to understanding the inherent differences between conservatives and liberals, and the precursors to developing conservative and liberal ideals, values, and attitudes. Much of the early research on ideological differences tends to focus on child rearing, socialization, and environmental factors in producing conservative and liberal ideologies (Adorno et al., 1950; Jennings & Niemi, 1968; Tomkins, 1965).

More recently, researchers have begun to explore the possibility that ideologies are interlinked with personality predispositions (Caprara, Barbarenlli, & Zimbardo, 1999; Caprara, Schwartz, Capanna, Vecchione, & Barbaranelli, 2006; Caprara & Zimbardo, 2004; Carney, Jost, Gosling, & Potter, 2008) as well as fundamental biological, emotional, motivational, and cognitive processes (Amodio, Jost, Master, & Yee, 2007; Carraro, Castelli, & Macchiella, 2011; Castelli & Carraro, 2011; Dodd et al., 2012; Janoff-Bullman, 2009; Janoff-Bullman, Sheikh, & Baldacci, 2008; Jost, Glaser, Kruglanski, & Sulloway, 2003; Kanai, Feilden, Firth, & Rees, 2011; Oxley et al., 2008; Vigil, 2010), although most researchers remain silent on the issue of causality.

However, some research on the role of genetics in fostering political proclivities suggests a role of our inherent biological constitutions on our political predispositions. Research on monozygotic and dizygotic twins suggests the heritability of political orientations, political attitudes, and strength of partisan attachments (Afrod, Funk, & Hibbing, 2005; Bell, Schermer, & Vernon, 2009; Settle, Dawes, & Fowler, 2009). Other research also suggests that genes may play a role in political ideology (Hatemi et al., 2011; Settle, Dawes, Christakis, & Fowler, 2010). Genes structure and inform our
biological composition, growth, and development. Our biological structure, chemical composition, and physiological wiring control our emotional responses to the environment, which may promote particular emotional predispositions and perhaps the adoption of particular political perspectives.

**Emotional predispositions.** Whether focusing on biological or environmental factors, research on political ideology suggests that conservatives and liberals differ in their emotional predispositions. Although oversimplified in this statement (with caveats explained more thoroughly below), much of this research seems to suggest that conservatives are predisposed to (e.g., heightened sensitivity to, stronger reactions to, more apt to report and display) negative emotions, whereas liberals are more predisposed to positive emotions.

**Authoritarianism.** Most theories and research exploring cognitive and emotional predispositions related to political ideology focus specifically on political conservatism (with liberalism assumed to be the opposite, or generally neglected). The most well-known and longest line of research is grounded in Adorno’s (Adorno et al., 1950) work on the authoritarian personality. Rooted in Freudian psychodynamics, the theory of this personality disposition suggested that repressed anger toward parental figures manifested as unadorned admiration and obedience toward authority figures.

The authoritarian personality has received much scholarly attention, from its inception in to the present day (Meloen, 1994). However, the theory of authoritarian personality has not proceeded unscathed. The most persistent and problematic critique is that authoritarianism (and the F-scale created to measure this personality type) is
ideologically biased. In its most extreme form, this criticism suggests that authoritarianism was developed to make conservatives look like fascists. Despite critiques, the link between authoritarianism and political ideology suggests that conservatism may be associated with emotional predispositions, particularly toward fear, anger, aggression, and contempt (Adorno et al., 1950, Altemeyer, 1996, 1998; Duckitt, 2001).

**Ideological polarity.** Research suggesting a relationship between conservatism and emotional predispositions also draws upon Silvan Tomkins’ (1963, 1965, 1987, 1995) theory of ideological polarity. The theory of ideological polarity theory suggests that generalized world orientations belong to either the left or right side of the ideological spectrum. Beliefs toward areas as diverse as mathematics, theology, the philosophy of science, metaphysics, epistemology, ethics, politics, art, psychology, psychiatry, educational theory, or child-rearing practices can be arranged on a very basic left-to-right continuum, according to Tomkins. The essence of this left-right ideology focuses on whether one believes that inherent value resides within man himself (a humanistic orientation, or left-leaning ideology) or that value exists external to and independent of man (a normative or right-leaning ideology).

The issues are simple enough. Is man the measure, an end in himself, an active creative, thinking, desiring, loving force in nature? Or must man realize himself, attain his full stature only through struggle toward, participation in, conformity to a norm, a measure, an ideal essence basically prior to and independent of man? In Greek philosophy this is the polarity between Protagoras and Plato, between the conception of man as the measure of all things and the conception of Ideas and Essences as the realm of reality and value. (Tomkins, 1995, p. 117).
The left is associated with liberty and humanism, whereas the right is associated with obedience and normative concerns. These orientations are determined, in part, through life experiences and their affective nature. Parents who encourage their children to focus on one’s inner self and development tend to reinforce emotions of excitement, joy, surprise, distress, and shame. These experiences lead to the adoption of humanistic values. In contrast, children raised according to a more punitive parenting model frequently experience feelings of anger, disgust, and contempt. This results in concerns about normative expectations and rule following.

**Motivated social cognition.** In their seminal work, on political conservatism as “motivated social cognition,” Jost and colleagues (Jost et al., 2003) argue that the core principles underlying the conservative ideology are fear of or resistance to change, endorsement of inequality, and the need to manage uncertainty and threat. Dispositional responses or needs related to fear and threat are intimately associated with (if not fully representative of) emotional needs and predispositions. Endorsement of inequality derives from or instills emotional predispositions, furthering this preference. These authors suggest that conservatism is related to epistemic and existential needs, such as uncertainty avoidance, regulatory focus (fear of loss), and terror management (fear of death), which are fundamentally related to emotions and motivations. Lastly, the authors review research suggesting that conservatism is directly related to emotions, including fear, anger, aggression, disgust, and contempt.

**Disgust.** Research also suggests that conservatism may be related to a heightened concern for and sensitivity to disgust. Haidt (2003) suggests that disgust may be used
(primarily by conservatives) to impose moral order, which liberals are apt to find disconcerting. “This disgust-based moral order may be disturbing to some people, particularly to political liberals and libertarians,” whereas moral motivations related to disgust “are attempts to impose, defend, or rectify a particular (conservative) moral order against perceived threats,” (Haidt, 2003, p. 858). Haidt and colleagues (Graham, Haidt, & Nosek, 2009; Haidt & Graham, 2007) suggest that conservatives are more likely than liberals to endorse and apply morals related to purity/sanctity (with the violation of purity leading to disgust).

Inbar and colleagues have also found that heightened sensitivity to disgust is related to conservatism. Inbar, Pizarro, and Bloom (2009) measured participants’ “disgust sensitivity” (assessed by measuring sensitivity to a wide range of disgust-inducing stimuli, such as bodily secretions, rotting meat, death, blood, and unusual sexual practices), the scores of which were related to self-reported conservatism and conservatives attitudes, such as opinions about abortion and gay marriage. This relationship between disgust sensitivity and conservatism was found not only in the United States, but also among a cross-cultural sample including individuals from 121 countries (Inbar, Pizarro, Iyer, & Haidt, 2012). These researchers also found that inducing disgust (by exposing participants to a disgusting odor) led participants to report less positive feelings (or less warmth as reported using feeling thermometers) toward gay men, but not toward gay women, African Americans, or the elderly.

**Threat.** Research also suggests that conservatives may have lower thresholds for threat perceptions and heightened sensitivity to threat. Tomkins’ (1965) conducted a
stereoscopic study, in which participants were simultaneously exposed to two photos of the same individual portraying different emotions (e.g., sadness, happiness, anger, contempt, and fear). On each trial, two photos were presented binocularly, with one emotional display presented to the left eye, and a different emotional display presented to the right eye. After each trial, individuals were then asked to describe the emotion they had just seen. Results indicated that left-leaning individuals were more likely to perceive the smiling face, and right-leaning individuals were more likely to perceive the contemptuous face.

Vigil (2010) presented Republicans and Democrats with photos of individuals making ambiguous (“i.e., not expressing a discrete emotion,” p. 551) facial expressions. After viewing each photo, participants were asked to identify the facial expression of the individual in the photo. Responses were coded as threatening (anger, fear, disgust) or non-threatening (joy, sadness, surprise). Results indicated that Republicans were more likely than Democrats to interpret the ambiguous faces as expressing a threatening emotion.

Researchers have found that authoritarianism was related to self-reported feelings of threat following the 9/11 attacks (Huddy, Feldman, Taber, & Lahav, 2005), and that right-wing authoritarianism was related to perceptions that the world is dangerous and threatening (Altemeyer, 1998). Jost et al.’s (2003) meta-analysis found that political conservatism was related to fear and threat.

Research also indicates that conservatives may have stronger physiological reactions to threat. Oxley and colleagues (Oxley et al., 2008) measured skin conductance
responses (as an index of emotional arousal) while participants were exposed to threatening images (e.g., a larger spider on a person’s face, a bloody face, and an open wound with maggots on it). The researchers also used orbicularis oculi electromyogram to measure the startle blink reflex while participants were exposed to an auditory loud white noise. Results indicated that individuals who had more socially protective attitudes (measured as participants’ attitudes on 18 political issues, such as support for military spending, the death penalty, gun control, gay marriage, and immigration) was related to a larger change in skin conductance when exposed to the threatening images, and a larger startle blink EMG response during exposure to the loud noise.

**Responses to positivity and negativity.** Research also indicates that conservatives are more attentive to (and distracted by) negative stimuli. Carraro et al. (2011) found that conservatives were more attracted to negative information than liberals across three experiments. In the first experiment, participants performed an Emotional Stroop Task. Participants were exposed to positive and negative words, printed in blue or red. Participants were asked to indicate the color in which the word was written as quickly as possible. Slower responses to this task indicate that the valence (positivity or negativity) of the word has distracted participants from the task (i.e., the positive or negative information has attracted the attention of the participant).

In the first experiment, political ideology was measured as self-reported attitudes to six social issues, with higher scores corresponding to a more conservative ideology. A difference score was calculated by subtracting response latencies for positive stimuli from response latencies for negative stimuli, such that positive scores indicated slower
responses to negative relative to positive words. Ideology was positively associated with this difference scores, indicating that the more conservative the participant, the slower his/her responses were to negative relative to positive words. “This indicates that more conservative individuals had a stronger automatic vigilance toward negative as compared to positive stimuli,” (Carraro et al., 2011, p. 3). Regression analyses indicated that political ideology was positively associated with response times for negative words and negatively associated with response times for positive words. Analysis of variance indicated that conservatives were slower to respond to negative compared to positive words, whereas liberals gave faster responses for negative than positive words, although the latter difference was not statistically significant.

In the second and third experiments, participants performed a Dot-Probe Task. On each trial, participants were exposed to two different pictures (one positive and one negative) simultaneously, one on the left side and one on the right side. Shortly after the pictures appeared, a grey dot appeared on either the left or right of the screen. Participants were asked to indicate as quickly as possible on which side of the screen the dot appeared. As opposed to the Emotional Stroop Task, in the Dot-Probe Task, faster responses indicate that individuals’ attention have been drawn to the valence of the picture on the same side of the screen as the dot appears. That is, if the dot appears on the same side of the screen as a negative/positive picture was initially shown, fast responses about the location of the dot indicates that participants’ attention was drawn to the negative/positive image prior to the appearance of the dot.
In the second experiment, results indicated that political ideology (measured as self-reported attitudes on 10 social issues, with greater conservatism indicated by higher scores) was positively correlated with a difference score calculated by subtracting response latencies for negative images from response latencies for positive images (such that higher scores indicate slower responses after positive compared to negative images, indicating attention is biased toward the negative pictures). Liberals’ responses were faster when the dot appeared on the same side of the screen as a positive rather than negative image, whereas conservatives’ responses were faster when the dot appeared on the same side of the screen as a negative image.

In the third experiment, results indicated that political ideology (measured as self-reported attitudes on 15 social and economic issues, with greater conservatism indicated by higher scores) was negatively related to response latencies when the dot followed a negative picture, and positively related to response latencies when the dot followed a positive picture. A difference score for response latencies for negative and positive images (calculated the same as above such that positive scores indicate slower responses following positive relative to negative images) was also positively associated with ideology.

Dodd et al. (2012) measured physiological responses to positive and negative stimuli, finding that “greater orientation to aversive stimuli tends to be associated with right-of-centre and greater orientation to appetitive (pleasing) stimuli with left-of-centre inclinations,” (p. 640). In the first experiment, political ideology was assessed by combining four measures, including (1) political party identification, (2) self-identified
ideological position (liberal-conservative), (3) 28 items measuring policy preferences, and (4) an index of social principles. Participants’ skin conductance was measured as they viewed positively and negatively valenced images.

When participants were split at the mean on the ideology composite measure and analysis of variance was conducted, increases in skin conductance levels (SCLs) were found to be greater for negative relative to positive images for conservatives, whereas SCL increases were greater for positive relative to negative images for liberals. A difference score was calculated by subtracting SCLs while viewing positive images from SCLs while viewing negative images. Regression analysis indicated that this difference score (with higher scores indicating greater responses to negative relative to positive stimuli) was positive associated with political ideology (with conservatism indicated by higher scores).

Participants were also shown pictures of well-known politicians (Ronald Reagan, Bill Clinton, Hilary Clinton, and George W. Bush). Dodd et al. (2012) suggest that pictures of politicians with the same ideology as the participant will be viewed as positive, whereas pictures of politicians with the opposite ideology as the participant will be viewed as negative. Results showed that SCL increases were greater for politicians with dissimilar versus similar ideology for conservative participants, but greater for politicians with similar versus dissimilar ideology for liberal participants. “Thus, whether the focus is on generically aversive/appetitive stimuli or on specifically political stimuli, the results suggest that individuals on the left are more responsive to appetitive relative to
aversive stimuli, while individuals on the right are more responsive to aversive relative to appetitive stimuli,” (p. 644).

In their second study, Dodd et al. (2012) used eyetracking technology to measure participants’ gaze toward positive and negative images. Political ideology was assessed by combining participants’ scores on measures of party identification and items tapping specific policy and broad political preferences. Participants were shown collages of four equally sized pictures. Some of these collages included one positive and three negative images, and some included one negative and three positive images. The researchers examined two measures recorded by the eyetracker, including dwell time (the amount of time spent looking at an image) and first fixation time (time elapsing from the start of the trial before participants looked at an image). Mixed ANOVA analysis indicated that although both liberals and conservatives devoted more attention (dwell time) to negative relative to positive images, this effect was stronger for those on the political right.

Attentional bias to a stimulus is indicated by longer dwell times, but shorter first fixation times. A significant interaction between ideology and image type (positive versus negative) was found for first fixation times. Conservatives first fixated on negative images faster than liberals, whereas liberals fixated on positive images more quickly than conservatives. A continuous measure of political ideology (with higher scores indicating more conservatism) was positively related to dwell time and negatively related to first fixation time for negative images.

**Liberalism.** Theories and research on emotional predispositions of liberals is much less developed compared to the abundance of research devoted to proclivities of
conservatives. George Lakoff (2008) argues that progressive (a term which he prefers over the word “liberal”) thought is dominated by empathetic motivations and responses. Other theories have also emphasized the role of empathy in the liberal perspective. As mentioned above, Silvan Tomkins’ (1965, 1987, 1988, 1995) theory of ideological polarity suggests that liberals are inclined toward humanitarianism. Drew Westen (2007) argues that whereas conservatives may be most vulnerable to what John Haidt (2003) refers to as other-condemning emotions (anger, contempt, and disgust), liberals are more susceptible to self-conscious emotions (shame, guilt), other-suffering emotions (compassion, empathy), and other praising emotions (admiration).

*Negativity bias among Republicans and positivity bias among Democrats?* If conservatives are more responsive to negative stimuli (particularly threat) and liberals more responsive to positive stimuli, there may be an interaction between Ad Type and Partisanship on Memory. Republicans (more likely to be conservative) may be more attentive to and more thoroughly process information in Negative political ads, whereas Democrats (more likely to be liberal) may be more attentive to and process information in Positive ads. Empirical evidence suggesting a proclivity toward positive or negative messages among Democrats and Republicans is scant. However, Ansolabehere and Iyengar (1995) find that Negative ads are more effective (i.e., persuasive) for Republicans, whereas Positive ads are more effective for Democrats.

*Political party homogeneity.* Research indicates that Republicans may be more ideologically homogenous as a group than Democrats. Conventional wisdom suggests relatively enhanced ideological homogeneity among Republicans compared to
Democrats. Referring to economic issues in particular, Chait (2001) suggests, “Republicans are a homogeneous conservative party, while Democrats are a heterodox mix of moderates and liberals.” More specifically, Chait proposes that Republicans cater almost exclusively to business interests, whereas Democrats balance the interests of business, labor, and environmental groups.

Empirical research demonstrates a stronger tendency toward ideological homogeneity among Republicans than Democrats in the general U.S. population. Research by Carmines and Berkman (1994) indicated that although ideological moderates and liberals comprised the majority of the Democratic constituency from 1972 to 1988, conservatives constituted at least 25 percent of Democrats. “In short, not only are Democrats more ideologically divided and heterogeneous than Republicans, but conservatives represent a significant segment of the party, unlike liberals within the Republican Party,” (Carmines & Berkman, 1994, p. 204).

Other researchers have found similar results. Levitin and Miller (1979) analyzed party identification and ideological self-placement using 1972 and 1976 survey data from the Center for Political Studies. These researchers found that Democrats were about evenly split between liberals and conservatives, whereas ideological conservatives constituted the modal group among Republicans. Grofman, Merrill, Brunell, and Koetzle (1999) analyzed American National Election Studies (ANES) panel data from 1988 to 1992, finding that in 44 out of 50 states, Republicans were more ideologically homogenous than Democrats. Clinton (2006) analyzed 1999 survey data from Knowledge Networks (KN) and the National Annenberg Election Survey, and found that
the constituents in Democrat U.S. House districts (i.e., those in which a Democrat House member was elected) were more ideologically heterogeneous than constituents in Republican districts.

Research also provides some evidence that Democratic elected officials are more ideologically heterogeneous than their Republican counterparts. Analyzing roll-call votes of the 1979 U.S. Congress, Poole and Daniels (1985) found that Democratic elected officials were much less ideologically homogeneous than Republican. Ray (1980) found that Democratic Congressional leaders (from 1969 to 1978) were less homogenous than Republicans in their support of national security issues. On the other hand, Burden’s (2004) analysis of 1988 House candidates revealed that Republican candidates were more ideologically heterogeneous than Democratic candidates. The rise of the Tea Party in recent years may suggest that Republicans are more heterogeneous than previous research suggests. However, a recent study by the Pew Research Center (2011) demonstrates that Republicans are more demographically and ideologically homogenous than Democrats.

If Republicans are, as a group, more homogenous than Democrats, there may be an interaction between Ad Type and Partisanship such that there is a stronger effect of Negative relative to Positive ads on Memory among Republicans compared to Democrats. That is, there may be a negativity bias among both groups, but this negativity bias may be stronger among Republicans. Since Republicans are predominantly conservatives, a memory advantage for Negative relative to Positive ads may be readily apparent among this partisan group. However, if Democrats include both liberals (less
sensitive to negativity) and conservatives (heightened sensitivity to negativity), the negativity bias might be weaker or canceled out among members identifying with the Democratic Party.

3-way interaction. In addition to 2-way interactions between Ad Type, Ad Sponsor, and Partisanship on Memory, there may also be a 3-way interaction among these variables. A 3-way interaction could take a number of different forms. One example is described here, in which Ad Type moderates the interaction effect between Ad Sponsor and Partisanship.

As described above, there may be a 2-way interaction between Ad Sponsor and Partisanship. Recall that the congeniality hypothesis suggests that Republicans will remember Republican-sponsored advertisements (attitude-consistent) more than Democratic-sponsored ads (attitude-inconsistent). Democratic will remember Democratic-sponsored ads better than Republican-sponsored ads. However, this moderating effect could depend on Ad Type. For instance, memory for attitude-consistent information may be stronger for a Negative Ad relative to a Positive Ad. This could occur if attitude-consistent information criticizing an opposing candidate elicits a stronger emotional response than attitude-consistent information promoting a supported candidate.

*RQ1: Are there any 2-way or 3-way interactions between/among Ad Type, Ad Sponsor, and Partisanship that moderate memory effects of political ads?*

**Research Question: What About Arousal?**

Theories of emotion and research on approach and avoidance gradients suggest separate positive and negative motivational substrates, and potential differences in
memory for positive and negative information. However, empirical research using more complex emotional stimuli or events yield mixed results. Research on memories from an individual’s life shows an inconsistent influence of emotional valence on memory. People tend to rate positive life events as being better remembered than negative life events. However, objective measures of accuracy often find no effect of valence, and sometimes better recollection of negative compared to positive events (Levine & Pizzaro, 2004).

In mass media research more generally, some studies have found that negative TV messages are remembered better than positive TV messages (Reeves, Newhagen, Maibach, Basil, & Kurz, 1991). On the other hand, some research has found no effect of emotional valence on recognition accuracy or speed (Levine & Pizzaro, 2004). As described at length in an earlier section, the mixed results in the political advertising literature may result, in part, from a failure on the part of researchers to measure intended versus evoked emotion. Use of stimuli across the spectrum of emotional arousal may also account for inconsistent results. That is, the negativity bias should manifest in information processing and memory differences at moderate rather than low or high levels of arousal.

Finally, some researchers have argued it is emotional arousal (rather than positivity or negativity) that ultimately drives the depth and extent of information processing. When emotional arousal is held constant or controlled, there may no difference between memory for positive and negative messages (M. M. Bradley, Greenwald, & Hamm, 1993), or positive information may even have an advantage (M. M. Bradley, Greenwald, Petry, & P. J. Lang, 1992; A. Lang, Dhillon, & Dong, 1995).
This effect of arousal on memory has been shown when researchers examine how individuals’ self-reported emotional arousal relates to memory (M. M. Bradley et al., 1992) as well as how the effect of different arousal levels of a message (measured as an average of arousal ratings across participants) influence memory (A. Lang et al., 1995).

For instance, in the study on memory for television messages described earlier, A. Lang et al. (1995) showed participants 12 video segments, three of which were devoted to each of the following categories: (1) high arousal negative, (2) high arousal positive, (3) low arousal negative, and (4) low arousal positive. Messages were selected for these categories based on pretest ratings of the messages, in which undergraduate students rated each video segment for emotional arousal, valence, and dominance. Mean arousal and valence scores were then used to select the final stimuli. A. Lang et al. (1995) found that positive compared to negative messages led to greater total memory ($M = 58.17$ versus $M = 52.07$, respectively) and number of sentences ($M = 9.295$ versus $M = 7.96$, respectively), but not number of words, as coded from participant recall protocols. The authors conclude that emotional arousal, rather than valence, determines information processing capacity, cognitive resource allocation, and memory. “Results show that when valence (how positive or negative a message is) is controlled, arousing messages are remembered better than calm messages. When arousal is controlled, positive messages are remembered better than negative messages,” (p. 313).

This dissertation uses political ad stimuli that were intentionally selected to be moderately arousing, as rated by four graduate student coders (described more in the Methods section under Stimuli). If a negativity bias is to exert an impact on memory, it
should occur at this level of arousal. However, even within this moderate level, self-reported arousal should vary among individuals for particular ads. According to some researchers, it should be emotional arousal (rather than emotional valence or Ad Type) that impacts information processing and memory. To assess whether emotional arousal subsumes any Ad Type effect on memory, this study measures self-reported emotional arousal to each experimental ad stimuli. After examining H1, H2, and RQ1 and selecting the best fitting model, self-reported arousal is statistically controlled in analyses.

**RQ2:** *Will main or conditional effects of Ad Type remain statistically significant when the emotional arousal of an ad is controlled?*

The suggestion that arousal rather than positivity or negativity is the main factor in enhancing memory is an interesting proposal, although in some respects difficult to interpret. Recall that positivity/negativity and arousal are intimately related, with arousal indicating the intensity or level of approach/avoidance motivational system activation. The negativity bias suggests that a one-unit increase in arousal leads to a greater increase in negativity system activation than a similar one-unit increase to the positivity motivational system. But if negative information is inherently more arousing than positive information, how does one simultaneously control emotional valence and arousal?

As a stimulus becomes more negative, it becomes more arousing at a faster rate than positive stimuli become arousing. This is Cacioppo’s negativity bias. The most complete study to date to examine television content found that when arousal is controlled, positive television content is better remembered (A. Lang, Dhillon, and Dong 1995). Controlling arousal in this fashion is somewhat misleading, however. Because of the negativity bias, television ads can be matched on only one dimension: valence or arousal. If the positive ads are as positive as the negative ads are negative (e.g., on the two scales used here), then
the negativity bias suggests that the negative ads will be more arousing. However, if arousal is held equal, the negativity bias predicts that the positive messages will be more positive than the negative messages are negative. (S. D. Bradley et al., 2007, p. 125, *italics original*)

S. D. Bradley et al.’s (2007) critique seems valid in some instances. For instance, when one is examining the effects of average positivity and negativity ratings across a range of stimuli, messages that are comparable in valence should differ in arousal. That is, according to the negativity bias, on average, negative and positive messages that are equal (but opposite) in valence should be higher and lower in arousal, respectively. However, this does not exclude the possibility that one can find particular instances in which a negative stimulus that is just as negative as a positive stimulus is positive may be equal in arousal to its positive counterpart.

Furthermore, the critique is not particularly relevant to the present study because Positive Ads and Negative Ads are defined according to their intended purposes (promote vs. derogate) rather than the emotions they actually elicit. Thus, it is reasonable to believe (and described further in the Methods section) that one may select Positive and Negative Ads that are equal in levels of arousal (as rated by expert coders). Individuals’ self-reported emotional arousal to these messages should still vary, and may influence memory for ad content beyond the effect of Ad Type.
Chapter 9: Self-Report, Behavioral, and Physiological Measures of Information Processing

Getting Inside the Black Box

As the field of communication expands and matures, understanding the communication processing mechanisms that occur within the “black box” of the human mind becomes increasingly important.

Inquiry in individual-level mass media effects has been limited by conceptualizing the human processor as an impenetrable “black box” with unknowable processes taking place between message reception and the traditional outcomes of learning, attitudes, or behaviors. Instead, we see these component processes as both important outcomes and predictors in their own right. In short, the perennial black box of mass media effects can be better illuminated by examining the black box of human information processing that goes on within it. (Geiger & Newhagen, 1993, p. 42)

Understanding what goes on inside the human mind is certainly no easy feat. There are a number of methodologies at the disposal of researchers interested in exploring these information processing mechanisms. Some studies use performance on memory measures to infer the extent of information processing. Researchers may also use verbal protocol self-report measures, asking individuals to report their thoughts and feelings during or after stimuli or message exposure. Researchers may also rely on participants’ response times to various tasks. Another method includes measuring psychophysiological responses related to peripheral nervous system activity, such as heart rate, skin conductance, and facial electromyography.
All of the abovementioned measures provide valuable insight into information processing mechanisms. However, while information processing pertains to activities of the mind, none of these measures provide direct evidence of activity, processing, and responses of the brain. This study uses electroencephalogram (EEG) recordings to measure brain activity while participants watch political TV ads. It is suggested here that memory is mediated by depth and extent of semantic processing, measured as neural oscillation power in the gamma frequency range (semantic processing and gamma are described in much more detail below). Before reviewing the basis of EEG recordings and research using EEG, it will be useful to first understand why recordings of brain activity should be particularly helpful in illuminating information processing during exposure to communication.

**Memory measures.** As discussed in an earlier section, A. Lang’s (2000) limited capacity model suggests that different measures of memory (recognition, cued recall, and free recall) index particular information processing components (encoding, storage, and retrieval, respectively). By comparing performance on different memory measures, this model makes inferences about the thoroughness of information processing at the encoding, storage, and retrieval stages. Memory measures are important tools for understanding what has occurred in the mind of an individual processing a message. The limited capacity model of information processing provides a nice model for understanding how individuals process information. However, this model requires researchers to make inferences about information processing based on results of memory measures rather than tapping information processing directly.
**Verbal protocols.** Other self-report approaches to examining individuals’ processing of stimuli and communication messages arise from cognitive assessment methodologies. These methods were devised with the understanding that how people think about, process, cogitate on, and elaborate upon messages is fundamental to ultimate cognitive and behavioral outcomes. “By ‘cognitive responses,’ we mean those thoughts that pass through a person’s mind as he or she anticipates, receives, or reflects upon a message designed to change beliefs, attitudes, or behaviors,” (Cacioppo & Petty, 1991, p. 310).

One of the more well-known techniques is the think aloud procedure (Duncker, 1945; Genest & Turk, 1981). The name of this procedure is an apt characterization of the method. Participants are instructed to verbally state thoughts that come to mind as they are exposed to some type of information. The think aloud method was originally developed to understand how individuals solve problems, although its applicability spread to a number of domains, including reading strategies (Magliano & Millis, 2003), text comprehension (Davey, 1983), processing of online content (Eveland & Dunwoody, 2000), technology usability testing (van den Haak, de Jong, & Schellens, 2003), and decision making (Kushniruk, 2001; Payne, 1976).

Another cognitive assessment technique is the thought listing procedure (Brock, 1967; A. G. Greenwald, 1968; Cacioppo & Petty, 1981). In this procedure, instructions ask participants to list thoughts prompted by the stimulus in particular, thoughts about the topic generally, or all thoughts that occurred in anticipation of and while attending to the stimulus (Cacioppo & Petty, 1981, p. 316). Participants may complete this thought listing
procedure in written or spoken form, and during or following stimulus or communication exposure. These spoken verbal reports may be given concurrently or retrospectively. The session is recorded and participants’ reports are later transcribed.

Cognitive assessment approaches are valuable methods for probing into the minds of message consumers. However, research has repeatedly shown that humans have limited access into the processes of their own minds. In many instances, individuals lack the insight necessary to identify what it is they are thinking. Additionally, the task of asking respondents to report what they are thinking disrupts the natural cognitive processing mechanisms that would ensue during or after message presentation. (For a critique and defense of the use of verbal self-reports of cognitive processes see Nisbett & Wilson, 1977, and Ericsson & Simon, 1980.) Finally, the brain processes information much more quickly than respondents can attend to and articulate their thought processes. If researchers are interested in real-time or dynamic changes in cognitive processes, verbal reports may provide little assistance in this endeavor.

**Reaction times.** Researchers may use reaction or response time tasks to gauge information processing. The well-known Stroop test (Stroop, 1935), for instance, examines cognitive attention and interference by measuring the time it takes for participants to name the color of a rectangle or a word. The words are typically the names of colors. Naming the color of the rectangle occurs more quickly than naming the color of printed words when the word represents another color. The conclusion is that the semantic meaning of the word draws the attention of the participant, which then interferes with naming the color in which the word is written.
**STRTs.** Media psychology studies examining information processing may also use secondary task reaction times (STRTs) to indirectly gauge cognitive activity. Questions about cognitive resource allocation tend to rely heavily on the STRT approach. In an STRT study, participants are asked to perform two tasks. Participants are told that the primary task (e.g., watching a television message) is the most important. They are also given a secondary task. This could entail, for instance, pushing a button as fast as possible after hearing a particular auditory signal.

The signal requiring a response pertaining to the second task is called the secondary task probe. The time it takes for participants to complete the secondary task (i.e., the time it takes for the respondent to push a button after the secondary task probe is presented) is known as the STRT. In theory, more resources are required by the primary task as the primary task becomes more cognitively difficult, demanding, or challenging. As more resources are allocated to the primary task, fewer resources are available to respond to the secondary task. This results in a slower STRT.

The STRT has a long history in cognitive psychology. When applied in the media psychology laboratory, some strange and counter-intuitive results emerged. For instance, some studies found that STRTs were slower for simple compared to complex messages (Britton & Tesser, 1982; Britton, Westbrook, & Holgredge, 1978). This would seem to imply that simple messages require more resources than complex messages, a neither sensible nor reasonable conclusion.

A. Lang and colleagues (A. Lang, S. D. Bradley, Park, Shin, & Chung, 2006) argue that strange or inconsistent findings using STRTs can be reconciled by re-
conceptualizing the meaning of STRTs as available rather than remaining resources.

Four components are included in the resource pool comprising mental resources or capacity. *Total Resource Pool* simply refers to the total amount of resources an individual has at her disposal. *Resources Allocated* refers to the resources devoted to a particular process (e.g., resources allocated to encoding). *Remaining Resources* refers to the resources remaining in the total pool after some have been allocated to a particular process (Remaining Resources = Total Resources – Resources Allocated). *Available Resources* is the difference between the amount of resources allocated and the resources actually required (Available Resources = Resources Allocated – Resources Required). Slower STRTs to simple compared to complex messages could be explained because fewer resources are allocated to simple stimuli, resulting in slower reaction times.

Behavioral measures of participants’ reaction times to a primary or secondary task have been used extensively in cognitive and experimental psychological studies to examine information processing. These measurement techniques have revealed a number of valuable insights into the processing of information. However, inferences about information processing are based on a number of (sometimes untested or untestable) assumptions, such as what processing components comprise a total reaction time, the number, size, and composition of cognitive resources available to an information processor, how various tasks compete for or demand cognitive resources, and whether facets of information and communication have an additive or selective influence on cognitive processing and resource allocation.
A psychophysiological approach. Understanding the black box of message processing can also be facilitated by physiological measurements. The history of physiological recordings in communication research is long in duration but restricted in prevalence. The area of psychophysiology in communication comprises a small but growing body of work in the communication literature.

According to R. F. Potter and Bolls (in press), physiological measures in communication have progressed in three stages. In the first two stages, the use of physiological data entered and then quickly exited the field of communication. Only in the third and ongoing stage have researchers fully embraced a truly “psychophysiological” approach. This psychophysiological perspective may lead to a more permanent presence of physiological data in communication research.

Not until media researchers fully embraced the theoretical underpinnings of psychophysiology—as opposed to just viewing physiological responses as more and different media effects one could measure—were they able to successfully utilize indices like heart rate, skin conductance and brain wave patterns as indicators of psychological states that vary in meaningful ways during the processing of mediated messages. (R. F. Potter & Bolls, in press, p. 23, *italics original*).

The first stage of physiological data in communication studies focuses on one particular study. The Payne Fund Studies of the 1930s attempted to examine potentially detrimental effects of motion picture films on audiences, particularly the youth population. Two researchers involved in these studies collected physiological data (including skin resistance and pulse rate) as participants watched movies (Dysinger & Ruckmick, 1933).
During the second debut of physiological recordings in mass media research, scholars seemed particularly immersed in a behaviorist stimulus-response (S-R) approach to media effects. Media scholars employed one or two simple physiological recordings and used these responses as direct measures of media effects. The misguided understanding of physiology as an “effect” of media and the mistaken belief that a given physiological response is a simple and direct indicator of a media effect led to study results that were often confusing and inconsistent.

Donnerstein and Barrett (1978) studied anger, erotic film viewing, and aggression. Blood pressure was measured and used as a direct indicator of arousal. Results indicated that individuals with higher physiological arousal (operationalized as mean blood pressure) acted less aggressively, which contradicted the expectations of Excitation Theory (Zillmann, 1971). “Sometimes during this ‘second wave’ of physiological measurement in media research physiological dependent variables did not act as expected and subsequent behaviors did not cleanly match,” (R. F. Potter & Bolls, in press, p. 45).

According to a truly psychophysiological approach, adopted during the currently ongoing third period of physiological measurement in media research, physiological responses do not necessarily represent effects of media, but rather should be seen as intervening processes during message processing. That is, physiological responses are markers or indices of ongoing cognitive and emotional processes during and after viewing of media stimuli. Furthermore, the relationships among and within emotional processes, cognitive processes, and physiological systems are complex. Physiological
responses are “monstrosities” (Cacioppo, Tassinary, & Berntson, 2000, p. 20), with any single physiological response multiply determined by environmental stimuli, internal physical and biological processes, and ongoing feelings and thoughts.

**PNS responses.** The bulk of psychophysiological studies in communication research focus on peripheral nervous system (PNS) responses. The nervous system is divided into the central nervous system (CNS) and the peripheral nervous system (PNS). The central nervous system includes neurons within the spinal cord and skull, whereas the peripheral nervous system includes neurons outside of these structures.

The PNS is divided into the sensory-somatic and autonomic nervous systems. The autonomic nervous system is further subdivided into two branches, the sympathetic nervous system and the parasympathetic nervous system. Generally speaking, in the sympathetic nervous system, efferent pre-ganglion neurons exit the central nervous system, emanating from the thoracic and lumbar segments of the spinal cord, synapse in the chain of ganglia near the spinal cord, and exit as post-ganglion neurons that innervate various internal organs and glands. This branch of the autonomous nervous system prepares the body for action or mobilization, or fight-or-flight responses. In the parasympathetic nervous system, efferent neurons emanate from and exit the brain stem and sacral spinal segments of the central nervous system, and tend to synapse on ganglia near or in the walls of target organs. This branch of the autonomous nervous system is generally responsible for the relaxation of the body. Common psychophysiological measures of PNS responses include heart rate (HR), skin conductance response (SCR),
and facial electromyography (EMG). These measures may be used as indicators of cognitive and/or emotional information processing mechanisms.

**Skin conductance.** Skin conductance is influenced by the sympathetic activation of the autonomic branch of the peripheral nervous system. Psychophysiologists generally use skin conductance as an index of arousal (regardless of emotional valence). Communication researchers have used skin conductance to measure arousal levels in a variety of communication contexts, such as listening to radio advertisements and messages (Bolls, Lang, & Potter, 2001; R. F. Potter & Choi, 2006; R. F. Potter, 2009), watching PSAs (A. Lang, Chung, Lee, Schwartz, & Shin, 2005), watching video clips from TV programs, ads, and movies (A. Lang, Zhou, Schwartz, Bolls, & Potter, 2000), playing video games (Ivory & Kalyanaraman, 2007), and viewing pictures (A. Lang, Chung, Lee, & Zhao, 2005).

One problem with the use of skin conductance responses (SCRs) in communication research is that SCRs tend to attenuate over the course of an experiment. This is an example of habituation. Habituation refers to the process of diminished responses upon repeated presentation of the same stimulus. Despite being a rather ubiquitous phenomenon, occurring across a range of species and physiological systems, “there is no universally accepted explanation of why habituation occurs” (Stern et al., 2001, p. 55). According to Stern and colleagues, Soklov’s (1963) comparator theory of habituation and Groves and Thompson’s (1970) dual-process theory of habituation are two of the most well known explanations for habituation of psychophysiological responses.
Skin conductance habituation in our data can be addressed in a number of ways. Dawson, Schell, and Filion (2007) describe three commonly employed techniques for addressing SCR habituation. The “trials-to-habituation” measure involves counting the number of repetitions of a given stimulus required to reach some pre-specified level of habituation, such as two or three consecutive presentations producing no measurable SCRs. Another technique involves calculating the rate of decline of SCR magnitude across presentation trials, accomplished by assessing the main or interaction effect of trials on SCR using analysis of variance. A third measure involves performing a regression analysis of SCR magnitude on the log of the trial number, which results in a slope and intercept score. Although these measures tend to be highly correlated, researchers have used covariance procedures to remove the dependency of the slope on the initial value or intercept. Unlike the ANOVA approach, this technique allows researchers to calculate individual habituation scores, and isolated SCRs will contaminate this measure less than the trials-to-habituation technique.

**Heart rate.** Communication scholars may use HR to measure attention or orienting responses. HR deceleration is generally used as an index of attention. Heart rate also plays a role in the orienting response, which occurs in response to novel or significant stimuli and events. Orienting responses are “automatic, reflexive, attentional responses to changes in the environment, or to stimuli that people have learned signal important information,” (A. Lang, Borse, Wise, & David, 2002, p. 217).

Communication scholars have used heart rate to measure attentional processes and orienting responses in a number of media contexts, including watching TV ads (A.
Lang, 1990), reading text online (A. Lang et al., 2002), listening to radio advertisements and messages (Bolls et al., 2001; R. F. Potter & Choi, 2006; R. F. Potter, 2009), watching video clips from TV programs, ads, and movies (A. Lang et al., 2000), viewing pictures (A. Lang et al., 2005), watching TV news stories (A. Lang et al., 1996), and viewing TV and film images on different sized screens (Reeves, Lang, Kim, & Tatar, 1999).

In examining attention to media using HR measures, attention is generally indexed by HR deceleration. However, the heart is dually innervated by the sympathetic branch and the parasympathetic branch of the autonomic nervous system. Activation of the sympathetic branch (or the fight-or-flight system) is generally seen as a measure of arousal, and results in increased heart rate. On the other hand, activation of the parasympathetic branch, or the rest-and-relax system, is generally seen as an indication of cognitive processing or attentional resources devoted to perceptual processing, and results in a decrease in heart rate (Berntson, Cacioppo, & Fieldstone, 1996).

Researchers tend to assume that in the context of media viewing, exposure to arousing media messages is generally not arousing enough to elicit sympathetic activity, which would override deceleration caused by the parasympathetic system. However, since dual innervation of the heart causes complexity in interpreting heart rate data alone, some researchers have suggested that media researchers use heart rate variability (HRV) in an effort to parse out the separate contributions of the sympathetic and parasympathetic systems to heart rate (N. Ravaja, 2004). HRV is a promising and exciting new measure for communication scholars, but is still in its infancy in communication research.
**Facial EMG.** Facial electromyography (EMG) is influenced by activation of the somatic branch of the peripheral nervous system. The facial muscles studied most extensively by psychophysicologists include the corrugator supercili and zygomaticus major. Measurements of activity over these muscle groups are generally used as indices of negative and positive emotional responses, respectively (Cacioppo, Petty, Losh, & Kim, 1986).

The corrugator supercili muscles are located above the eyes, near the base of the eyebrows. They control the lowering and raising of the eyebrows and are involved in frowning. The corrugator supercili muscles have been found to contract when viewing unpleasant pictures (Cacioppo et al., 1986; P. J. Lang, Greenwald, Bradley, & Hamm, 1993). Activation over these muscles is frequently used as an indicator of negative emotional reactions or aversive motivational system activation.

The zygomaticus major is responsible for tightening of the cheek (Tassinary, Cacioppo, & Geen, 1989). Activation of this muscle occurs during smiling. Zygomaticus major activity increases while viewing positive stimuli, is negligible during the viewing of neutral or moderate stimuli, and increases again for highly negative stimuli (such as mutilation and death), which indicates a quadratic association between pleasantness and activation of the zygomaticus major muscle (M. M. Bradley & Lang, 2000b; P. J. Lang et al., 1993). Generally, however, zygomatic EMG activity is used as a measure of positive emotional responses or activation of the appetitive motivational system.

Communication scholars have used facial EMG to measure activity over the corrugator supercili and zygomaticus major to index negative and positive emotional
responses, respectively (Bolls et al. 2001; Hazlett & Hazlett, 1999; M. Ravaja, Saari, Kallinen, & Laarni, 2006). Although facial EMG is most widely used as an index of emotional responses, researchers have used electrophysiological responses over facial muscles to gauge cognitive processes as well (Bartoshuk, 1956; Cacioppo & Petty, 1979; Haagh & Brunia, 1984).

**Studying the body to understand the mind.** Physiological recordings of peripheral nervous system measures provide valuable insight into human information processing. Indeed, the embodied brain is a fundamental assumption of the psychophysiological approach. A psychophysiological approach rejects the mind-body dualism perspective, which asserts that the mind is a non-physical substance, and mental and cognitive phenomena cannot be understood by examining the body. Rather, the psychophysiological perspective contends that mental activity arises from activity in the brain, and the brain and body are intimately intertwined. Brain activity influences and reflects what is going on in the rest of the body, and activity in the rest of the body influences and is influenced by the brain.

Psychophysiology has no place for Cartesian dualism. You cannot look for indicators of thought in heart rate or skin conductance or facial muscle activity if you believe that the soul or the mind is just riding around in the vehicle that is the body. Instead, psychophysicists assume that thinking, feeling, meditation, awareness, and consciousness are side effects of the function of an organ called the brain, which is physiologically connected to every other organ and system in your body. It is an embodied brain. (A. Lang et al., 2009, p. 186)

The concept of the embodied brain suggests that communication scholars can further our understanding of information processing mechanisms by studying physiological recordings of PNS measures. However, if mental phenomena arise
predominantly from activity in the brain, understanding cognitive and emotional processing may be most directly tapped by assessing responses of the brain.

**Neuroscientific methods.** A vast array of techniques may be used to understand the responses, processes, and workings of the brain. This dissertation uses electroencephalography (EEG) to examine information processing of political TV ads. Other methods used to study brain activity include functional magnetic resonance imaging (fMRI), magnetoencephalography (MEG), transcranial magnetic stimulation (TMS), conventional radiography (X-Ray), pneumoencephalography, computer tomography (CT scan), positron emission tomography (PET), magnetic resonance imaging (MRI), magnetic resonance spectroscopy (MRS), and diffusion tensor imaging (DTT). All of these measures have their respective strengths and weaknesses. One advantage of EEG, particularly in comparison to the more popular fMRI, is that EEG provides a direct measure of brain activity. A brief lesson on neurophysiology will be useful for the subsequent review of research using EEG technology to study information processing mechanisms and communication phenomena.

**A Quick Lesson in Neurophysiology**

**Neurons.** The human body has trillions of cells. A neuron (or nerve cell) is a particular type of cell that specializes in receiving and transmitting information. Neurons send and receive these “messages” through electrical and chemical signals. Neurons serve as the building blocks of the nervous system. Recall from an earlier section that the CNS includes neurons within the spinal cord and skull, and the PNS includes neurons outside of these structures.
A neuron consists of a cell body, axon, and dendrites. Negative and positive ions exist both within and outside of the neuron cell. The distribution of these ions creates a voltage gradient (or difference in electrical charges) across the cell membrane separating the intracellular and extracellular fluid. At rest, the interior of a neural cell is slightly negative compared to the extracellular fluid (approximately -50 to -80 millivolts [mV]). That is, the resting membrane potential has a negative polarity. Concentration gradients and electrostatic pressures drive the movement of positively and negatively charged ions into and out of the cell, consequently changing the polarity across the cell membrane.

**Electrical signals.** Neurons are electrically excitable, meaning that they experience changes in polarization. When stimulated, various ion channels permeating the cell membrane open and close, changing the distribution of ions, and hence the electrical or voltage gradient across the cell membrane.

Small changes to the membrane may create local potentials. These local potentials attenuate quickly as they move away from the initial area of stimulation. If a cell becomes depolarized past a certain threshold (approximately -40mV), an action potential (or neuronal spike) is generated. An action potential represents a short but significant change in the voltage gradient of a neuron, creating a burst of electrical energy that is generated in the axon hillock (area where the cell body meets the axon) and propagated down the axon.

Neurons are not directly physically connected to one another. Rather, a synaptic cleft is a small gap (approximately 20 to 40 nanometers) between the axon of one neuron and the dendrites of another. Synapses provide a location through which pre-synaptic and
post-synaptic neurons communicate with, or transmit information to, one another. Propagated to the end of an axon, the action potential of a pre-synaptic neuron again influences ion channels, but this time in the axon terminal. An influx of ions into the axon terminal causes the release of neurotransmitters from the pre-synaptic terminal into the post-synaptic cleft.

The neurotransmitters bind to receptor molecules in the postsynaptic membrane, leading ion channels on the post-synaptic membrane to open. This creates inhibitory postsynaptic potentials (IPSPs) or excitatory postsynaptic potentials (EPSPs) over the dendrites and cell body of the postsynaptic neuron. An EPSP brings the post-synaptic neuron closer to an action potential, meaning that it increases the likelihood that the neuron receiving the signal will itself produce a signal to be transmitted to another neuron. An IPSP decreases the likelihood that the neuron will generate an action potential.

**Electroencephalography.** The electrical and chemical signals of neurons (described above) constitute a fundamental communication system by which the brain receives, processes, integrates, and transmits information to itself and the rest of the body. The human brain has over 100 billion neurons and 100 trillion synapses (E. K. Miller & Cohen, 2001; Williams & Herrup, 1988). Neuron activation or firing, action potentials, EPSPs, and IPSPs correspond with changes in electrical potentials, or the voltage differences across the cell membrane. A neuron can therefore be conceptualized as an oscillator, with the electrical charge across the cell membrane fluctuating across time, modulated by action potentials and post-synaptic potentials (Ward, 2003).
By inserting an electrode directly into an individual’s brain, researchers can measure the electrical activity of one or more individual neurons. However, this practice of opening an individual’s skull to take a peek inside the brain quite obviously poses a number of risks. Electrocorticography (ECoG), or intracranial EEG (iEEG), is generally performed only when an individual is undergoing neurosurgery for some reason, such as epilepsy.

Fortunately, researchers can study electrical signals of brain neurons without inserting electrodes into an individual’s brain. Electroencephalography (EEG) records biopotentials at the surface of the scalp. The action potentials of individual neurons would be impossible to measure from the surface of the scalp. Not only is the electrical signal generated by a single action potential very small, but neural tissue and the skull effectively function as low-pass filters, leading action potentials to diminish rapidly with increasing distance from the source. Rather, the biopotentials captured by EEG recordings reflect a summation of electrical activity from many neurons firing synchronously. Specifically, EEG recordings most likely reflect the summation of postsynaptic potentials (Stern, Ray & Quigley, 2001).

Sending and receiving excitatory and inhibitory signals to and from one another, neurons are interconnected in a massive and complex neural network. When performing a task, responding to a stimulus, or executing an action, neurons in the brain act in concert with one another. Neurons involved in similar functions or processes tend to be activated at the same time. Repeated simultaneous firings of particular neurons generate strong synaptic connections between and among these neurons. Through this process, a number
of separate but functionally interrelated neurons form local networks or groups of neurons.

Distributed local networks, linked by excitatory and inhibitory as well as feedback and feedforward connections, comprise larger neural networks called neuronal populations or neural assemblies (Varela, Lachaux, Rodriguez, & Martinerie, 2001). Coordinated action of neurons is reflected in the synchronous firing of neurons in neural assemblies. It is the synchronous firing of neurons that is thought to underlie information processing and constituent components. “[S]ynchronous neural oscillations reveal much about the origin and nature of cognitive processes such as memory, attention and consciousness,” (Ward, 2003, p. 553). The rate of firing of these neural assemblies produces neural oscillations with varying frequencies.

Neural assemblies are much more complex than, but conceptually similar to, the semantic network models of memory discussed earlier. Neurons in the brain’s network are somewhat analogous to the nodes in semantic knowledge or network models of memory. However, in the brain, each individual neuron does not itself represent a “concept.” Rather, concepts are represented by particular patterns of activation, distributed over many regions of the brain. “In ‘semantic network’” each unit has a meaning (e.g., ‘dog’). In ‘neural networks’ units are individually meaningless; information is represented in a distributed fashion by the simultaneous activation of multiple units,” (Siegle & Hasselmo, 2002, p. 262).

In summary, patterns of neuronal activation modulate virtually everything that we do, think, and feel. When groups of neurons are activated or work together in concert, the
very small electrical potentials related to individual neuronal activation accumulate, manifesting as biopotentials that can be recorded from the surface of the scalp. EEG captures these biopotentials, and researchers make inferences about cognitive and emotional processing based on the patterns of neurological activity generated. The rate at which neurons discharge, the strength of firing, and the timing and phase coherence of activity between and among neurons and neuronal populations underlie our cognitive, emotional, and behavioral responses.

Comparing EEG and fMRI. Before further elaboration of synchronous neural activity, it may be useful to compare and contrast EEG and fMRI, the latter of which may be the most popular technique used in social cognitive affective neuroscience. Comparing fMRI and EEG procedures provides a nice illustration of the tradeoff in temporal and spatial resolution often demanded in neuroscience techniques.

EEG is a direct measure of brain activity because it records potentials produced at the scalp that are generated by underlying neural activation. In contrast, fMRI is an indirect measure of brain activity that relies on the recordings of blood flow in the brain. The basic assumption of this approach is that localized increases in blood flow and oxygen accompany increased neural activity in these areas. Researchers have found that during functional activity of the brain, increased blood flow actually exceeds the brain’s need for oxygen. When neurons become active, they use more oxygen, but they simultaneously signal blood vessels to dilate and increase blood flow. This results in more oxygen being delivered than the amount that will actually be used. Based on the
ratio of oxygenated to deoxygenated blood, fMRI data provide an indirect measure of brain activity.

An fMRI is basically a big magnet. When participants lie in the fMRI chamber, some protons in the brain line up along the magnetic pole. A second magnet is then turned on, with a signal perpendicular to the original magnet. The second signal is often in the range of radio frequency, and thus commonly referred to as an RF pulse. The RF pulse knocks the protons out of their alignment with the original magnet. When the RF pulse is turned off, the protons slowly precess back to the initial magnetic position alignment.

The rate or precess is recorded, providing a “picture” of the brain. Some RF pulse sequences are designed to measure proton precession based upon the amounts of deoxyhemoglobin (deoxygenated) and oxyhemoglobin (oxygenated) blood. Studies using this approach generally refer to the BOLD (Blood Oxygen-Level Dependent) signal. An fMRI scan can thus produce a brain image map, with different colors representing relative amounts of oxygen in various brain regions compared to others.

The most compelling strength of fMRI is its very high spatial resolution, on the order of 1 mm. However, because changes in blood flow can take as long as a third of a second, and imaging techniques generally average activity over seconds or minutes, the temporal resolution of fMRI is decidedly lacking. EEG, on the other hand, has high temporal resolution, detecting changes within a millisecond timeframe. However, the ultimate bane of EEG is the inverse problem, or the inability to infer precisely which
neurons have contributed to a biopotential at the skin’s surface. The inverse problem is not only an issue for EEG, but other electrophysiological recordings as well.

The inverse problem arises because there exists an infinite combination of parameters that could be fit to a model that could generate the observed data. At its core, this is a basic mathematical problem. If there are more parameters to be solved than there are unique values in a matrix of manifest variables, there will be an infinite number of solutions. As discussed, the biopotentials that we record at the surface of the scalp using EEG represent a summation of various post-synaptic potentials from various neurons distributed variously throughout the brain. It is impossible to identify the precise location of the individual neurons that originally produced the EEG signal.

However, researchers are often able to infer the general brain areas from which biopotentials at the scalp are initially generated. The cortical activity measured by EEG is generally produced from a cortical area close to the electrode recording sites. “Although there are exceptions to this rule… cortical sources are in many cases located close to recording sites where strong electrocortical effects can be recorded,” (Pulvermueller et al., 1999, p. 503). This phenomenon occurs mainly because in recording biopotentials from the surface of the body or scalp, distance matters. Cells closer to the recording cite will contribute more to the recorded signal (Stern, Ray, & Quigley, 2001).

Neural oscillations. Synchronous activity of oscillating cortical neural networks may form the basis for cortical coordination and integration (Salinas & Sejnowski, 2001; Singer, 1999). Frequency bands of the EEG have functional significance, with different

\footnote{These authors suggest Rockstroh, Elbert, Canavan, Lutzenberger, & Birbaumer (1989) for an extended discussion of this topic.}
frequency bands corresponding to specific cortical processes involved in perception, attention, memory formation, emotion, and behavior (Knyazev, 2007; Nunez, 2002; Varela et al., 2001).

The dominant frequency bands in the human EEG are the delta, theta, alpha, beta, and gamma. Although the general ranges for these individual frequency bands tend to be standard, exact endpoint specification is somewhat ambiguous. Researchers may define the delta frequency band as oscillations falling in the range of 0 to 4 Hz, 0.5 to 3 Hz, 0.5 to 4 Hz, or 1 to 4 Hz. Theta is variously identified as including waves in the range of 3.5 to 7 Hz, 4 to 7 Hz, 4 to 8 Hz, or 5 to 7 Hz. Alpha is used to indicate brainwaves in the 8 to 12 or 8 to 13 Hz range. Beta may refer to frequencies in the 13 to 20 Hz, 13 to 30 Hz, or over 30 Hz range. Gamma may indicate oscillations in the 36 to 44 Hz, or 30 to 70 Hz range (Basar, Basar-Eroglu, Karakas, & Schurmann, 2001; Davison, Jackson, & Larson, 2000; Pizzagalli, 2007; Steriade, Gloor, Llinas, Lopes da Silva, & Mesulam, 1990).

The slower oscillation frequency bands (delta, theta, alpha) are global processing modes, spanning large cortical regions. The higher frequency bands (beta and gamma) are local processing modes, exhibiting smaller amplitudes and emanating from a more limited topographic area.

Changes in activity in these frequency bands can be calculated from the EEG signal. EEG records biopotentials from the surface of the scalp. Recorded over time, these biopotentials are represented as a continuous waveform, oscillating between negative and positive voltages. Spectral power analysis can be used to divide this
spontaneous EEG signal into its constituent components, or various waves with distinct frequencies and amplitudes that comprise the recorded brainwave.

Fourier’s Theorem states that any repeated series of oscillations can be analyzed into a set of the simplest possible oscillations, or sine and cosine waves of varying frequencies and amplitudes. In spectral power analysis, Fast Fourier Transform (FFT) decomposes a waveform into its component sine waves. The square of the amplitude of the sine wave at a particular frequency produces the spectral power at that frequency. The result of this spectral analysis is that the neural waveform, originally represented in the time domain, has now been transformed to the frequency domain.

**Alpha band.** Although EEG methods in communication research are certainly not the norm, scholars have devoted some attention to the study of brain waves in response to communication. Most of this research has focused on the alpha frequency band.

Alpha was the first neural oscillation frequency discovered by Hans Berger (1929). Berger noticed that alpha was greater when an individual’s eyes were closed rather than opened. Because a decrease in alpha power is observed with almost any type of cognitive task or mental exercise (Klimesch, 1999), alpha activity has been widely taken as an inverse measure of cortical activation in general or attention in particular. The alpha rhythm has been described as indicating a “relaxed, unoccupied brain” (Ward, 2003, p. 553) or “cortical idling” (Chase & Harper, 1971, p. 90).

When the brain is neither receiving nor processing sensory information, the system may be described as ‘idling’ (Adrian & Matthews, 1934), reflected in steady, synchronous neuronal firing or rhythms. For instance, occipital alpha rhythms may
represent the idling rhythm of the visual system. Decreased synchronization may occur as more neural networks are recruited for information processing (Pfurtscheller & Lopes da Silva, 1999). Attenuated amplitude in a given frequency range occurs when these neurons desynchronize, and can represent system activation (Hari & Salmelin, 1997; Niedermeyer, 1999; Pfurtscheller, 1992; Lee et al., 2003). Thus, a decrease in alpha power, referred to as alpha blocking, alpha desynchronization, or alpha inhibition, is used as an index of cortical activity (Pfurtscheller, 1992; Pfurtscheller, Stancak, & Neuper, 1996).

On the other hand, information processing is sometimes associated with increased alpha activity. For instance, some research demonstrates evoked alpha oscillations in response to sensory stimulation (Basar, 1999; Basar & Schurmann, 1994; Silva, Amitai, & Connors, 1991). Klimesch and colleagues (Klimesch, Doppelmayr, Rohm, Polhuber, & Stadler, 2000; Klimesch, Doppelmayr, Schwaiger, Auinger, & Winkler, 1999) have suggested that alpha may effectively function to increase the ratio of signal to noise during information processing. According to this theory, alpha is a mechanism for increasing the ratio of signal to noise within the cortex, as enhanced cognitive processing in some areas should lead to inhibition of activation of cortical areas that are not required, or are irrelevant, to the given task (Klimesch et al., 1999, 2000; Pfurtscheller & Lopes da Silva, 1999).

**Alpha in communication.** EEG has not been studied extensively in communication research. However, some media scholars have used alpha blocking (derived from EEG recordings) as a measure of attention or cortical activation.
Appel, Weinstein, and Weinstein (1979) examined alpha blocking during exposure to TV ads that scored high or low on the 24-hour recall score\textsuperscript{16}. Results indicated that high recall ads generated more overall brain activity (less alpha) compared to ads with low recall scores. Reeves et al. (1985) examined how movement and scene changes in TV commercials influence attention. Attention was indexed using alpha inhibition. Results indicated that mean alpha was negatively correlated with recall and recognition for the commercials. More recently, Simons and colleagues (Simons, Detenber, Cuthberg, Schwartz, & Reiss, 2003) examined the influence of image motion, emotional arousal, and emotional valence on attention, again using alpha inhibition as an index of cortical activation or attention. Results indicated that alpha power reduction was significantly related to self-reported arousal, and moving images elicited greater alpha inhibition compared to still images.

While alpha inhibition is used as an index of cortical activation generally, other research suggests that different sub-bands within the alpha frequency (or within the same sub-band but occurring at different localized cortical regions) may correspond to more specific emotional and cognitive processes. M. E. Smith and Gevins (2004) used EEG to study brain activity while participants viewed TV commercials. Results indicated that

\textsuperscript{16} The 24-hour recall score is one of the most common yardsticks used for testing the effectiveness of television commercials. The procedure requires the advertiser to run the commercial on the air and, the next day, to interview by telephone a sample of respondents (usually 200) who were watching the program carrying the commercial at the time the commercial was shown. These respondents are questioned as to whether they remembered seeing a television commercial the night before for brand X; and, using a standard series of questions, those claiming to remember such a commercial are asked to describe it from memory. On the basis of their verbatim testimony the respondents are classified as recalling the test commercial or not. (Appel et al., 1979, p. 8)
alpha power over posterior regions was inversely correlated with frequency of screen changes, indicating that alpha power in this region is most responsive to (or most likely to index) visual attention or stimulation. A frontal component of lower frequency alpha (8 to 9.5 Hz) was negatively related to commercials with high subjective interest, indicating a role of this sub-band alpha frequency in more controlled attentional processes and likely those involving working memory. An upper alpha frequency band (10-11.5Hz) in the frontal region was associated with recall of the commercial, suggesting that alpha power in this frequency sub-band at the frontal regions may be involved in episodic memory encoding.
Chapter 10: Gamma Band and Semantic Processing

It is suggested here that the impact of negative, positive, and comparison ads on memory for issues associated with candidates featured in 30-second political TV spots is mediated by power in the gamma band frequency range (calculated from EEG recordings). Gamma band power is proposed as a measure of depth and extent of semantic processing, or the formation and strengthening of associations between and among concepts and elements that comprise these concepts.

Semantic Processing

Semantic processing is defined as the mental activity and operations through which an individual derives or infers meaning from a message. In its entirety, semantic processing is an infinitely complex process, involving many levels, parallel systems, reciprocal feedback loops, and iterative bottom-up and top-down processing. Despite this complexity, semantic processing involves two fundamental sub-processes, matching and binding of cognitive concepts and the attributes or elements comprising these concepts.

Linguistics may refer separately to the processing of phonological, orthographic, morphological, syntactical, and semantic information. However, the definition of semantic processing provided here includes all of these components. This is because the matching and binding occurs at all of these levels, and all of these levels are necessary for comprehending the meaning of a message. While watching a political commercial, the
brain matches cues articulated by the narrator to corresponding mental codes. Phonologically, representation of this message entails matching the smallest units of auditory or phonological information (i.e., the individual phenomes) presented in the auditory track of the message to the corresponding codes stored in the viewer’s memory. These phenomes are then integrated or unified to produce a recognizable word.

Semantic processing involves a matching process, whereby mental codes are retrieved or activated from memory depending on a match between sensory information presented in the message and previously developed or acquired mental codes existing in memory. This stage of information processing may be referred to variously as matching (Herrmann, Munk & Engel, 2004), encoding (A. Lang, 2000), decoding (Biocca, 1991), or retrieval (Hagoort, 2005). To infer meaning from the sensory input provided by a message, another critical component of semantic processing is the binding together of these mental codes. That is, mental codes must not only be matched and retrieved from memory, they but must be unified into a coherent whole.

It is generally agreed that during language comprehension, incoming sounds or orthographic patterns trigger a cascade of memory retrieval operations that make available the phonologic, syntactic, and semantic properties of individual words. Once available, these different ingredients have to be integrated (unified) at the sentence and/or discourse levels into a meaningful whole, in order to yield a coherent interpretation of the linguistic input (Bastiaansen & Hagoort, 2006, p. 180).

The matching and binding sub-components of semantic processing can be described further in terms of depth or extensiveness of processing. Craik and Lockhart (1972) describe a framework for understanding human memory with an emphasis on depth or levels of processing. Initial or superficial levels of processing refer to
preliminary information processing stages in which the sensory features of a stimulus are encoded. Later or deeper information processing stages include further elaboration of the stimulus. Deeper processing of information, such as elaboration or rumination, lead to stronger and more persistent memory traces.

This conception of a series or hierarchy of processing stages is often referred to as “depth of processing” where greater “depth” implies a greater degree of semantic or cognitive analysis. After the stimulus has been recognized, it may undergo further processing by enrichment or elaboration. For example, after a word is recognized, it may trigger associations, images or stories on the basis of the subject’s past experience with the word. (Craik & Lockhart, p. 675).

**Gamma**

**Percept binding.** Indication that gamma band activity represents binding of basic elements necessary for object representation is nowhere more famously illustrated than the groundbreaking research by C. M. Gray and Singer (1989). In neuroscience, the “binding problem” refers to the question of how the activation of individual neurons, or groups of neurons (neuronal assemblies), devoted to processing specific features or characteristics of stimuli, are combined into an overall representation.

When presented with the visual image of, for instance, the United States flag, how do our brains combine the discrete bits of visual information to recognize the object as a whole? How does the information processed by visual neurons, neuronal columns, and neuronal assemblies specific to color, lines, shapes, and spatial relations get combined into a coherent precept? The answer seems to lie, at least in part, on binding through neural oscillations in the gamma band frequency. C. M. Gray and Singer’s (1989) research on neural activation in the visual columns of the occipital cortices of cats
strongly suggested that the gamma band frequency may play an active role in this visual binding process.

Tallon-Baudry and Bertrand (1999) suggest that gamma activity may represent bottom-up and top-down processing necessary for object representation. Neurological activity in the gamma band frequency range may help bind together visual, auditory, and semantic information represented in different areas of the brain. This object representation hypothesis “suggests that rhythm synchronization of neural discharges in the gamma band (around 40 Hz) may provide the necessary spatial and temporal links that bind together the processing in different brain areas to build a coherent percept,” (p. 151).

**Retrieval and unification.** Some researchers have suggested that activation in the theta band is critical to semantic memory retrieval, and activation in the gamma frequency band is predominant during unification processes (Bastiaansen & Hagoort, 2006; Hagoort, 2005). Others suggest that gamma may be involved in both matching and unification operations. Hermann, Munk, and Engel’s (2004) match-and-utilization (MUM) model proposes that an early gamma response reflects a matching process whereby input stimuli are compared to previously stored information. A late gamma response indicates use of this now active mental representation, such as “coordinating behavioural performance, for redirecting attention or for storage in memory,” (p. 351). Lisman and Idart (1995) suggest an interesting model in which gamma oscillations are nested within theta oscillations. With memory for an item stored in each gamma cycle, the authors suggest this model can account for G. A. Miller’s (1956) “magic number
seven plus or minus two” (see the previous section on “chunking” in information processing).

**Word processing.** Research indicates that gamma band is involved in lexical-semantic processing, or the “meaning aspects of words” (Bastiaansen & Hagoort, 2006, p. 186). In understanding associative links formed between and among concepts (such as the formation and strengthening of links between candidates and issues during political TV ad viewing), lexical-semantic associations are of critical interest. The process of retrieval and unification of words (or concepts) during language processing exhibits substantial overlap with the network models of semantic knowledge. Words and concepts in memory are defined, in large part, by their associations with other words and concepts. “The domain of semantic memory consists of stored information about the features and attributes that define concepts and the processes that allow us to efficiently retrieve, act upon and produce this information in the service of thought and language” (Martin & Chao, 2001, p. 194).

A difference in gamma power is observed for words and pseudowords whether presented in auditory (Krause, Korpilahti, Porn, Jatti, & Lang, 1998) or visual formats (Lutzenberger, Pulvermueller, & Birbaumer, 1994). In an MEG study, Pulvermueller et al. (1996) found that gamma power decreased for pseudowords compared to words. The authors suggest that these power differences reflect failure to activate neuron assemblies representing words upon presentation of non-words.

Another study presented participants with 50 nouns and 50 verbs, matched on dimensions of arousal and valence (Pulvermuller et al., 1999). Nouns (i.e., persons,
places, things) are intimately related to the processing of visual information, whereas verbs (e.g., actions) are associated more closely with the processing of motor information. Results indicated that the cortical counterparts of nouns and verbs differed. Exposure to nouns led to greater activation in the gamma frequency band over the occipital areas of the cortex, which is predominant in visual information processing. Exposure to verbs was associated with increased gamma band frequency activation over the motor cortex, which is involved in the processing and production of movement.

“These different physiological responses are related to semantic associations (motor or visual) elicited by these word groups” (Pulvermuller et al., 1999, p. 497, italics added). Thus, there is neurological evidence suggesting that different components of a concept are activated upon exposure to a word that represents that concept, and concurrent activation of these components may be facilitated by neural oscillations in the gamma frequency band.

Comprehension. Beyond binding together various components of a concept, gamma band frequency is also related to sentence comprehension, which requires the binding or unification of concepts presented in a message. Sentence comprehension requires not only the mental activation of a concept and its constituent elements, but binding together various concepts to understand the meaning of the sentence.

Crucially, one core feature of the binding problem for language is how information that is not only processed in different parts of cortex (as in visual processing), but also at different time scales and at relatively widely spaced parts of the time axis, can be unified into a coherent representation of a multi-word utterance. (Hagoort, 2005, p. 418-9)
Data from neuro-electrophysiological studies suggests that gamma band activity is related to unification of concepts necessary for sentence comprehension. Research indicates that sentences with incongruous semantic endings evoke decreased activation in the gamma frequency range (i.e., less binding) compared to sentences with semantically congruous endings. In an experiment by Hagoort and colleagues (Hagoort et al., 2004), Dutch denizens heard slightly altered versions of the following sentence: Dutch trains are yellow/white/sour. The sentence ending in “yellow” is true because Dutch trains are in fact yellow. The ending “white” is semantically correct, but violates actual knowledge about Dutch trains. The sentence ending with “sour” represents a semantic violation. No sense can be made of such a sentence.

Compared to the semantic violation condition, processing of the other sentence versions lead to an increase in gamma band frequency. The sentence from which no real meaning could be inferred (i.e., sour) did not generate an increase in gamma band frequency. Additionally, the world violation condition (i.e., white) led to larger gamma band power increases relative to the correct ending (i.e., yellow), presumably because the world violation condition is more difficult to semantically process because it contradicts known information.

**Elaboration.** That gamma band frequency is related to the formation of stronger associations among concepts is also suggested by research suggesting a link between gamma band and elaboration or rumination. In an EEG experiment by Siegle and colleagues (Siegle, Condray, Thase, Keshavan, & Steinhauer, 2010), participants were asked to perform a lexical emotion identification task. Participants were exposed to a
series of words and were asked to categorize them into the appropriate emotional category (positive, negative, neutral). Participant groups included (1) individuals diagnosed with unipolar major depression, (2) individuals diagnosed with schizophrenia without depressive symptoms, and (3) individuals with normal, non-depressed mental health. Excessive elaboration or rumination over negative information is characteristic of depressed individuals.

The researchers hypothesized that increased gamma power in response to negative (versus neutral) words would be evident among depressed individuals but not the other two groups. Results confirmed the hypothesis. Furthermore, increased gamma activity following negative words was correlated scores on the Response Styles Questionnaire (RSQ; Nolen-Hoeksema, Morrow, & Fredrickson, 1993). The RSQ is a 71-item self-report measure that gauges an individual’s propensity to devote sustained attention to negative information. Results of this study suggest that gamma band is not only related to binding at the level of stimuli features, dimensions of concepts, or lexical meanings of sentences, but also higher order elaboration. “This result is consistent with the idea that gamma could represent an index of sustained feature binding/semantic association/working-memory processing such as elaboration,” (Siegle et al., 2010, p. 115).

**Memory.** The necessity of gamma activity for memory processes is also suggested by Crick and Koch’s (1990) theory that neural oscillations in the gamma frequency range (40 to 70 Hz) are integral to consciousness. Furthermore, activation and
unification of concepts and their constituent components likely involves working memory processes, which have also been shown to relate to gamma power.

During exposure to messages (such as political TV ads), retrieval and binding components of semantic processing may occur through working memory. “As sentences extend over relatively long time periods, maintaining the working memory (WM) trace of the linguistic input is a prerequisite to performing unification operations,” (Bastiaansen & Hagoort, 2006, p. 186). Baddeley (2000) also suggests that the episodic buffer component of the working memory system (which, recall from an earlier section, integrates information from the visuospatial sketch pad, the phonological loop, and long-term memory), might rely on synchronous discharge of neuronal activity. “Of the various speculations as to the biological mechanism of binding, I would regard the process of synchronous firing as providing one promising hypothesis,” (p. 421).

Other researchers have suggested a direct link between gamma and working memory. Hermann et al. (2004) suggest that “working memory processes directly use gamma oscillations – perhaps to encode templates for matching with subsequently perceived stimuli,” (Hermann et al., 2004, p. 351). Gamma activity has also been linked to actual memory performance. In a study by Osipova et al. (2006), neurological activity in both the theta and gamma frequency ranges were enhanced for items that were later remembered versus forgotten. During the memory retrieval session, theta and gamma activity was also greater for correctly recognized versus correctly rejected new items, and gamma power was greater for correctly recognized versus forgotten items.
**Hypothesis: Gamma as mediator.** It is suggested here that power in the gamma band frequency range represents semantic processing. Semantic processing is defined as the activation, matching, or retrieval of concepts and their constituent components, and the formation and strengthening of associations within components of concepts and among concepts themselves. Semantic processing, or the active representation and unification of concepts, is necessary for sentence comprehension and inferring meaning from a message.

Research on the gamma band frequency is most widely known for its relation to the binding together of visual elements (C. M. Gray & Singer, 1989). Other research suggests that gamma is involved in top-down and bottom-up binding processes necessary for object representation (Tallon-Bertrand, 1999), or “match-and-utilization” of stimulus-related information (Herrmann et al., 2004). Research indicates that gamma band power increases during retrieval or spreading activation of words (Pulvermüller et al., 1996, 1999), the unification of words in sentence comprehension (Hagoort et al., 2004), and elaboration or rumination following stimulus presentation (Siegle et al., 2010). Retrieval, unification, and manipulation of cognitive representations involve working memory, which has also been found to relate to gamma power (Herrmann et al., 2004). Lastly, empirical evidence indicates that gamma is related to successful memory encoding and retrieval (Osipova et al., 2006).

*H3: Gamma band power (indexing semantic processing) will mediate the impact of ad exposure on memory.*
Chapter 11: Method

Participants

Sample size. Appropriate study sample size is determined, in part, by expected effect size. Two important limitations prevent sample size selection for this dissertation based solely on effect size. First, the expected effect size for memory measure differences from political TV advertising research would suggest an unrealistic sample size given the neurophysiological emphasis of this study. Second, the influence of negative and positive messages on semantic processing (indexed using neural activation in the gamma band frequency range in EEG recordings) has not been empirically examined in political communication research. Thus, there is no prior research upon which to base an expected effect size.

Empirical results on differential recognition memory effects of positive and negative ads have revealed a range of effect sizes. A. Lang’s (1991) study included four positive and four negative ads, and 12 multiple-choice recognition questions about each of the ads. The statistically significant effect revealed that the percentage of correctly answered questions was higher for negative ads (57 percent) than positive ads (54 percent). Newhagen and Reeves’ (1991) study included analysis of 18 political ads (6
positive, 6 negative, and 6 comparison\textsuperscript{17}). Visual recognition included 112 one-second video presentations (half of which were foils). Audio recognition included 28 two-second audio clips. Recognition accuracy was greater for negative video clips (91 percent) relative to positive (77 percent) and comparison (78 percent) ads. Thorson et al.’s (1991) included four ads, two positive and two negative\textsuperscript{18}. Results indicated that the proportion of correctly recognized information was higher for positive ads (45.86 percent) compared to negative ads (35.34 percent).

Based on the research cited above, a 10 percent difference in recognition accuracy for positive and negative ads might be expected. This might suggest a sample size of approximately 80 individuals. However, given the monetary and time constraints of EEG research, such a sample size is not particularly realistic. Yarkoni and Braver (2010) suggest that the norm in cognitive neuroscience research is a sample size somewhere between 15 and 20 participants. In communication research using EEG data, sample sizes range between 10 and 30 (e.g., Appel et al., 1979; Reeves et al., 1985; Simons et al., 2003; M. E. Smith & Gevins, 2004).

The second obstacle in using expected effect size to generate an appropriate sample size for the current study is that there exists no extant research examining differential effects of negative and positive messages on elicitation of neurological activation in the gamma band frequency range using EEG. This study proposes that gamma band power should indicate the formation and strengthening of associations

\textsuperscript{17} As described earlier, there seem to be discrepancies in the descriptions, and it is unclear which of the 28 ads were eliminated for final analysis.

\textsuperscript{18} As discussed earlier, their description of the negative ads seems to suggest this ad category actually represents comparison ads.
between and among cognitive concepts and their constituent components. The relationship between gamma band power and semantic processing is suggested by research demonstrating a role of gamma activity in very basic binding processes (C. M. Gray & Singer, 1989), object representation (Tallon-Bertrand, 1999), retrieval or spreading activation of words (Pulvermüller et al., 1996, 1999), the unification of words in sentence comprehension (Hagoort et al., 2004), elaboration or rumination following stimulus presentation (Siegle et al., 2010), and also successful memory encoding and retrieval (Osipova et al., 2006).

Although research provides a strong case for the role of gamma band in semantic processing, no actual studies have used gamma power to examine memory differences for positive and negative messages. Because of the two limitations described above, the goal for this study was to collect useable datasets from 30 individuals. This is a larger sample size than the norm in cognitive neuroscience research, and is on the high end of sample sizes used in communication research using EEG recordings. Data were collected from more than 30 participants with the expectation that some data sets would need to be discarded due to excessive artifacts, equipment failures, and experimenter error. (The expectation that some datasets will be excluded for the abovementioned reasons is common in EEG research.)

**Participant population.** This study was approved by the Behavioral and Social Sciences Institutional Review Board (IRB) at the Ohio State University. Characteristics required for recruitment included that individuals be 18 to 40 years of age, right-handed, have normal or corrected-to-normal hearing, and have normal or corrected-to-normal
vision. These selection criteria are recommended by Picton et al. (2000) for studies collecting EEG data. Because this study examines moderating effects of partisanship on memory, participants also needed to self-identify as Republicans or Democrats.

Participants were students at Ohio State University, a large Midwestern university with a total enrollment of over 64,000 (http://www.osu.edu/facts.php).

**Recruitment.** A recruitment flier was developed to distribute to potential participants. The flier stated that researchers at the Communication and Psychophysiology (CAP) Lab of the School of Communication at the Ohio State University were seeking participants for a study titled “Brain Responses to Political TV Messages.” The flier included a brief description of the nature and purpose of the study (using recordings of brain activity to examine how partisans respond to political mass media messages) and a short introduction to EEG research (a non-invasive brain wave recording method that measures voltage fluctuations caused by neurological activity). The flier provided the researcher’s name, email address, and telephone number. Individuals interested in participating were asked to contact the researcher to answer some pre-screening questions and to schedule an experimental session. (The recruitment flier is found in Appendix A.)

The recruitment flier was sent via email to the School of Communication’s listserv for undergraduate students. Students were also recruited through undergraduate classes in the School of Communication. Professors and instructors teaching these classes emailed the flier to students or posted the flier on their class website. Individuals who participated in the study were also encouraged to email the flier to anyone they knew who
might also be interested in participating. This tactic was used because participants (who self-identified as Republicans or Democrats) should be likely to know other partisans. All participants received $20 for their participation in the experiment. Students recruited through their classes also received extra course credit for participation in the study.

**Pre-screening.** Individuals interested in participating in the study were asked to contact the researcher to answer some pre-screening questions and to schedule an experimental session time. Pre-screening was done over the phone and through a form sent via email. Participants were screened in order to ensure that they were 18 to 40 years of age, right-handed, with normal or corrected-to-normal hearing and vision. As discussed, these selection criteria are recommended by Picton et al. (2000) for studies collecting EEG data.

Participants were also asked to indicate their party affiliation (Strong Republican, Republican, Leaning Republican, Strong Democrat, Democrat, Learning Democratic, Democrat, Learning Democrat, Democrat).

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19 The principle of homophily suggests that individuals tend to associate with those who are similar to themselves. In other words, “similarity breeds connection” (McPherson, Smith-Lovin, & Cook, 2001, p. 415). Manifestation of homophily occurs across myriad dimensions, including demographic characteristics, such race and ethnicity (Kalmijn, 1998; Marsden, 1987; Mayhew, McPherson, Rotolo, & Smith-Lovin, 1995), sex (Marsden, 1987, 1988; Verbrugge, 1977), age (Fischer, 1977, 1982; Verbrugge, 1977), and socioeconomic characteristics such as education and occupation (Louch, 2000; Marsden, 1987; Verbrugge, 1977; Yamaguchi, 1990). Empirical research suggests that political preferences tend to follow the principle of homophily as well, with individuals tending to discuss politics with politically homogenous others (Huckfeldt & Sprague, 1995; Lazarsfeld, Berelson, & Gaudet, 1944; Mutz, 2006). By asking participants to pass along the study information to friends who may be interested in participating, this study attempted to recruit additional self-identified partisans.

20 The original intent was to conduct all pre-screening over the phone. However, given the number of individuals who expressed interested in participating in the study and the difficulty in scheduling times to talk, this proved to be an unmanageable strategy. Thus, most pre-screening was done by sending a pre-screening form to participants via email and asking the participants to fill out and return the form to the researcher.
Independent, Some other party, None). Only individuals who self-identified as Republicans or Democrats were recruited for participation. Participants were given the opportunity to ask any questions they might have about the study or EEG data collection. (The pre-screening phone script and pre-screening form can be found in Appendix B).

For individuals who were interested in participating in the experiment and who met the pre-screening criteria, a specific date and time was scheduled for the participant’s experimental session. After the pre-screening interview, participants were sent a confirmation email. (The confirmation email can be found in Appendix C).

**Experiment duration and participant incentives.** Total time requested for participation included approximately 1.5 hours in the lab. This lab time included setting up the participant for EEG data recording (fitting and application of the EEG cap), viewing of experimental ad stimuli (24 30-sec political TV ads), making three emotional response ratings after each ad, unhooking EEG cap electrodes and removing the EEG cap after ad watching, completing the post-exposure questionnaire (which included the memory measures, and basic demographic and political measures), and a debriefing period. In the debriefing period, participants were given the opportunity to ask any questions they had about the study. All participants received $20 as an incentive for participation. Students enrolled in communication classes offering extra credit for study participation also received course extra credit\textsuperscript{21}.

\textsuperscript{21} Because students enrolled in communication classes offering extra course credit received extra credit in their classes as well as the $20 incentive offered to all participants, participation incentives were not equal across all participants. However, the IRB approved this incentive strategy.
**Sample.** Participants for this study included 47 students from the Ohio State University. Data from 12 participants were excluded because of noisy EEG signals (described further below), leaving 35 participants in the data analysis sample.

**Stimuli**

**Ad types.** Final stimuli for this experiment included 24 30-second political TV ads featuring real but unfamiliar candidates from the 2010 U.S. House of Representative races. Eight ads were included in each of three ad categories (positive, negative, comparison).

Positive ads are defined as ads that focus on a sponsoring or supported candidate, providing information about the candidate’s attributes and issue positions. Positive ads have the intended purpose of promoting the sponsoring or supported candidate by creating positive feelings toward and favorable impressions of the candidate. However, this objective is not necessarily fulfilled among audience members. Negative ads are defined as ads that focus on an opposing, competing, or targeted candidate, providing information about the candidate’s qualities and issue stances. Negative ads have the intended purpose of criticizing, derogating, or disparaging an opposing candidate by creating negative feelings toward and unfavorable impressions of the candidate. However, these intentions are not necessarily fulfilled. Comparison ads provide information about a sponsoring/supported candidate and an opposing/competing candidate. Comparison ads have the intended purpose of bolstering perceptions of the supported candidate and depressing evaluations of the opposing candidate by creating positive perceptions of the former and negative perceptions of the latter. However,
elicited positive and negative feelings will not necessarily manifest among viewers. Four ads from each political ad type category were sponsored by a Republican candidate, the Republican Party, Republican-affiliated groups, or Republican-affiliated individuals. The other four ads from each ad type category were sponsored by a Democratic candidate, the Democratic Party, Democratic-affiliated groups, or Democratic-affiliated individuals.

In other words, there were four *Positive Republican* ads (positive ads sponsored by a Republican candidate, the Republican Party, or Republican-affiliated groups or individuals, which promote a Republican candidate), four *Positive Democratic* ads (positive ads sponsored by a Democratic candidate, the Democratic Party, or Democratic-affiliated groups or individuals, which promote a Democratic candidate), four *Negative Republican* ads (negative ads sponsored by a Republican candidate, the Republican Party, or Republican-affiliated groups or individuals, which criticize a Democratic candidate), four *Negative Democratic* ads (negative ads sponsored by a Democratic candidate, the Democratic Party, or Democratic-affiliated groups or individuals, which criticize a Republican candidate), four *Comparison Republican* ads (comparison ads sponsored by a Republican candidate, the Republican Party, or Republican-affiliated groups or individuals, which promote a Republican candidate and criticize a Democratic candidate), and four *Comparison Democratic* ads (comparison ads sponsored by a Democratic candidate, the Democratic Party, or Democratic-affiliated groups or individuals, which promote a Democratic candidate and criticize a Republican candidate).

**Ad manipulations.** To test whether positive, negative, and comparison ads have varying effects on semantic processing and memory, one would aspire to devise ads that
are exactly comparable except for focusing on a sponsoring candidate, opposed candidate, or both candidates. If ads are not comparable on all accounts except the featured candidate, the cause of the observed effect might be attributable to spurious or confounding factors.

Beyond whether an ad features a sponsoring candidate, opposing candidate, or both, myriad factors exist that might influence semantic processing and memory for information presented in political ads. A non-exhaustive list includes: continuous and overall negativity of the ad, continuous and overall positivity of the ad, continuous and overall arousing content of the ad, presence of visual images, emotional content of visual images, audio-visual redundancy, issue or image-orientation of the ad, complexity of language and sentence structure of the verbal information, specific issues discussed, specific character traits discussed (e.g., competence, honesty), structural features of ads (e.g., edits, cuts), music, sound effects, gender of candidates, attractiveness of candidates, number of times the candidate’s name is mentioned, narrator traits (e.g., gender), and linguistic characteristics of the narration (pitch, tone, rhythm, stress). Unfortunately for political advertising researchers, it is virtually impossible to create (let alone select) realistic TV ads that are similar on all of these dimensions except for featuring a sponsored candidate, opposed candidate, or both candidates.

To create experimental manipulations for positive, negative, and comparison ads, researchers have two options are their disposal. They may create their own ads, or rely on existing ads. Both approaches, of course, have their respective strengths and weaknesses,
which correspond to the more general trade-off between experimental control and ecological validity in experimental research.

*Experimental manipulations: Opportunities and constraints.* Researchers who create their own ads have complete control over the final product. Researcher control over experimental manipulations provides validity for causal inferences derived from experimental condition effects. The primary advantage of experiments over other research methodologies is the ability to identify and examine causal mechanisms by isolating experimental variables. In theory, then, a study maximizing the control afforded by experimental designs should manipulate only whether an ad promotes a candidate, critiques a candidate, or both, while keeping constant all other variables that might influence semantic processing and subsequent memory for the message. Achieving this level of control over ad content, however, may result in ads that are not particularly realistic. This necessitates the question, even if all researchers had the abilities or resources to produce their own ads, would it possible to create positive, negative, and comparison ads that are comparable on all variables except which candidate is featured in the ad?

Another approach used by political advertising researchers is to select extant political ads. Selection of existing ads gives researchers limited control over the many other factors that might influence focal outcomes. However, this tactic provides experimental stimuli to which individuals are likely to be exposed through the actual campaign media environment, enhancing the ecological validity of the study.
**Ad creation and editing.** By creating their own ads (or substantially editing existing ads), researchers achieve maximal levels of control in political advertising studies. In comparing the effects of positive and negative ads, researchers have created their own print (Chang, 2001), radio (Geer & Geer, 2003), and TV ads (Christ et al., 1994, Thorson et al., 1994).

In the literature on political TV ad effects, Ansolabehere and colleagues’ (Ansolabehere & Iyengar, 1995; Ansolabehere, Iyengar, Simon, & Valentino, 1994) work must be commended for its exemplary experimental control. These authors edited footage from actual political ads to create realistic 30-second TV spots about real candidates during an ongoing election campaign. One positive/advocacy version and one negative/attack version was made for each ad. The ads included identical visual elements and the same narrator was heard in both conditions. The scripts for the two versions were nearly identical, except for the manipulation of a small number of words. Below is the script for one of the positive ads, followed by the script for the corresponding negative ad.

For over 200 years the United States Senate has shaped the future of America and the world. Today, California needs honesty, compassion, and a voice for all the people in the U.S. Senate. As mayor of San Francisco, Dianne Feinstein *proposed* new government ethics rules. She *rejected* large campaign contributions from special interests. And Dianne Feinstein *supported* tougher penalties on savings-and-loan crooks. California *needs* Dianne Feinstein in the U.S. Senate. (Ansolabehere et al., 1994, p. 830, *italics original*)

For over 200 years the United States Senate has shaped the future of America and the world. Today, California needs honesty, compassion, and a voice for all the people in the U.S. Senate. As state controller, Gray Davis *opposed* new government ethics rules. He *accepted* large campaign contributions from special interests. And Gray Davis *opposed* tougher penalties on savings-and-loan crooks.
California can’t afford a politician like Gray Davis in the U.S. Senate. (Ansolabehere et al., 1994, p. 830, *italics original*)

The manipulation used by Ansolabehere et al. (1994) to create positive and negative ads seems almost beyond reproach. Only a few words were altered in these versions, creating nearly identical scripts for the positive and negative ads. However, it seems likely that the impressively tight experimental manipulation undermined the ecological validity of the ads.

For instance, if the visual images in the stimulus ads were so bland that they could be shown on screen when a narrator either says, “She rejected large campaign contributions from special interests,” or “He accepted large campaign contributions from special interests,” it may be safe to assume that producers of real political ads would opt for more dramatic visual elements. Similarly, if the tone of the narrator’s voice was identical when saying a phrase that is normatively positive (e.g., “proposed new government ethics rules”) and one that is normatively negative (“opposed new government ethics rules”), one might suppose such a neutral voice would be avoided in a real political ad.

Conversely, if more appropriate images and an appropriate narrator tone were used when an ad promoted positive achievements/behaviors or criticized failures/actions, the level of experimental control over all extraneous factors has not truly been achieved. If the narrator used an appropriate tone when showering praise and when casting aspersions, the positivity and negativity of the ad would be altered, at least if the narrator’s voice is considered one aspect of ad emotion. Thus, the nature and purpose of
positive, negative, and comparison ads might make it impossible to create ads that are similar on all relevant dimensions except the featured candidate.

**Is it possible to create comparable positive and negative ads?** This perhaps insurmountable challenge of creating comparable but realistic negative and positive ads is identified and discussed quite articulately by Brader (2005). The purpose of Brader’s manipulation was to create “enthusiasm” and “fear/anxiety” emotional cues. This is not the same as creating positive and negative ads as defined here (i.e., featuring a sponsoring or opposing candidate, respectively). However, the challenges faced by Brader are highly relevant to the task of creating ads that are comparable on all factors except the featured candidate.

Brader (2005) used a clever technique to create more and less emotional ads by manipulating nonverbal cues (images and music) used in political TV ad spots. Keeping the script the same but replacing neutral images (e.g., government buildings) with positive images (e.g., images of children) and adding music, a positive-baseline ad was made into an “enthusiasm” ad. Similarly, while keeping a similar script but replacing neutral images with negative images (e.g., drug use) and adding “discordant” music, a negative-baseline ad was made into a “fear/anxiety” ad. However, Brader acknowledged that the positive and negative ads were not truly comparable. Because of this incomparability between the positive and negative ads, Brader (2005) limited empirical analyses to comparisons of the positive-baseline ad to the enthusiasm ad, and the negative-baseline ad to the anxiety ad. Furthermore, in all versions of the ad the narrator contrasts two candidates, so all ads are actually “comparison spots,” (p. 392).
In principle, the most direct experimental test would pair three sets of cues (enthusiasm, fear, neutral) with an identical script. However, in practice, it is difficult to create a single script that can be realistically paired with all three of these cues. Fearful music and images would seem out of place next to a message full of praise and optimism. Like-wise, enthusiasm-eliciting music and images would clash with a message dominated by gloom and condemnation. Therefore, this study employs a separate experimental test for each emotion. (Brader, 2005, p. 392)

Even if researchers have the skills or financial resources to create their own ads, designing ads that are identical in all respects except featuring a sponsoring candidate, opposed candidate, or both a sponsoring and opposed candidate may be close to impossible. If such results are achieved, it may necessitate a final product that includes such bland narration, visuals, and music that the ad would never be used in an actual campaign.

The discussion so far has focused on developing comparable positive and negative ads. A somewhat different problem arises for creating comparison ads that are identical to positive and negative ads except for the featured candidate. In particular, creating a comparison stimulus ad that simply combines a negative and positive ad would result in a comparison ad that contains twice as much information as the negative and positive ad.

Consider the strategy used by Ansolabehere et al. (1994), in which only a few words were altered to create positive and negative versions. How would one operationalize a comparison ad? If negative and positive ad scripts were combined to create a comparison ad, the comparison ad would be longer and include more information than the other two ad types. Or, if the total amount of information across ads were made to be comparable, the comparison ads could not include all of the same issues or traits.
mentioned in the positive and negative versions (or the information would be presented at twice the speed).

**Use of existing ads.** This dissertation uses real 30-second political TV ads from the 2010 races for the U.S. House of Representatives. Other researchers have also employed real political TV ads (Basil et al., 1991; S. D. Bradley et al., 2007; Hitchon & Chang, 1995; A. Lang, 1991; Newhagen & Reeves, 1991). Using political ads produced and/or aired for actual election campaigns may provide studies with enhanced stimuli realism compared to studies using ads created particularly for research experiments. This is particularly likely if the components of the ads created for experimental studies (music, images, narrator tone) are so banal or neutral that they could be applied to a script discussing a sponsoring or an opposing candidate. However, use of already existing ads requires that researchers be especially careful to select or control for ad characteristics that might influence outcomes of interest.

The experimental stimuli employed in this study include positive, negative, and comparison ads from Republican as well as Democratic candidates. As discussed, individual predispositions could generate different emotional responses to the same positive or negative ad among different political ad viewers. These varying emotional responses could drive information processing, influence memory effects, and at least partially explain inconsistent results in the literature on the effects of positive and negative ads. Control over emotional responses could perhaps be achieved by only including a particular party’s ads, or only showing partisans ads sponsored by the party they support. A study might expose Republican participants to Positive Republican and
Negative Republican ads, with the assumption that these types of ads will have their intended emotional effect among the selected sample. That is, it might be assumed that Republicans respond positively to an ad in which a Republican candidate is promoted, and negatively to an ad articulating the shortcomings and failures of a Democratic candidate.

Although the abovementioned practice might reduce variability in emotional responses among message viewers, this study includes ads from both parties precisely because the emphasis is on examining interaction effects between and among Ad Type, Ad Sponsor, and Partisanship. Furthermore, in real life, individuals are exposed to a barrage of political ads, with little control over which party’s candidates are featured in the ads, and whether those ads are intended to promote, criticize, or compare.

One potential perk of political ads is their potential to disseminate political information from the sides of both major political parties to all members of the public. Political TV advertising may have the democratic advantage of subverting patterns of behavioral self-selection. People have a tendency to selectively expose themselves to mediated and interpersonal communication with reinforcing rather than challenging perspectives (J. L. Freedman & Sears, 1965; Huckfeldt & Sprague, 1995). Self-selective information exposure has become an increasing cause for concern in recent years. The technological era in which we live has provided citizens with more and more control over their information environment, which may heighten self-selective behavior and contribute to further polarization (e.g., Sunstein, 2001). Political TV ads, however, are a type of message for which it proves difficult for individuals to exert much selection control.
“[T]he information environment driven by political ads creates a less self-selective context than that driven by news media,” (Cho, 2008, p. 427-8).

**Selection of final ad stimuli.** In the present study, the important concern is ensuring that factors likely to produce differences in semantic processing and memory are similar across the different ad types. The researcher compiled an initial pool of 56 30-sec TV spots. Four coders rated each of these ads for (1) the arousing content of the ad and (2) the number of idea units presented in each ad. The four coders included the author and three graduate students in the same department as the author. All coders were familiar with the meaning of arousing content, having prior knowledge of the conceptualization and measurement of arousal in communication and media psychology literature. Selection of final experimental ads was based on the ratings made by the four coders. Ads selected for the experiment were rated to be moderately arousing and have a comparable number of idea units across all categories of ad types.

**Initial pool.** An initial pool of 56 30-second political TV spots from the 2010 U.S. House of Representatives elections was selected as follows. There were 151 U.S. House of Representatives races in 2010 ([http://www.reuters.com/subjects/elections-2010-house](http://www.reuters.com/subjects/elections-2010-house)). Races featuring candidates who might be familiar to the participants were excluded. This included the Minnesota 6th District race, in which Michele Bachmann (who received substantial media coverage as a contender in the Republican primaries for the 2012 presidential election) ran against Democrat Tarryl Clark. All eight races that occurred in the state in which the experiment took place (Ohio) were also excluded.
For the remaining 142 races, the researcher tried to find one ad from each electoral race on YouTube. An attempt was made to balance the number of ads in each of the ad type categories. For each race, no more than one ad was identified for selection. There were a number of races for which no ads could be found. These were presumably non-competitive races, in which neither candidate invested heavily in political TV advertising. Other ads were excluded because they did not mention more than two issues (the recognition measures included three issues presented in each ad, described further below). The total number of ads selected for the initial pool included 56 ads, including 10 Positive Republican ads, 10 Negative Republican ads, 8 Comparison Republican ads, 10 Positive Democratic ads, 10 Negative Democratic ads, and 8 Democratic Comparison ads.

Arousal. It is important to control for arousal in the current experiment. As discussed previously, the negativity bias suggests that negative messages should have a memory advantage over positive messages, but only within a moderate arousal level range. The positivity offset suggests that positive messages will have a memory advantage at low levels of arousal. At very high levels of arousal, the limited capacity model suggests that memory will be impaired for both positive and negative ads because processing capacities are overloaded. Selection of experimental stimuli controlled for

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22 Different ads pertaining to the same race in a given district will mention the same candidates and perhaps issues, making it difficult to infer from which ad the individual remembers the information in the post-exposure memory test. For instance, suppose one ad is a Comparison Democratic ad featuring Candidate A and Candidate B, and discussing Issues X and Y. Another ad is a Positive Democratic ad featuring Candidate A and discussing Issue X. If a study participant correctly identifies Issue X as being associated with Candidate A, it is impossible to know whether that memory has resulted from watching the Comparison Democratic ad or the Positive Democratic ad.
arousal levels. Each of the 56 ads from the initial pool of ads was rated for levels of emotional arousal. Ads used in the experiment fell within a range of moderate arousal.

**Meaning and measurement of arousal.** As discussed earlier, two-dimensional approaches to emotion often identify two primary factors of emotion, including valence and arousal (M. M. Bradley, 1994; P. J. Lang, M. M. Bradley, & Cuthbert, 1992, 1997; Osgood, May, & Miron, 1975; Russell, 1978). Valence indicates the direction of the emotion (i.e., positive or negative), whereas arousal indicates the intensity or extent of activation (M. M. Bradley, Codispoti, Cuthbert, & P. J. Lang, 2001; Osgood, Suci, & Tannenbaum, 1957; C. A. Smith & Ellsworth, 1985).

In empirical research, arousal may be measured by asking coders or participants to rate messages using semantic differential scales. In Mehrabian and Russell’s (1974) Semantic Differential Scale for assessing emotions, the following six scales were used to capture emotional arousal: (1) Relaxed—Stimulated, (2) Calm—Excited, (3) Sluggish—Frenzied, (4) Dull—Jittery, (5) Sleepy—Wide awake, (6) Unaroused—Aroused. These six semantic differential scales have been used in other studies to measure message arousal (M. M. Bradley & P. J. Lang, 1994; Thorson et al., 1991).

Self-reported emotion may also be measured using the Self-Assessment Manikin (SAM, P. J. Lang 1980). SAM includes non-verbal pictoral scales, which individuals can use to indicate their emotional responses. For the arousal dimension of emotion, a nine-point pictorial scale ranges from a very calm manikin to an extremely excited manikin. This measure has been used to gauge arousal in previous research (A. Lang et al., 1995; A. Lang, Potter, & Bolls, 1999; M. M. Bradley & P. J. Lang 1994).
**Factors that contribute to arousal.** Controlling aspects of positive, negative, and comparison ads that might influence outcome variables of interest may be challenging. However, controlling arousal may prove a particularly formidable task. Focusing on the arousal component of emotion, S. D. Bradley et al. (2007) argue “controlling arousal… is relatively more difficult with political ads due to the limited size of the corpus of available ads. Controlling for arousal while ensuring that ads are balanced across the candidates and that a variety of issues are discussed may be impossible,” (p. 124).

Previous research has identified a number message features that influence emotional arousal. Researchers have also identified a number of factors shown to influence message sensation value (MSV; Lorch et al., 1994; Palmgreen et al., 1991). Although message emotional arousal is not synonymous with message sensation value, the two concepts share remarkable overlap. “Message sensation value represents the degree to which formal and content audiovisual features of a message elicit sensory, affective, and arousal responses… Messages high in sensation value (HSV) are characteristically novel, creative, exciting, intense, dramatic, or fast-paced,” (Morgan, Palmgreen, Stephenson, Hoyle, & Lorch, 2003, p. 513). Thus, factors that increase sensation value may also increase message arousal. For instance, audio structural complexity contributes to MSV, and research indicates that audio structural complexity contributes to listener arousal (R. F. Potter & Callison, 2000; R. F. Potter & Choi, 2006).

Factors that influence message arousal include visual structural features, visual content features, audio structural features, audio content features, linguistics and language (which could be presented through visual or audio channels), and people
featured in messages. Visual structural features that influence the emotional arousal of messages (or message sensation value) include the number of cuts, edits, zooms, pacing, movement, and scene changes (A. Lang, 1990; A. Lang, Bolls, Potter, & Kawahara, 1999; A. Lang et al., 2000; Thorson, Reeves, & Schleuder, 1985), soft focus (A. Lang, 1991), color images or video (Detenber et al., 2000), unusual color, visual special effects, and slow motion (Morgan et al., 2003). Visual content features that influence message arousal (or message sensation value) include the use of emotionally evocative symbols (A. Lang, 1991), graphic or intense images (Morgan et al., 2003), portrayals of emotional images (P. J. Lang et al., 2005), portrayals of events traditionally associated with emotion (Reeves, A. Lang, Thorson, & Rothschild, 1989), and images of risky products (A. Lang et al., 2005).

Audio structural features that influence emotional arousal (or that comprise structural complexity, which in turn influences arousal), include audio pacing (A. Lang, Potter, & Grabe, 2003; A. Lang, Schwartz, Lee, & Angelini, 2007), special auditory/sound effects (Morgan et al., 2003; R. F. Potter & Callison, 2000; R. F. Potter & Choi, 2006), onset of music, production effects, voice changes, vocal processing, voices of actors/characters (R. F. Potter & Callison, 2000; R. F. Potter & Choi, 2006), and saturation of background sound (Morgan et al., 2003). Audio content features that influence emotion include the genre or type of music featured, background music, and unusual music (Brader, 2005; A. Lang, 1991; Morgan et al., 2003). Verbal, language, or linguistic information that influence arousal includes the use of emotional words (A.
Lang, 1991; M. M. Bradley & P. J. Lang, 1999b; Pennebaker & Francis, 1996) and the emotional intensity of the issues in the ads.

The people featured in political TV ads might influence the overall arousal of a message. Coding systems such as the Facial Action Scoring Technique (FAST, Ekman, Friesen, & Tomkins, 1971) and the Facial Action Coding System (FACS, Ekman & Friesen, 1978) have been devised for identifying facial expressions associated with emotional responses. Other systems have been devised for coding behavior associated with emotion (Gross & Levenson, 1993, 1997; Kunzmann, Kupperbusch, & Levenson, 2005). Thus, facial expressions, body movements, and gestures may increase message arousal level.

**Idea units.** In studying the effects of positive, negative, and comparison ads on semantic processing and memory, it is also important that ads used as experimental stimuli include a comparable amount of information. Remembering a certain proportion of ad content should become more difficult as the amount of information in a message increases. That is, if an ad only discusses one issue or personality trait, it may be fairly easy to remember which issue or trait was discussed. However, if an ad mentions 10 different issues or traits, it should be more challenging to remember all 10 issues or traits that were discussed in the ad. This study evaluated the initial pool of ads for the number of verbally stated idea units presented in the auditory track of each ad. An idea unit can

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23 Initial coding of ads for quantity of idea units included all information in an ad, whether it pertained to issues, issue stances, personality traits, personal background, or accomplishments. The post-exposure recognition memory test, however, focused exclusively on issues (for reasons described earlier, such as issue information may be
be thought of as the smallest unit of information that includes a complete idea or meaningful thought. The number of idea units can be counted or coded from message texts or written audience response protocols.

**Research using idea units.** Idea units were originally used in the area of text or prose comprehension. In such studies, participants might be asked to read a prose passage and then recall the story in as much detail as possible. By matching idea units presented in a text to the idea units recalled by respondents, researchers can examine what information has been retained in memory, learned, interpreted, or comprehended from the message. Researchers employing this method have studied how comprehension and recall are influenced by individual differences (Reid et al., 1995; Schiefele & Krapp, 1996), mood (Srull, 1983), prior orientations and perspectives (R. C. Anderson & Pichert, 1978; Pichert & Anderson, 1977), provision of contextual knowledge (Bransford & Johnson, 1972; A. L. Brown, Smiley, Day, Townsend, & Lawton, 1977), provision of immediately preceding prose passages (Royer & Cable, 1975), the structural importance of information (Johnson, 1970), and text structure (Surgent, 1985).

The technique of coding idea units from text and response protocols has also been used to examine how student learning is impacted by different teaching instruction techniques (Baumann, 1984; Cook & Mayer, 1988), visual learning aids (Dean & Enemoh, 1983; Dean & Kulhavy, 1981), and the presentation of a combination of animation, text, and narration (Mayer & Anderson, 1992; Mayer & Moreno, 1998). Idea units have been used to examine a variety of other topics, such as how students might most pertinent to citizens making voting decisions). All ads included as final stimuli mentioned at least three issues.
correct for overconfidence in recalling definitions (Dulosky, Hartwig, Rawson, & Lipko, 2011), how different instructions influence topic-related idea generation (Bakunas, 1996), and how the elderly recall past experiences (Kovach, 1991). Idea units have also been used in the political advertising literature.

Geer and Geer (2003) coded idea units from radio ads and respondents’ recall protocols to examine memory differences for positive and negative ads. Jamieson (2000) used idea units to quantify the proportion of negative and positive information presented in ads. In analyzing verbal information, idea units may be preferable over other units of analyses, such as sentences or propositions. This may be particularly true for political ads, as “the verbal content of ads is often expressed in phrases rather than sentences” (Jamieson, 2000, p. 224).

**Idea unit definitions.** Definitions and measurement of idea units varies somewhat across studies. Some studies do not provide a conceptual definition of an idea unit (e.g., Pichert & Anderson, 1977). Others define idea units based on the inclusion of a complete idea or thought. An idea unit is “a short statement expressing a complete idea,” (Reid et al., 1995, p. 33). Idea units are “parts of or whole sentences that express only one complete idea,” (Surgent, 1985, 254). A broader definition of an idea unit is “a constellation of words or statements that relate to the same central meaning or chief end of a particular action or situation,” (Kovach, 1991, p. 289).

Other researchers define an idea unit in terms of its constituent grammar components, such as predicates, arguments, propositions, and independent and dependent clauses. Some examples from previous research are listed. “Idea units are prose segments
that express a single action, event, state, or relationship. Each contains a *predicate and one or more arguments,*” (Bakunas, 1996, p. 391, *italics added*). An idea unit “essentially segments a text into *independent and dependent clauses,*” (Baumann, 1984, p. 100, *italics added*). “Idea units are designated a priori and correspond either to individual *sentences,* basic *semantic propositions,* or *phrases,*” (Bransford & Johnson, 1972, p. 720, *italics added*). “Basically, an idea unit was defined as a single complete idea which consisted of a *sentence, clause, or phrase,*” (Dean & Enemoh, 1983, p. 22, *italics added*). “Each idea unit represents a meaningful information complex that corresponds to a *proposition,*” (Schiefele Krapp, 1996, p. 147, *italics added*). Srull (1983) also defines idea units as “*propositional statements*” (p. 521, *italics added*).

Dunlosky et al. (2011) define idea units as “intermediate conceptual units of information, the size of which fall inbetween atomic and complex *propositions*” (Dunlosky et al., 2011, p. 470, *italics added*).

**Measurement of idea units.** In their examination of memory for radio ads, Geer and Geer (2003) coded idea units from ads and also participants’ written recall protocols. These authors found that an idea unit was generally comparable to a sentence. “A sentence often contains one idea or theme. Of course, in longer, compound sentences, there would be more than one idea unit,” (Geer & Geer, 2003, p. 90). Johnson (1970)’s strategy for dividing text into “pause acceptability units” (p. 13) has been used by other researchers to identify idea units (e.g., A. L. Brown et al., 1977; Dean & Enemoh, 1983). This technique asks raters to indicate in a text where a reader or speaker might pause “to catch a breath, to give emphasis to the story, or to enhance meaning,” (p. 13). A. L.
Brown et al. (1977) describe instructions for coding idea units as follows. “The students were told to read the story carefully and then reread it, putting a vertical slash wherever they felt an idea unit had been completed or where they would pause while reading,” (A. L. Brown et al., 1977, pp. 1460-1)

Some studies provide one or two illustrative examples of how a prose passage or response protocol was divided into idea units. Some examples are shown below. Slash marks indicate the separation of idea units.

An elevation map shows the height of land. / The height is usually color-coded on an elevation map. / For example, red might indicate the highest elevation, / marking the topics of mountains. / Yellow might indicate the next highest elevation, / hills or plateaus. / Light green might go with prairies, / and dark green might go with swamps / or low places near the ocean. / A user of elevation maps can tell easily from a quick glance where the high and low parts of land areas are. / (Baumann, 1984, p. 115)

If we were to magnify the interior of a good conductor (say, copper or silver) we would see that it consisted of many regular crystalline box-like structures / joined together. / We would see that the sides of the boxes were open / and that passing in and through these box-like structures there would be many small particles (electrons). / (Royer & Cable, 1975, p. 120)

**Methods of idea unit coding.** In some research studies, the author or one rater may identify idea units in a prose passage or memory protocols, or match the idea units in recall protocols to those presented in the text (Baumann, 1984; Dean & Enemoh, 1983; Mayer & Anderson, 1992; Mayer & Moreno, 1998; Royer & Cable, 1975). In what appears the most common coding strategy for idea units, one rater identifies idea units in response protocols and/or matches them to those present in a text passage. Another rater scores a subset of the larger sample.
In the study by Bakunas (1996), the author coded each of two protocols (one pre-prompt and one post-prompt) written by each participant. A second rater scored 25 percent of the protocols. The interreliability coefficients were .96 and .97 for the pre-prompt and post-prompt answer sheets, respectively. In Cook and Mayer’s (1988) study, one rater matched the idea units in response protocols to those presented in the text. Twenty protocols were randomly selected and rated by a second coder for total number of idea units. Estimated intercoder reliability was .84. In Royer and Cable’s (1975) study, idea units in recall protocols were matched to those in the text by an undergraduate coder. A sample was also coded by one of the authors, with an intercoder reliability score of .98. In Surgent’s (1985) study, recall protocols were rated by the author, with a subset of recalls coded by a second rater. Agreement between the two raters was 91 percent.

In other studies, a number of coders decompose a text into idea units, identify idea units in response protocols, or match idea units from text and recalls. Reliability may be calculated as a percentage of agreement in idea units or using reliability coefficients. Johnson (1970) had 23 undergraduate students divide a folktale into “pause acceptability units,” (p. 13). Final units were those in which agreement was reached by 50 percent of the raters. A. L. Brown et al. (1977) used a similar tactic. In Schiefele and Krapp’s (1996) study, the text was divided into idea units by four coders. Disagreements were resolved through discussion among the coders.

In the study by Pichert and Anderson (1977) four raters divided two stories into idea units, with the raters in agreement on 87 percent and 76 percent of the idea units. In Kovach’s (1991) study, three individuals rated elderly women’s reminiscent responses.
Intercoder reliabilities ranged from .87 to .89. Differences were resolved as a group. In the study by Bransford and Johnson (1970), two coders compared idea units in participants’ response protocols to idea units presented in the text. Intercoder reliabilities ranged from .91 to .99, and any differences were resolved using a third rater. In Geer and Geer’s (2003) study, two coders rated participants’ memory protocols, with 83 percent agreement. When differences existed, a third rater resolved any disagreements.

**Coding.** The researcher devised two coding instruction handouts for the coders. One handout referred to the coding of arousal, whereas the other described the coding of idea units (see Appendix D for coding instructions). The four coders met and discussed the two coding instruction handouts prior to watching and coding the ads.

**Coding instructions.** The instruction sheet for arousing content coding described the meaning and measurement of arousing content and factors that might contribute to the arousal level of political TV ads (visual structural features, visual content features, audio structural features, audio content features, language and linguistics, people). The coding sheet designated the three categories of arousal to which ads could be assigned (low, moderate, high).

As discussed, a number of factors may contribute to message arousal. Coders were not asked to rate the ads on specific factors that may contribute to arousal, nor were they instructed that particular factors should take precedence in determining emotional arousal ratings. Rather, coders provided overall or holistic impressions about the emotional arousal content of each ad, considering the dimensions they believed to be
most salient, relevant, or important. Coders were told to view the ad in its entirety, and make overall ratings of ad emotional arousal.

The coding instruction handout for idea unit coding described definitions of idea units used in previous research. For the current study, identification of idea units followed a strategy similar to that devised by Mayer (1985). According to this coding technique, idea units include a predicate, and are generally recognizable by the presence of a verb. Each coder was asked to indicate idea units present in the ad by using slash marks to parse the transcribed text, and count the total number of idea units in each ad.

Coding procedure. After discussing the coding instruction handout, the four coders watched three practice ads (one positive, one negative, and one comparison). Each coder gave his/her evaluation of arousing content. The coders discussed in-depth the reasons behind their category selection. The coders then watched all 56 ads ad a group. After watching each ad, each coder gave his/her individual rating of whether the ad was of low, moderate, or high arousal. When discrepancies among coders were found, the coders discussed the reasons for their evaluations. The ad was then watched a second time, and the coders discussed until unanimous consensus was reached.

After coding the arousing content of ads, coders rated the ads for the number of idea units in each ad. The coders reviewed the instructions for idea unit coding. Each coder received transcripts of all of the 56 ads. Each of the four coders went through two ads, individually separating idea units using slash marks. The group as a whole then went through the transcriptions of these two ads in detail, discussing where idea unit slash marks should be placed. Any disagreements were resolved and clarifications provided.
The coders then individually marked the presence of idea units in each of the remaining 54 ad transcripts. After all coders were finished marking each ad, they convened to discuss the total number of idea units identified for that ad. If the range for the difference in idea units across coders was between 0 (e.g., all coders identify 10 idea units) and 2 (e.g., lowest count by a coder is 10, highest count by a coder is 12), this was deemed sufficiently reliable, and the group moved on to the next ad. In the rare instances when the range was greater than two, the group went through the ad text together\(^{24}\). Also, if any coder indicated that a particular ad text was unusually challenging to code\(^{25}\), the group went through the transcription together.

**Final stimuli.** Of the 56 ads in the initial pool, 10 were rated as low in arousal, 39 were moderately arousing, and 7 were highly arousing. All ads included as stimuli in the experimental session were moderately arousing. Arousal ratings by the coders narrowed the initial pool from 56 to 39 ads. Based on the idea unit scores, 24 of the remaining 39 ads were selected for final inclusion in the experiment. An idea unit score was calculated for each ad by taking the average count across the four coders. Again, the range of scores assigned to any given ad was never greater than two. The lowest number of idea units in an ad was 9.5 and the highest was 20 ($M = 13.64$, $SD = 2.16$).

Four ads were selected for each of the following six categories: Positive Republican, Positive Democratic, Negative Republican, Negative Democratic, Comparison Republican, and Comparison Democratic. All ads were rated by the coders as being moderately arousing. The number of idea units presented in an ad across all ad

\(^{24}\) For two ads, the range across coders was greater than two.

\(^{25}\) There were two instances in which this occurred.
categories ranged from 10.50 to 16.50 ($M = 13.52, SD = 1.29$). (The mean, standard deviation, and range of idea units in ads for each of the six ad categories are shown in a Table 7 in Appendix E). One-way analysis of variance indicated that the number of idea units in ads did not differ across the six ad type categories ($F(5,18) = 0.114, p = .988$). (Table 8 in Appendix F provides the particular race, the Democratic and Republican candidates, and a link to each of the 24 ads used in the experiment.)

**Presentation orders.** All participants viewed the same 24 30-second political TV ads. The ads were shown in four blocks of six messages each. Six ads, one from each of the six ad categories, comprised a given block. The six categories included the following: (1) Positive Republican (PR); (2) Positive Democratic (PD); (3) Negative Republican (NR); (4) Negative Democratic (ND); (5) Comparison Republican (CR); and (6) Comparison Democratic (CD). Six presentation orders were constructed using the balanced Latin squares design to counterbalance the six types of ad messages shown in each block. For each ad category, the particular ad shown in each block was randomly selected. (Presentation orders can be found in Appendix G).

**Experimental Procedure**

The experimental session was held at the Communication and Psychophysiology (CAP) Lab of the School of Communication at Ohio State University. Upon arrival at the research lab, the experimenter reviewed the informed consent form with the participant. The consent form provided a general overview of the study. It also included a description of the fitting and application of the EEG cap, the political message viewing task, the emotional ratings participants would make after the viewing of each message, removal of
the EEG cap, the risks and benefits of the procedure, a confidentiality statement, the incentive for participation (i.e., $20 and extra credit for those enrolled in courses offering course credit for participation), and their rights as study participants. Participants then provided informed consent by signing the form.

**Participant set-up.** After signing the consent form, the participant was fitted with the EEG cap and electrode sensors. This took approximately 20 to 30 minutes to complete. Following the application of the EEG cap and electrode sensors, the participant was seated in front of a computer monitor and given a keyboard to place in his/her lap (to make the emotional response ratings). After the researcher had made sure that the participant was comfortable, the ad viewing portion of the experiment began. Participants first read instructions on the computer monitor, which explained the nature of the task (watching political advertisements and making emotional response ratings). (The instruction pages for the ad viewing task can be found in Appendix H.)

**Ad viewing task.** Stimulus delivery was administered using Presentation software (Neurobehavioral Solutions). Presentation not only displays experimental stimuli, but also allows for the programming of pre-set time codes (described in more detail in the section on power analysis) and the collection of participant self-report responses after each trial.

After viewing each ad, participants rated the ad on three 7-point semantic different scales (extremely positive/not at all positive; extremely negative/not at all negative; extremely arousing/not at all arousing). Previous research has used similar
scales to measure emotional responses (e.g., S. D. Bradley et al., 2007; Ravaja et al., 2006).

**Baseline periods.** Immediately preceding the ad stimulus delivery, there was a 5-second baseline or reference period. During this time, a black screen appeared on the monitor with a pair of white crosshairs at the center of the screen to facilitate visual fixation. Participants were told to watch the crosshairs during this brief interval before the beginning of the next message.

**Post-exposure.** After viewing all ads and completing the corresponding emotional ratings for the messages, the participant was unhooked from the EEG recording equipment and brought back to the set-up room. The EEG cap and electrodes were removed. Afterward, participants completed a post-exposure questionnaire on a computer in the CAP lab (see Appendix I for post-exposure questionnaire instructions). The survey included the recognition memory measures and asked participants to provide

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26 The initial experimental protocol included a distractor task between the ad viewing task and the recognition memory task. It was proposed that while the EEG cap was removed, participants would be asked to count backwards by 3s, starting with the number 100. This counting backward technique serves a commonly employed distractor task in research experiments (e.g., de Renzi, Fagolini, & Previdi, 1978; Fougnie & Marois, 2009; Garcia-Larrera & Cezanne-Bert, 1998). Counting backward engages working memory, specifically involving the attentional-control system of the central executive component of working memory (Han & Kim, 2004). The counting task was not used in the current experiment for the following reasons. First, two pre-test participants were run before the focal experiment. Both suggested, unprompted by the researcher, that the recognition memory task was very challenging. Second, removing the EEG cap and face electrodes took a few minutes, during which the researcher tried to engage the participant in conversation unrelated to the material in the experiment, which should also serve to clear working memory. Finally, the interest of this dissertation focuses on whether semantic associations have been made between candidates and issues, not whether that information has been recently activated in working memory versus stored more thoroughly in long-term memory.
information about their demographic and political characteristics. The post-exposure survey was administered using MediaLab (Empirisoft, NYC).

**Measures**

**Emotion ratings.** Participants rated each ad (immediately after viewing the ad) on three 7-point semantic different scales (extremely positive/not at all positive; extremely negative/not at all negative; extremely arousing/not at all arousing). (See Appendix J for exact wording.)

**Demographic and political measures.** Basic demographic information included age, gender, race, and socioeconomic status. Political measures included political interest, political party affiliation, political ideology, and political knowledge. (See Appendix K for exact wording.) Demographic variables are standard measures in most studies, as are basic political variables in studies of political communication.

**Memory.** This study uses a recognition test to assess memory for information presented in the political TV ads. Participants were presented with the name and picture of a candidate, followed by a list of issue stances. Participants were asked to indicate which of the issue stances were presented in the ad about the particular candidate. For each ad viewed, the name and a profile picture of a candidate presented in the ad appeared on the computer screen. If two candidates were presented in an ad, both candidates’ names and pictures were shown on the screen. (Negative and positive ads featured one candidate, whereas comparison ads featured two candidates.)

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27 This recognition memory strategy is similar to the one used by Thorson et al. (1991). In Thorson et al.’s study, respondents were presented with a list of six issues or candidate qualities and were asked to mark which ones they had heard in the ad.
Beside the name(s) and picture(s) were a list of issues (e.g., concealed carry, debt, Medicare, Wall Street bailout), issue problems identified by the candidate or ad (e.g., irresponsible budget, massive debt, wasteful spending), candidates’ general objectives or election promises (e.g., business growth, tough campaign finance, eliminate debt), specific policy stances (e.g., against bank bailouts, flat national income tax, mothers should not work, privatize Social Security), or references to past actions that implicate policy stances (e.g., opposed middle class tax cuts, opposed teacher funding, authored health care plan).

The recognition memory measure for each ad included six issues, issue problems, candidate objectives, policy stances, or past policy-relevant behavior. Three of these were actually presented in the ad, whereas the other three represented issues or policies not associated with the candidate or candidates shown on screen (i.e., foils, lures, distractors). Participants were asked to mark which issues were presented in each ad. (An example of a post-exposure recognition test for one ad is shown in Figure 2 in Appendix L.)

**Targets items.** Full transcripts of all experimental ad stimuli and the issues mentioned in each ad are listed in Table 9 in Appendix M. The issues are listed in chronological order as they were presented as verbal information in the auditory track of the ad. For each ad, three “target” issues or policy stances were randomly selected for inclusion in the recognition memory test. The issue and issue stances presented in the ad were assigned a number based on the chronological order of presentation in the ad. Random numbers were generated to select the target items for the recognition memory test, which included issues and policy stances mentioned in the ads. If the ad included
only three issue or policy positions, all three were used in the recognition memory measure. (Target items are listed in bold in the right-hand column of Table 9 in Appendix M.)

**Foils.** In addition to the three target items, three “foils” (i.e., information not presented in the ad) were included in the recognition test for each ad. Foil items were selected as follows. A list was compiled that included all issues, issue problems, candidate objectives, policy stances, and past policy-relevant behavior from the 56 ads in the initial pool of 30-second TV spots. Table 10 in Appendix N includes all of these election promises, issue stances, issue problems, objectives, and prior policy-relevant behavior (right column), organized by general issue category (left column).

For selection of the foil items, the rows in the right-hand column of the Table 10 in Appendix N (e.g., issue stance, policy objective) were assigned ascending numbers. A random number between 1 and 201 (total number of issue problems, issue stances, candidate objectives, and past behavior from the initial pool of ads) was generated to select each of the foil items used in the memory recognition test for each ad. For selection of the foil items, the rows in the right-hand column of the Table 10 in Appendix N (e.g., issue stance, policy objective) were assigned ascending numbers. A random number between 1 and 201 (total number of issue problems, issue stances, candidate objectives, and past behavior from the initial pool of ads) was generated to select each of the foil items used in the memory recognition test for each ad.

**Order.** Random numbers were generated to determine the presentation of ads in the recognition memory test. All participants viewed the same order of questions in the post-exposure test. The pictures of the candidate(s) featured in each recognition memory question are shown in Appendix O. Appendix P lists all the target and foil items included.

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28 Foil issues that overlapped with target responses or with other foil issues for that ad were excluded. However, different issue aspects or policy stances about the same issue were acceptable for inclusion. For instance, if a target item was “against Wall Street bank bailouts,” items such as “against bank bailouts” or “crack down on Wall Street” were excluded as foil items. However, an item such as “supports bailout” could still be included.
in each recognition memory test question. Target items are listed in bold, and the non-bold items represent foils. In Appendix P, as in the actual recognition test, items appear in alphabetical order based on the first word of the phrase.

**Memory score.** Participants were asked to mark which issues were presented in each ad. Target and foil recognition items for each ad were scored as correct or incorrect. Target items correctly identified by the respondent as seen in the ad featuring the candidate or candidate pair are known as “true recognition” items. (Target items that have not been positively identified by the respondent are known as “misses.” See Footnote 8 on signal detection theory). For each ad, the sum of true recognitions represented the memory score for that ad (range 0 to 3).

**EEG Data Collection and Processing**

**Data collection.** Electroencephalography (EEG) data were recorded using a 64-channel electrode cap manufactured by the company BioSemi (Amsterdam, the Netherlands). The cap layout is based on the International 10/20 system (Homan, Herman, & Purdy, 1987; Jasper, 1958; Klem, Luders, & Jasper, 1999)\(^{29}\). Six additional surface electrodes were used. Two electrodes were placed at the left and right mastoid bones (protrusions located behind the ears; M1, M2). These were used to re-reference the

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\(^{29}\) The circumference of the participant’s head is measured to determine the correct cap size (small = 50 to 54 cm; medium = 54 to 58 cm; large = 58 to 62 cm). After the cap has been applied, additional measurements are taken to ensure that the Cz electrode is equidistant from the nasion and the inion, and from the left and right pre-auricular points (depression in front of the ear, at the posterior root of the zygomatic arch directly in front of the tragus).
data offline. Four electrodes were used to monitor eye movements\textsuperscript{30}. Impedances were kept below 5 kΩ. Data were sampled online at a rate of 512 Hz. EEG data were collected using the ActiveTwo data acquisition software system (BioSemi).

**Data processing.** Pre-processing of EEG data was done offline using EMSE Suite (Source Signal Imagining, San Diego, CA, USA). A polynomial detrend (3\textsuperscript{rd} order) was applied to remove DC offsets. Data were re-referenced to average mastoids. EMSE’s Express Ocular Artifact Correction (EOAC) was applied to remove artifacts caused by eye movements. EOAC is based on principles of spatial filtering, and uses data from the four external electrodes placed below and lateral to the left and right eyes (see Pfleiger, 2001).

A Butterworth IIR band-pass filter was applied, with a high-pass cutoff of .1 Hz and a low-pass cutoff of 100Hz. Lastly, a spatial interpolation filter was applied to reconstruct noisy channels. The spatial interpolation function in EMSE recreates a particular channel using all other channels, with greater weight given to spatially closer channels and less weight given to channels farther away from the interpolated channel.

**Gamma Band Power**

**Power analysis.** One power spectrum analysis was performed for each ad for each individual. One power spectrum analysis was also performed for each baseline/reference period immediately preceding the ads for each individual. Thus, in total, 48 power spectrum analyses were performed for each individual. Power analyses

\textsuperscript{30}Two electrodes were placed at the left and right infra-orbital points below the eyes (IO1, IO2), and two electrodes were placed at the outer canthus of the left and right eyes (LO1, LO2).
were conducted using EMSE’s Power Spectrum tool. The Power Spectrum tool computes Fast-Fourier Transforms (FFTs) on specified data intervals. These values are squared and then averaged across “events” of the same type. Power is reported in units of volts².

Each ad had three events unique to that ad, time-locked to the target items in the recognition memory test. The three events represented preset time codes indicating the midpoint in time during which each target item from the recognition memory test was presented in the stimulus sequence. For instance, consider the transcript below from a Positive Republican ad from the initial pool of ads (not included in the experiment).

Here on the ranch in South Dakota, we don’t take a lot of polls. Or hold many caucuses. We do what needs to be done. That’s what I’ll do in Washington. Unlike my opponent I’ll vote to lower the national debt. Vote against wasteful spending, repeal government mandated health care, and work every day to create jobs. Oh and one more thing, my first vote won’t be to make Nancy Pelosi speaker. I’m Kristi Noem, and I approve this message. Sorry Nancy.

A possible target recognition items for this ad is “vote against wasteful spending.” The candidate begins saying the phrase “vote against wasteful spending” at 12.51 seconds from the start of the ad, and ends at 13.80 seconds. Thus, the time code in this ad for the target item would be at 13.16 seconds (13.80 – 12.51 = 0.65; 12.51 + 0.65 =13.16). Identification of the exact time during which issue information for target items was presented in each ad was done using Quicktime Pro. The researcher played each ad, noting the beginning and end time (to the nearest hundredth of a second) when the phrase containing the target issue item was presented in the ad. The timing of the pre-set time codes for each of the three target items in each ad was calculated as described above. Each baseline period also had three events unique to that baseline. The events were programmed to occur at seconds 2, 3, and 4 of the 5-second baseline period.
Power analyses were performed using zero-padding (to produce a number of data points equal to a power of two, required by FFT) and a Hanning window. Magnitude limits were set to +/- 100mV. Epochs were 1-second in length.

**Time epochs.** Power analyses were calculated for two separate epochs for each ad, one using a window of -.5 to .5 seconds (time-locked to the event), and another using a time window of .5 to 1.5 seconds.

In studies of information processing, timing may be of critical interest. During message viewing, information is presented over time, and information processing occurs over time. Communication researchers are frequently interested in the role of timing in information processing and memory. For instance, Newhagen and Reeves’ (1991) study of audio and visual recognition for political TV ads separately examined memory for information presented in the first half and the second half of the message. Newhagen’s (1998) study of the influence of emotional images on recognition memory for TV news segments examined memory at four different 20-second time periods (before the emotional video manipulation, during the manipulation, right after the manipulation, and late in the video segment).

Psychophysiology studies are particularly adept at examining how the timing of brain activity corresponds with information processing. Compared to other measures of neurological activity, EEG, with its high temporal resolution, is particularly suited for studying activity within narrow windows of time as well as how activity changes over time. In communication research, some researchers have examined brain activity and
information processing by averaging neurological recordings over a large segment of time, such as an entire message (e.g., Appel et al., 1979).

Others have examined how brain activity during smaller time epochs is related to the processing of particular message segments. Simons et al. (2003) examined the impact of image motion, emotional arousal, and emotional valence on attention, with attention indexed by alpha inhibition measured using EEG recordings. Participants viewed 60 images for 6 seconds each. EEG analysis focused on three EEG recording sites (Fz, Cz, and Pz). Data from these channels were subjected to a fast Fourier transformation (FFT) by dividing the 6-sec stimulus presentation into 11 epochs. These frequency spectra were then averaged separately for the first five and last five epochs of stimulus presentation. Results showed that there was a main effect of motion and a main effect of interval, such that moving images were associated with greater alpha reduction (more cortical activity), and alpha power was reduced more (more cortical activity) during the first than second half of stimulus presentation. There was also an interaction between motion and interval, such that there was a larger increase in alpha activity (less cortical activity) for the still than moving images during the second half of stimulus presentation.

Reeves et al. (1985) examined how movement and scene changes in TV commercials influences attention (where attention was indexed using alpha inhibition calculated from EEG recordings). EEG was recorded as participants watched nine 30-second commercials embedded in a half-hour viewing of a situation comedy. Two time series were constructed, including an alpha time series and a stimulus time series. Fourier spectral analysis was used to attain power values in the alpha frequency range for each
half-second interval. For each individual, alpha power was averaged across the four electrode sites of interest (C4, C3, O1, and O2) and normalized (using a calculated mean across the programs and commercials). Median alpha power across subjects for each half-second interval was used to create the alpha time series. A stimulus time series was constructed using codes for the presence or absence of scene changes or movement.

The effect of movement and scene changes on attention (alpha) was examined for each of the commercials separately and also for a larger series that combined the seven commercials. Hierarchical regression equations were employed, with increment to R (IR) used as the criterion to assess the influence of movement and scene changes on alpha. For each variable, five forward lags (t+1 to t+5) were included, in addition to the original position in the series (t+0). This was done to examine potentially delayed reactions in alpha in response to stimulus cues. For instance, a significant effect at t+0 indicates that alpha reacted within the immediate .5-second window of stimulus (movement, edit) onset, whereas significant values at forward lags indicate the amount of delay and the direction of change in alpha. Results indicated that for movement, IR was significant in the overall series and for five of the seven commercials individually. Alpha decreased significantly during t+0 and also at the first and fourth forward lags in the overall time series. For edits, alpha decreased at t+1 and t+3 in the overall series. An increase in alpha occurred at t+4.

Although the Reeves et al. (1985) study included measures of memory, they were used to validate the use of alpha as a measure of attention, rather than formally included in the time series analyses. After stimulus viewing, half of the participants were tested for
immediate recall and recognition, and the other half returned two weeks later and completed the memory tests. Memory measures focused on recognition and recall of the product category, brand name, claims made, scenes, and the product package. Memory analysis focused on whether individuals remembered aspects of the commercial, without consideration of when this information appeared in the ad. Thus, median alpha values were aggregated across each commercial. In immediate recall, alpha was significantly and negatively related to recall for product, claim, and scene. In immediate recognition, alpha was significantly and negatively related to recognition of product and package. In delayed recall, alpha was significantly and negatively related to product memory. In delayed recognition, alpha was not significantly related to recognition measures.

Although the Reeves et al. (1985) study examined the effect of movement and scene changes on alpha, whereas the present study is interested in the effects of gamma on memory, the findings from the former study provide some indication of the time epochs that might be most useful for studying time-locked effects of information processing. Combining results for movement and scene changes, analyses indicated that changes in alpha activity might occur from the .5-second window of stimulus onset to up to two seconds following stimulus onset. Although Reeves et al. were interested in attention and alpha, alpha inhibition was related to performance on memory measures. Thus, the time periods during which crucial information processing occurs (such as semantic processing, indexed by gamma band power) may occur during the time the information is presented, and up to two seconds following. This study conducted gamma
power analysis on two time windows, one surrounding presentation of the issue in the ad
(-.5 to .5 seconds), and the second following issue presentation onset (.5 to 1.5 seconds).

**Frequency range.** Each power spectrum analysis produces a matrix, with each
cell representing the power for one electrode (channel site) within a 1-Hz frequency bin.
Gamma was defined in this study as 36 to 44 Hz. For each electrode, power was averaged
across each of the 1-Hz frequency bins from 36 to 44 Hz to calculate one gamma score
for each power spectrum analysis.

**Electrodes.** This study focused on 10 EEG channels (Fz, F1, F3, F5, F7, FCz,
FC1, FC3, FC5, FT7). These channels included sites on the midline and left side of the
brain over frontal and anterior temporal cortical areas.

As discussed earlier in the section on neurophysiology and EEG, the inverse
problem prevents researchers from identifying the precise locations of the specific
neurons contributing to EEG signal. However, recordings over general cortical areas are
typically predominantly generated by the underlying cortical structures.

Research indicates language lateralization in the brain, such that activity in the
left hemisphere of the brain dominates during language processing and speech production
(Galaburda, LeMay, Kemper, & Geschwind, 1978). Two well-known language centers,
Broca’s area (left, inferior frontal gyrus; Broadman’s Area 44 and 45) and Wernicke’s
area (left, posterior region of the superior temporal gyrus; BA 22), are located on the left
side of the brain.

Evidence of left lateralization for language was first indicated by the work of Paul
Broca (1865). Broca found that damage to particular regions on the left side of the brain
led to a certain type of aphasia characterized by slow, labored, and inarticulate speech. Shortly following Broca’s breakthrough findings, Carl Wernicke (1874/1977) discovered that lesions to another part of the brain produced a different type of aphasia. The speech of those who suffer from this type of aphasia, if not closely attended to, may sound quite normal. The speech may be fast-paced, and words are articulated clearly. However, the content of the speech is deficient, such that the speech is nonsensical and lacking in meaning.

Left-hemisphere lateralization is particularly true of right-handed subjects, for whom approximately 95% exhibit left-hemisphere dominance (Binder et al., 1996; Pujol, Deus, Losilla, & Capdevila, 1999). However, research also indicates that although the likelihood of right-hemispheric dominance and symmetric activation during language processing is higher among left-handed and ambidextrous people, left-hemispheric dominance still characterizes well over the majority of these individuals too (Szaflarski et al., 2002).

Researchers have suggested a number of areas involved in linguistic information processing. Hagoort (2005) suggests that the left inferior frontal gyrus (LIFG) is critical to binding or unification processes required for the cognitive processing of language. Although Hagoort suggests there may be some regional specificity for different aspects of verbal information processing (semantic, syntactic, phonological), there is also significant overlap in activation areas for these processes. Furthermore, as described earlier, the definition of semantic processing provided here includes the processing of phonological, orthographic, morphological, syntactical, and semantic information.
Roughly speaking, BA 47 and BA 45 are involved in semantic processing; BA 45 and 44 contribute to syntactic processing; and, finally, BA 44 and parts of BA 6 have a role in phonological processing. LIFG is thus involved in at least three different domains of language processing (semantic, syntactic, phonological), with, presumably, a certain level of specialization in different LIFG subregions. However, the overlap of activations for these three different types of information is substantial and suggests the possibility of interactive concurrent processing in which various types of processing constraints are incorporated as soon as they become available. (Hagoort, 2005, p. 420).

Martin and Chao (2001) identify similar cortical regions as responsible for the processing of semantic information.

[E]vidence has accumulated suggesting that an anterior and inferior prefrontal region (roughly equivalent to Brodmann’s Area BA 47 and the inferior aspect of BA 45) may be involved selectively in semantic processing… [T]his region may serve as a ‘semantic working memory system’ responsible for retrieving, maintaining, monitoring and manipulating semantic representations stored elsewhere. (Martin & Chao, 2001, p. 198)

Neuroscience lesion studies have also indicated that the medial temporal lobe (MTL) and prefrontal cortex (PFC) are involved in declarative memory (Squire, Stark, & Clark, 2004). Declarative memory is similar to semantic memory (as it has been described here), in that declarative memory represents knowledge that can be consciously accessed and explicitly described. Declarative memory is often compared to procedural memory, where procedural memory is often not consciously accessible. Rather, procedural memory refers to acquired skills or behaviors. The most common example of procedural memory is riding a bicycle. Many individuals know how to ride a bicycle but would have difficulty describing the exact movements necessary to perform this skill.

In the study described earlier examining neurophysiological responses to sentences that were correct, semantically incorrect, or included world knowledge violations, Hagoort et al. (2004) found an increase in gamma power over lateral frontal
regions during semantic processing. In the study by Siegle et al. (2010) examining depressed individuals’ elaboration or rumination following presentation of negative words, differences in gamma power between depressed and control individuals were found at 13 electrode sites, including frontal, central, and some temporal and parietal regions (Fz, F3, Fp2, F4, F8, Cz, C3, C4, Pz, P3, P4, T5, T6).

**Strategies for baseline correction.** Studies conducting spectral decomposition of EEG signals generally implement some sort of baseline correction or normalization. That is, researchers generally attempt to adjust values of interest (e.g., power during stimulus presentation) to values prior to stimulus presentation (e.g., baseline power values). “[A] baseline period is defined by the average of the values within a time window preceding the time-locking event,” (Roach & Mathalon, 2008, p. 918). As described earlier, baseline periods in this study included 5-second time windows immediately preceding each ad. Three pre-set event codes were inserted into each baseline period, at consecutive 1-second time intervals.

The simplest forms of baseline correct involve subtracting (Kiebel, Tallon-Baudry, & Friston, 2005) or dividing by baseline values (Gruber, Muller, Keil, & Elbert, 1999; Jodo et al., 2005; Makeig, 1993; Rickert et al., 2005; Waldert et al., 2008). Other studies may divide by frequency or power over the entire trial duration (Chervin et al., 2004), power within another frequency band (Mecklinger, Kramer, & Strayer, 1992) or across the entire power spectrum (Jin et al., 2006; Peiris, Jones, Davidson, & Bones, 2006). Other researchers interested in power changes use more complex baseline or
normalization techniques, such as subtracting and then dividing by baseline power\textsuperscript{31}. Even more options exist for time-frequency analysis\textsuperscript{32} (in which spectral decomposition is conducted and changes over time are examined).

**Baseline correction and data exclusion.** For this study, baseline correction was implemented by dividing gamma power elicited during each ad by gamma power averaged across all valid baseline periods. The initial intent was to correct gamma power for each ad by dividing by the baseline period immediately preceding that ad. However, following data collection, it was apparent that this method would lead to the exclusion of too many trials from data analysis. For instance, for Epoch 1 of the ad data (-.5 to .5 seconds), across the 47 participants there were an average of 5.87 trials (out of 24 trials, one for each ad) for which no power spectrum could be calculated because the magnitude of the EEG signals exceeded voltage thresholds (i.e., invalid trials). For Epoch 2 of the ad data (.5 to 1.5 seconds), there were an average of 6.00 invalid trials. For the baseline periods, there were an average of 7.76 invalid trials.\textsuperscript{33}

\textsuperscript{31} Still other researchers use more complex baseline correction or normalization techniques. One of the more common methods, popularized by Pfurtscheller and colleagues (Pfurtscheller, 1992; Pfurtscheller & Lopes da Silva, 1991), calculates what is called event-related desynchronization (ERD) or event-related synchronization (ERS). Percent of ERD is computed using the formula $\frac{A - R}{R}$, where $A$ represents power in the frequency band of interest after the event and $R$ represents power in that frequency band in the baseline period before the event.

\textsuperscript{32} Makeig (1993) introduced event-related spectral perturbation (ERSP) as a “generalization of the ERD” (p. 284), the calculation of which includes baseline correction. ERSP is an example of time-frequency analysis. Roach and Mathalon (2008) provide a summary of four common baseline correction techniques for time-frequency analysis.

\textsuperscript{33} There is no definitive answer for why this higher average of invalid trials resulted in the baseline periods than the ad data. Voltages exceeding the magnitude thresholds
One baseline gamma power score was calculated for each individual by averaging
the gamma band power score for all valid baseline periods for that individual. Gamma
power during each ad was then divided by each individual’s average baseline gamma
power score. Individuals for whom half or more of all ad trials (12 or more out of 24 total
ads) resulted in EEG signals exceeding magnitude thresholds were excluded from further
analysis. This included 12 individuals from the total sample, leaving 35 participants
whose data was used in the models described below. Across these 35 participants, the
average number of invalid ad trials was 3.20.

usually result from movement, fidgeting, scratching, or adjusting the head cap or chin
strap of the cap. The researcher verbally explained to the participant that movement
interferes with the EEG data collection. The instruction pages read on the computer
screen prior to the ad viewing task reiterated this point. “Lastly, please remember to try to
limit any movement during the viewing of the ads.” However, it seems likely that
participants did not realize that data recorded during the rest period would be needed for
analysis of the EEG data, and might have thought it appropriate to move during this
period.
Chapter 12: Results

Sample Characteristics

The final sample used for data analysis included 35 participants, all of whom were students at Ohio State University. All participants were pre-screened to ensure that they were right-handed, had normal or normal-to-corrected vision, had normal or normal-to-corrected hearing, and identified themselves as partisans (Republicans or Democrats).

The post-exposure questionnaire measured responses to a number of demographic and political variables (see Appendix K for exact question wording). The sample was close to evenly split between Democrats (18) and Republicans (17). Participants ranged in age from 18 to 31 years old ($M = 20.89$, $SD = 2.32$). There were more females (68.6%) than males, and the sample was predominantly white (77.1%).

Demographic questions also included highest level of education completed ($M = 2.34$, $SD = 1.03$, Median = 2; 2 = “some college,” 3 = “associate or technical degree”), class ($M = 2.20$, $SD = 0.63$, Median = 2; 2 = “middle class,” 3 = “upper-middle class”), and family income in 2010 ($M = 3.69$, $SD = 1.23$; Median = 4; 3 = “$50,000 to $74,999,” 4 = “$75,000 to $100,000”).

Political interest was captured by a single question asking respondents to indicate “How interested are you in politics and public affairs?” on a scale of 1 to 5 (1 = not at all, 5 = a great deal, $M = 1.89$, $SD = 0.80$). Economic and social ideology (liberal-
conservatism) were measured on a 7-point scale (7 = conservative, economic: \( M = 3.26, SD = 1.44 \); social: \( M = 3.00, SD = 1.41 \)). Political knowledge was measured by summing each individual’s correct responses to Delli Carpini & Keeter’s (1993) 5-item index of political knowledge (\( M = 3.20, SD = 1.45 \))

**Variables**

Analyses were run using HLM (described further below). Variables corresponding to ad characteristics are entered as Level 1 variables. Variables corresponding to individual-level characteristics are entered as Level 2 variables. The outcome variable (Memory) is a sum of the correctly identified target items for each ad in the recognition memory test (range 0 to 3). Other Level 1 variables included Ad Type and Ad Sponsor. Two dummy codes were used to represent the three categories of political ad types (Positive, Negative, Comparison). Positive ads were used as the reference group (i.e., coded as 0 for both dummy codes). Negative ads were represented by the first dummy code (Negative dummy code, Negative ads = 1, Comparison ads = 0), and Comparison ads were represented by the second dummy code (Comparison dummy code, Comparison ads = 1, Negative ads = 0). Ad Sponsor was indicated by a dichotomous variable (Democratic sponsor = 0, Republican sponsor = 1). The only Level 2 variable used for the present analyses was Partisanship (DEM, Republican = 0, Democrat = 1).

**Analyses**

Analyzes were run using HLM 6.02. Variables specific to the ad (Memory, Ad Sponsor, Ad Type) are Level 1 variables, nested within Level 2 units (individuals). The
models are estimated using Full Estimation Maximum Likelihood (FEML)\textsuperscript{34}. A normal
distribution of the outcome variable (Memory) was employed\textsuperscript{35}. Equations for all models
run in the analyses below are shown in Appendix Q.

**Step-down approach to model selection.** The approach to model fit used here
follows Aiken and West’s (1991) step-down approach suggested for use in models with
interaction terms. The most complex model is run first. Terms are then eliminated based

\textsuperscript{34} When the number of Level 2 units is not large, some researchers recommend using
Restricted Estimation Maximum Likelihood (REML) over FEML. FEML was chosen
here for two reasons. First, using FEML, any pair of nested models can be tested for
model fit using a likelihood ratio test. That is, nested models that differ in fixed and/or
random effects can be compared. In REML, direct tests of model fit can only be
employed for models that differ in random effects (variance-covariance). Second,
although the deviance reported and model fit comparison will be reported using FEML,
all models were also run using REML. No apparent differences in these two estimation
methods were observed. Coefficient estimates tended to be identical, and p values tended
to change by a thousandth of a point (i.e., from .007 to .006), if at all.

\textsuperscript{35} A Poisson distribution for of the outcome variable was considered, as the data are
counts of the correctly identified target items. A Normal distribution was ultimately
selected over the Poisson for the following reasons. First, as there is a limit (i.e., 3) to the
number of target items in the recognition test, the outcome variable does not represent a
true Poisson distribution. Second, in examining the distribution of the Memory scores,
the frequency of scores (0 correct = 18.5%; 1 correct = 31.0%, 2 correct = 33.3%, 3
correct = 17.1%), skewness (-.018) and kurtosis (-1.010) indicated that the variable was
close to normally distributed. Third, comparisons of model fit (using Likelihood Ratio,
discussed in more detail below) rely on the deviance statistic produced for each model.
Poisson models use full or restricted PQL (referred to as “penalized quasi-likelihood,”
Brewlow & Clayton, 1993, cited in Raudenbush, Bryk, Cheong, Congdon, & du Toit,
2004, p. 103), which do not provide deviance statistics. Laplace, which can also be used
to estimate Poisson models, does provide deviance. However, Laplace estimation does
not allow for overdispersion, which may be necessary when the conditional mean is not
equal to the conditional variance. Lastly, a number of the models were also run using a
Poisson distribution (allowing for overdispersion using both full and restricted PQL).
Although the coefficients obviously changed (the Poisson distribution uses a logit link
function), the significance of variables remained consistent as with the Normal
distribution).
on the statistical significance of variables. Simpler models are then run. The approach taken here includes both sequential and global testing. In term-by-term sequential testing, only scale-invariant terms (terms of the highest order) are omitted (as recommended by Aiken and West).

**Likelihood Ratio Tests.** Formal statistical tests of model fit (i.e., those that include critical values and significance tests) were conducted using Likelihood Ratio Tests. Likelihood Ratio Tests test for statistically significant differences in model fit for nested models using the deviance statistics for models being compared.

The formula for the Likelihood Ratio Test is shown below.

\[
\text{Deviance}_\text{null} - \text{Deviance}_\text{alt} = -2 \times \log(\text{Likelihood}_\text{null}) - (-2 \times \log(\text{Likelihood}_\text{alt}))
\]

represents the deviance for the simpler model, and is the deviance for the more complex model. The difference in the deviance for two nested models follows an

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36 In HLM, the statistical significance of fixed effects (both intercepts and slopes) are tested using a t-test, whereas random effects are tested using a chi-square test.

37 Rather intuitively, better models are those that include rather than exclude significant effects. Failure to include higher order terms that have a nonzero effect on the outcome variable will bias coefficients for lower order terms (Aiken & West, 1991). Although including higher order terms whose actual effect on the outcome variable is zero should not bias lower order coefficient estimates (unless first order terms are correlated), including unnecessary terms lowers the statistical power for all tests of coefficients in the model. In other words, good models fit the data and are parsimonious.

38 Two models are nested when one model is the direct subset of another model.

39 HLM automatically produces a deviance statistic for each model run, where Deviance = -2 * Log(Likelihood). Deviance provides a measure of model fit, or more accurately, model misfit. The smaller the deviance, the better the model fit. In model selection, researchers strive for not only goodness of fit but also parsimony. In general, models that include more parameters will fit the data better than models that include fewer parameters. This can make direct comparisons of model deviance somewhat misleading.

40 Likelihood Ratio Tests using deviance produced under REML are appropriate when nested models differ only in random effects, whereas deviance produced using FEML can be used in Likelihood Ratio tests to compare nested models that differ in fixed and/or random effects.
approximate chi-square distribution, with degrees of freedom \((df)\) equal to the difference in the number of parameters in the two models\(^{41}\). Failure to reject the null hypothesis indicates that the less complex models fits just as well as the more complex model, whereas rejection of the null indicates that the more complex (less parsimonious) model is more appropriate.

**Hypothesis 1 and 2**

Hypothesis 1 stated that memory will be better for Negative relative to Positive ads, and Hypothesis 2 stated that memory will be better for Comparison relative to Positive ads. These hypotheses were tested using Model 1, which included Memory as the outcome variable and the Ad Type dummy codes as the only predictors. Results indicated that participants’ memory did not differ for Positive ads relative to either Negative or Comparison ads (Table 1, Column 1). Neither Hypothesis 1 nor Hypothesis 2 was supported.

\(^{41}\) In REML, parameters include only variance-covariance components, whereas parameters in FEML include both fixed and random effects.
<table>
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<tr>
<th></th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
<th>Model 5</th>
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Table 1. Models Testing for Main and Interaction Effects

Note: The dependent variable is accurate recognition memory. Independent variables include Ad Type (represented by dummy codes, with Positive Ads as the reference group), Ad Sponsor (represented using a dichotomous variable, Republican-sponsored =
1, Democratic-sponsored = 0), individual-level Partisanship (represented using a dichotomous variable, Democrat = 1, Republican = 0), and interactions between and among these three variables. Model 1 includes only main effects of Ad Type. Model 2 includes a 3-way interaction among Ad Type, Ad Sponsor, and individual-level Partisanship (as well as first order terms and 2-way interactions between these three variables). Model 3 includes 2-way interactions between Ad Type and Ad Sponsor, Ad Type and Partisanship, and Ad Sponsor and Partisanship (as well as first order terms). Model 4 includes 2-way interactions between Ad Type and Ad Sponsor, and Ad Type and Partisanship (as well as first order terms). Model 5 includes 2-way interactions between Ad Type and Ad Sponsor (as well as first order terms).

# = p < .10
* = p < .05
** = p < .001

Research Question 1

The first research question asked whether there are any 2- or 3-way interactions between/among Ad Type, Ad Sponsor, and Partisanship that moderate memory effects. A number of models were run to test this research question. Results for these models are shown in Table 1 and Table 2. Model 2 was the most complex model, including a 3-way interaction among Ad Type, Ad Sponsor, and Partisanship. (Results are shown in Table 1, Column 2.) The 3-way interactions were not significant. However, the coefficients for both dummy codes (representing conditional effects of ad types) were significant in this model. (Recall that the main effects of the Ad Type dummy codes were not significant in Model 1, as shown above in the tests for Hypothesis 1 and Hypothesis 2). The interaction between the Negative Ad dummy code and Partisanship was also significant.

Sequential testing was implemented by excluding the non-significant 3-way interaction term. Model 3 included all 2-way interactions. (Results are shown in Table 1, Column 3.) Again, the coefficients for the dummy codes representing ad types were
significant. The interaction between the Negative Ad dummy code and Partisanship was significant (as in Model 2), and the interaction between Comparison Ad and Partisanship was marginally significant. The interaction between the Comparison Ad dummy code and Ad Sponsor was also marginally significant. The Likelihood Ratio Test showed there was no significant difference between Model 2 and Model 3 ($\chi^2 = 0.19$, $df = 2$, $p > .05$). Thus, Model 3 (the more parsimonious) is preferred.

Model 4 excluded the non-significant 2-way interaction from Model 3. (The non-significant interaction was between Ad Sponsor X Partisanship. Although the interaction between Ad Type and Ad Sponsor did not reveal a statistically significant effect in Model 3, the marginally significant interaction between the Comparison Ad dummy code and Ad Sponsor led to the inclusion of Ad Type X Ad Sponsor in this model). The same pattern of significant and marginally significant terms from Model 3 appeared in Model 4. (Results for Model 4 are shown in Table 1, Column 4). Additionally, the coefficient for Partisanship was marginally significant in this model. The Likelihood Ratio Test showed there was no significant difference between Model 3 and Model 4 ($\chi^2 = 0.00$, $df = 1$, $p > .05$). Thus, Model 4 is preferred.

Model 4 was next compared to Model 5 and Model 6. Model 5 included the interactions between Ad Type and Ad Sponsor (results are shown in Table 1, Column 5), which allows for a global test of the variable Partisanship. In Model 5, the interaction between the Comparison Ad dummy code and Ad Sponsor was marginally significant (the same as in Model 4). The Likelihood Ratio Test showed that Model 4 and Model 5 differed significantly in fit ($\chi^2 = 9.00$, $df = 3$, $p < .05$). The results of this test provide

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evidence that Partisanship should be retained in the model. Model 4, the more complex model, should be retained over Model 5.

Model 6 included the interactions between Ad Type and Partisanship (results are shown in Table 2, Column 1). Comparing Model 6 to Model 4 provides a global test of the variable Ad Sponsor. In Model 6, the interaction between the Negative Ad dummy code and Partisanship was significant, and the interaction between the Comparison Ad dummy code and Partisanship was marginally significant (as in Model 4). The Likelihood Ratio Test showed there was no significant difference between Model 4 and Model 6 ($\chi^2 = 4.02, df = 3, p > .05$). Model 6, the more parsimonious model, is therefore preferred.
Intercept: 1.66** (.13) 1.36** (.12) 1.53** (.12)

Level 1: 
Negative: -.26* (.11) .19# (.10) -.01 (.08)
Comparison: -.16 (.11) .11 (.10) -.01 (.08)

Level 2: 
Partisanship: -.30# (.17) .30# (.17) -.06 (.15)

2-Way Interactions: 
Negative X Partisanship: .45* (.15) -.45* (.15) -
Comparison X Partisanship: .27# (.15) -.27# (.15) -

N (Level 1): 35 35 35
N (Level 2): 840 840 840

Table 2. Models showing the interaction between Ad Type and Partisanship.

Note: The dependent variable is accurate recognition memory. Models 6 and 7 show the interaction effect between Ad Type (represented by dummy codes, with Positive Ads as the reference group) and individual-level Partisanship. Partisanship is represented using a dichotomous code, with the coding indicated across the columns of the first row. For example, in Model 6, Democrats are coded as 1, and Republicans are coded as 0. Model 8 shows the main effects of Ad Type and Partisanship.

# = p < .10
* = p < .05
** = p < .001

Research Question 1 was tested in Models 2 through 6. There was no indication of a 3-way interaction. However, results indicated an interaction effect between Ad Type
and Partisanship on memory. Although there was a marginally significant interaction between Ad Type and Ad Sponsor (particularly between the Comparison Ad dummy code and Ad Sponsor), this interaction was excluded from the final model selected for best fit based on the results of the Likelihood Ratio Tests.

**Ad Type and Partisanship Interaction Probe**

Model 6 provided evidence of an interaction between Ad Type and Partisanship. To probe this interaction, Model 6 was re-run as Model 7, with Partisanship reverse coded (Republican = 1, Democrat = 0). (Results are shown in Table 2, Column 2).

The coefficients in Models 6 and 7 reveal the nature of the interaction between Ad Type and Partisanship. The coefficients for the interaction terms and the conditional effect of Partisanship are, of course, the same in Model 6 and Model 7, but opposite in sign. In Model 6, the coefficient for Partisanship indicates that for Positive Ads (the Ad Type reference group based on dummy coding), Republicans have enhanced memory compared to Democrats. However, this effect is only marginally significant ($b = -.30, p = .09$).

Of particular interest here is how the coefficients for the Ad Type dummy codes differ in Model 6 and Model 7. Model 6 shows that Republicans remember less from Negative ads compared to Positive ads ($b = -.26, p < .05$). The coefficient for the interaction term ($b$, $p < .05$) indicates that the effect of Negative Ads relative to Positive Ads on memory is statistically significantly different for Republicans and Democrats. Model 7 shows that Democrats tend to remember more from Negative ads.
relative to Positive ads ($\beta = .19, \ p = .06$), although the conditional effect of Negative Ads is only marginally significant among Democrats.

In Model 6, the coefficient for the Comparison Ad dummy code suggests that Republicans remember less from Comparison Ads relative to Positive Ads ($\beta$, $p = .16$). However, this effect is not statistically significant. In Model 7, the coefficient for the Comparison Ad dummy code suggests that Democrats remember more from Comparison relative to Positive ads ($\beta$, $p = .28$), but again this conditional effect is not statistically significant. The coefficient for the interaction term between the Comparison Ad dummy code and Partisanship is marginally significant ($\beta$, $p = .08$), providing limited support for a difference between Republicans and Democrats in memory for Comparison relative to Positive ads.

The interactions between the Ad Type dummy codes and Partisanship are illustrated in Figure 1. To reiterate, for Republicans, Negative Ads produce less memory than Positive Ads (statistically significant effect). Although Republicans and Democrats differ significantly in the effect of Negative Ads (relative to Positive Ads) on memory, the increase in memory for Negative Ads among Democrats is only marginally significant. The pattern for Comparison Ads (relative to Positive Ads) is similar to that of Negative Ads. However, the conditional effect of the Comparison Ad dummy code is not significant for Republicans or Democrats, and the interaction between the Comparison Ad dummy code and Partisanship is only marginally significant.
Figure 1. Interaction between Ad Type and Partisanship.

Note: The number of correctly identified target items from the recognition memory test are shown on the y-axis.

Model 6 was also compared to Model 8, which included only main effects for Ad Type and Partisanship (i.e., no interactions between Ad Type and Partisanship). (Results for Model 8 are shown in Table 2, Column 3). A Likelihood Ratio Test indicated that Model 6 (the more complex model) should be retained over the model with main effects only ($\chi^2 = 8.78, df = 2, p < .05$).

**Mediation**

Hypothesis 3 predicted that semantic processing (indexed by gamma band power from EEG recordings) mediates the impact of ad exposure on memory. The final model selected above (Model 6) included a 2-way interaction between Ad Type and Partisanship. To test a mediating effect of Gamma, a test of mediated moderation is
required. Before testing for mediated moderation, the relationship between Gamma Power and Memory was examined, focusing on the 10 electrodes (Fz, F1, F3, F5, F7, FCz, FC1, FC3, FC5, FT7) and two time epochs of interest (-.5 to .5 and .5 to 1.5 seconds surrounding the event codes). For each of these analyses, Gamma Power was entered in HLM as the only predictor variable of Memory.

Results are shown in Table 3. The Time 1 Epoch focused on a time window - .5 to .5 seconds surrounding the midpoint in time during which the target item in the recognition test was presented in the actual ad. In this Time 1 Epoch (results are shown in Table 3, Column 1), Gamma Power was related to Memory at only three of the electrode sites of interest. However, Gamma power in the Time 2 Epoch (time window from .5 to 1.5 seconds) was consistently related to Memory (results are shown in Table 3, Column 2). Subsequent analyses focus on Gamma Power from the Time 2 Epoch. Gamma scores across all 10 electrodes of interest for the Time 2 Epoch were averaged to create one Gamma Power score for each individual for each ad viewed. Scale reliability on these 10 items was first run in SPSS 19.0 (IBM). These 10 items formed a scale with an acceptable reliability (Cronbach’s alpha = .804).

---

42 Gamma Power was entered group-mean centered.
<table>
<thead>
<tr>
<th></th>
<th>Time Epoch 1</th>
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</tr>
</thead>
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<tr>
<td>F3</td>
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<td>.04* (.02)</td>
</tr>
<tr>
<td>F5</td>
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<td>.15 (.09)</td>
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<tr>
<td>N (Level 2)</td>
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</table>

Table 3. Gamma and Memory

Note: Table 3 shows the correlation between gamma band power and accurate recognition memory. Gamma is represented at 10 different electrode sites (shown across the rows of the far-left column) and two different time epochs. Time 1 Epoch focused on a time window -.5 to .5 seconds surrounding the midpoint in time during which the target item in the recognition test was presented in the actual ad. Time Epoch 2 used a window of .5 to 1.5 seconds.

* = p < .05

Mediated moderation is tested here using the strategy suggested by Muller and colleagues (Muller, Judd, & Yzerbyt, 2005). The basic equations illustrated by these
authors are expanded in the present study to include two “treatment effects” (Ad Type
dummy codes). The Muller et al. strategy requires running three models. Appendix R
shows these three models in their original form, and describes the pattern of results
needed to demonstrate mediated moderation. Appendix R also includes the three
equations needed to test mediated moderation but revised to fit the variables used in the
current study, along with an explanation of the pattern of results needed to demonstrate
mediated moderation.

Mediated moderation is tested in Models 6, 9, and 10 (results are shown in Table
4, Columns 1, 2, and 3). (The equations used to test mediated moderation in HLM form
are shown in Appendix Q.) Model 6 (the results of which were described earlier) includes
the interaction between Ad Type and Partisanship on Memory. Model 9 is identical to
Model 6, except Gamma Power rather than memory is the outcome variable. Model 10 is
the same as Model 6 (with Memory as the outcome variable), but also includes Gamma
Power and an interaction between Gamma Power and Partisanship.

To establish mediated moderation, the following should occur. First, there should
be an overall moderation effect. In Model 6, the coefficient for the interaction between
the Negative Ad dummy code (or the Comparison Ad dummy code) and Partisanship
should be statistically significant. In the Models 9 and 10, one or both of the
following should occur. First, the interaction between the Negative Ad dummy code and
Partisanship (or the interaction between the Comparison Ad dummy code and
Partisanship) should have a statistically significant impact on Gamma Power (in Model
9), and the effect of Gamma on Memory should be statistically significant (in Model 10).
That is, (or ) (in Model 9) and (in Model 10) should both be significant. Or, the coefficient for the Negative Ad dummy code (or the Comparison Ad dummy code) should have a statistically significant impact on Gamma Power (in Model 9), and the interaction between Gamma and Partisanship should be statistically significant (in Model 10). That is, (or ) (in Model 9) and (in Model 10) should be significant.

Results provided no indication of mediated moderation.

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<th>Model 10</th>
<th>Model 11</th>
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<td>.17 (.17)</td>
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<tr>
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<td>.16# (.09)</td>
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<td>-.26 (.18)</td>
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<tr>
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<td>Parameters</td>
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Table 4. Models Testing for Mediated Moderation
Note: Models 6, 9, and 10 in Table 4 show the results of models that were run to test mediated moderation. The dependent variable is accurate recognition memory. Ad Type is represented by dummy codes (with Positive Ads as the reference group). Gamma Power is averaged over the 10 electrode sites of interest for the Time 2 epoch. Individual-level Partisanship is represented using a dichotomous variable (Democrat = 1, Republican = 0). Model 11 shows the moderating effect of Ad Type and Partisanship with an independent (rather than mediating) effect of Gamma Power.

# = p < .10  
* = p < .05  
** = p < .001

Model 6 shows support for an overall moderation effect (the interaction between the Negative Ad dummy code and Partisanship is significant). However, results from Models 9 and 10 provide no support for mediated moderation. The interactions between Ad Type and Partisanship did not have a significant effect on Gamma Power in Model 9, nor was the effect of Gamma on Memory significant in Model 10. The dummy codes for Ad Type did not indicate significant conditional effects of Ad Type on Gamma Power in Model 9, and the interaction between Gamma and Partisanship did not have a statistically significant impact on Memory in Model 10.

Together, Model 6, 9, and 10 provided no evidence of mediated moderation. A final model was run (Model 11) that included an independent (rather than mediated) effect of Gamma Power on Memory (results are shown in Table 4, Column 4). The effect of Gamma Power on Memory was statistically significant, \( p < .001 \). A Likelihood Ratio Test showed that Model 6 and Model 11 differed significantly in fit (\( \chi^2 = 347.71, df = 1, p < .001 \)). Thus, Model 11 is the final preferred model.
Research Question 2

Research Question 2 asked whether any main or conditional effects of Ad Type on Memory would continue to be statistically significant when individuals’ self-reported emotional arousal for each ad was controlled in analysis. Model 12 was run to test this research question. Model 12 was identical to Model 11 but also included the arousal level of each ad. Results (shown in Table 5) indicate that the arousal level of an ad influences participants’ memory for information in that ad ($\beta = .06, p < .05$). Beyond the addition of ad arousal, results from Model 12 are very similar to Model 11. The interaction between the Negative Ad dummy code and Partisanship is still significant, as is the conditional effect of the Negative Ad dummy code and the coefficient for Gamma Power.
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<td>Gamma Power</td>
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</table>

Table 5. Effect of Self-Reported Emotional Arousal.

Note: The dependent variable is accurate recognition memory. Independent variables include Ad Type (represented by dummy codes, with Positive Ads as the reference group), Gamma Power (averaged over the 10 electrode sites of interest for the Time 2 epoch), individual-level Partisanship (represented using a dichotomous variable, Democrat = 1, Republican = 0), self-reported emotional Arousal, and the interaction between Ad Type and Partisanship.

* = p < .05
** = p < .001
Chapter 13: Discussion

Political TV Ads: Keeping the Public Informed

Political advertisements are an inherent and unavoidable component of election campaigns. Political TV ads are sponsored, produced, and aired by a variety of political advocates, including political candidates, political parties, political action committees, and private citizens in an attempt to convey controlled messages to the public. These messages are designed to disseminate platforms and agendas, endorse and oppose political hopefuls, highlight issues of public concern, propose solutions to contemporary problems, and ultimately persuade the public on Election Day.

Critics of political advertisements suggest that this particular form of political communication does little more than fill the minds of the electorate with misleading information, scathing aspersions, and deceitful or unattainable campaign promises. Advertisements expose the public to frivolous and inconsequential rather than politically relevant information, and portray vague or distorted policy positions rather than specific goals, strategies, and issue stances. Political advertisement cynics and skeptics suggest that these messages betray the prudent senses of the public by subverting the rationality of the head with emotional appeals to the heart. Although these denouncements may be used to characterize a number of different media, advertisement admonitions are applied most resoundingly to the 30-second political TV spot.
Confirming the suspicions of some critics, content analyses have revealed that political TV ads use emotional appeals to persuade voters (Kaid & Johnston, 1991) and discuss the qualities and personalities of candidates running for office (Johnston & Kaid, 2002). On the other hand, research has also found that political TV ads offer voters factual and substantive information about candidates vying for office (Jamieson, 1984; Johnston & Kaid, 2002; West, 2005).

Research also indicates individuals acquire and retain information presented in political TV ads. Some studies even suggest that voters may learn more from political TV ads than from other types of broadcast media, such as TV news and televised political debates (Just et al., 1990; Patterson & McClure, 1976). If political ads have the potential to bestow knowledge upon the public (shown to be woefully uninformed by an array of extant research), a next logical question is, are certain types of ads (i.e., Positive, Negative, Comparison) more likely to lead to information acquisition and memory formation? Second, do individual differences (i.e., party affiliation) or ad characteristics (i.e., ad sponsor) moderate the effect of Ad Type on Memory? Third, what is the role of emotional arousal, if any, in memory for ad content? Fourth, what information processing mechanisms or processes are responsible for the development of political knowledge through TV ad viewing?

No Main Effect of Ad Type (H1 and H2 Not Supported)

Much attention has been paid to the category of negative political advertising. Negative ads are often vilified by the news media, political pundits, the public, and political candidates themselves. Yet, research finds that negative ads comprise a sizeable
chunk of aired ads (Goldstein & Freedman, 2002b). What explains the prevalence of negative ads? Conventional wisdom suggests the following. Negative political advertising, while despised, gets the job done. In other words, negative advertising works.

Researchers proposing a difference in information retention for positive and negative ads usually premise their arguments on theories of emotion. The negativity bias, in particular, is often touted as justification for expecting enhanced memory for negative ads. The negativity bias asserts that the gradient of the aversive motivational system is steeper than that of the approach motivational system (Berntson et al., 1993; Cacioppo & Bernston, 1994; Cacioppo & Gardner, 1999; Cacioppo et al., 1997, 1999). The negativity bias suggests that humans are more sensitive to negative relative to positive information (Huang & Luo, 2006), and that negative events, objects, and stimuli elicit faster and stronger responses than their positive counterparts (Carretie, Mercado, Tapia, & Hinojosa, 2001).

Similar to previous research, this dissertation suggested that the negativity bias could produce a memory advantage for negative ads. Hypothesis 1 predicted that memory would be better for Negative Ads relative to Positive Ads. Hypothesis 2 predicted that memory would be better for Comparison Ads (which include elements of both Positive and Negative ads) relative to Positive Ads. Results indicated that neither Negative Ads nor Comparison Ads produced differences in Memory relative to Positive Ads. That is, neither Hypothesis 1 nor Hypothesis 2 was supported.
The importance of definitional clarity. Although the results of the present study did not support H1 or H2, the results are not entirely surprising. As discussed earlier, whether focusing on persuasive, demobilization, or memory effects, the relative effectiveness of negative compared to positive political ads is not definitive. In research on political ad types and memory, some studies reveal a memory advantage for negative ads (S. D. Bradley et al., 2007; Chang, 2001; A. Lang, 1991; Newhagen & Reeves, 1991; Shapiro & Rieger, 1992), other research demonstrates an advantage for positive ads (Basil, Schooler, & Reeves, 1991; Kaid, Chanslor, & Hovind, 1992; Thorson et al., 1991), and still other studies find no difference in memory for the two types of ads (Geer & Geer, 2003; Hitchon & Chang, 1995).

It has been repeatedly emphasized throughout this study that inconsistent results from previous research could be attributed, in part, to the failure to clearly and consistently define Positive, Negative, and Comparison ads within and across studies. Researchers predicting enhanced effectiveness or memory for negative relative to positive ads typically invoke theories of emotion, particularly the negativity bias.

However, in the political advertising literature, conceptual and operational definitions of Positive and Negative Ads may variously emphasize (1) whether a supported or opposed candidate is featured in the ad, (2) whether the objective is to promote or criticize a candidate, or (3) whether the ad evokes positive or negative emotional responses in viewers. Varying conceptual and operational definitions of positive and negative ads within and across political advertising studies and failure to acknowledge that positive and negative ads will not always instill the intended emotional
response might account for inconsistent results on the memory differences for positive and negative ads.

In this study, both conceptual and operational definitions emphasized whether an ad was intended to promote a supported candidate (in part by attempting to instill positive emotions toward the candidate) or criticize an opposed candidate (in part by attempting to evoke negative emotional responses toward that candidate). The comparable memory performance for Positive and Negative Ads demonstrated in this study underscores the importance of distinguishing between intended and elicited emotional reactions.

Participants’ self-reported emotional responses (positivity, negativity, and arousal) were measured after viewing each of the 24 30-second political TV ads. Post-hoc analyses examined average emotional response ratings across all participants for the three ad types (Positive, Negative, Comparison). Results are shown in Table 6. It appears that Positive and Negative ads did elicit positive and negative emotions (at least as reported by participants), respectively. T-tests revealed that for Negative relative Positive Ads, self-reported positivity scores were lower ($t(558) = -32.64, p < .001$) and self-reported negativity scores were higher ($t(558) = 34.38, p < .001$).
Table 6. Emotional Response Ratings

Note: Table 6 shows the means and standard deviations (in parentheses) of the three emotional self-report ratings (positivity, negativity, and arousal) for Positive, Negative, and Comparison ads. For all cells, n = 280. The original measurement scale (1 to 7) was converted to a scale 0 to 6 for all emotional response ratings.

However, the negativity bias suggests that heightened sensitivity to negative relative to positive information occurs because negative stimuli are inherently more arousing than positive stimuli. Indeed, some researchers have suggested that it is emotional arousal rather than emotional valence that drives information processing (M. M. Bradley, Greenwald, & Hamm, 1993; M. M. Bradley, Greenwald, Petry, & Lang, 1992; A. Lang et al., 1995). Although the Negative and Positive ads used in this study did produce different positivity and negativity ratings, these two types of ads did not differ in self-reported emotional arousal ($t(558) = 1.27, p = .205$). The role of arousal in information processing is explicitly addressed in Research Question 2, and discussed more thoroughly below.

**No 3-Way Interaction (RQ1)**

The first research question posed in this dissertation asked whether 3-way interactions among Ad Type, Ad Sponsor, and Partisanship might influence memory for
information presented in political ads. Although results did not support this 3-way interaction effect, future research should continue to explore the potential for multiple 2-way and 3-way interactions between and among these variables to impact information processing of political messages.

Although the 3-way interaction was not statistically significant in the present study, there may be some tentative evidence to suggest that the effect of Ad Type depends on both Ad Sponsor and Partisanship. In Model 3 (see the results section addressing RQ1), there was a marginally significant interaction between the Comparison Ad dummy code and Ad Sponsor. For reasons related to model fit comparison, this interaction was not included in the final model selected. However, the interaction was further probed in post-hoc analyses.

Ad Type was recoded with one dichotomous variable (rather than using dummy codes as in previous analyses), such that Comparison ads were coded as 1 and Positive ads were scored as 0. Models were then run that included two 2-way interactions, one between Ad Type and Partisanship and one between Ad Type and Ad Sponsor. Four models were run, using all combinations of dichotomous coding of the Partisanship and Ad Sponsor variables. Together, these four models allow examination of the statistical significance of Comparison (relative to Positive) Ads at all combinations of Partisanship and Ad Sponsor.

Results are shown in the Table 12 in Appendix S. Coefficients are similar across all models except for the variable representing Ad Type (i.e., Comparison). As revealed in Table 12, the statistical significance and the direction of the effect of Comparison Ads
relative to Positive Ads on memory differs across the four models. Columns 1 and 4 illustrate that the impact of Comparison (relative to Positive) Ads on memory is not statistically significant for Democratic Ads among Democrats or Republican Ads among Republicans. Column 2 shows that the impact of Comparison Ads is negative and statistically significant for Democratic-Sponsored ads among Republicans. That is, Republicans remember less from Comparison relative to Positive ads when ads are Democratic-Sponsored.

Column 3 shows that Comparison Ads lead to an increase in memory for Republican-Sponsored ads among Democrats. That is, Democrats remember more from Comparison relative to Positive ads when the ads are Republican-sponsored. This could be evidence of an attitude-inconsistency memory bias among Republicans when ads are Positive but not Comparison, and an attitude-inconsistency memory bias among Democrats when ads are Comparison but not Positive.

The congeniality effect is a well-known memory bias for attitude-congruent information. However, this effect is not always observed in research studies. For instance, Eagly et al.’s (1999) meta-analysis of 70 studies found evidence of the congeniality effect in 60 percent of the studies reviewed. Furthermore, sometimes the opposite occurs, in which individuals remember more from attitude-inconsistent messages (Chaiken et al., 1995). The preliminary examination of the 3-way interaction above might suggest that enhanced memory for attitude-incongruent information occurs for partisans, but only when enough information processing resources are available for thorough elaboration or comprehension of message content.
This attitude-incongruent memory bias may occur for Republicans while viewing Positive but not Comparison ads because negative cues in the Comparison Ads might distract Republicans, leaving them with fewer resources for information processing (this idea of distraction by attention-capturing stimuli is discussed much more extensively below). Democrats, on the other hand, may exhibit an attitude-inconsistent memory bias when viewing Comparison but not Positive ads because positive emotional cues in the Positive ads might distract Democrats, preventing thorough elaboration or processing of message content.

Although not providing definitive evidence, the post-hoc analyses conducted using the dichotomous code for Comparison (relative to Positive ads) may tentatively suggest that the impact of Ad Type on memory depends on both Ad Sponsorship and Partisanship. That the conditional effect of Comparison relative to Positive Ads differs across four models using all combinations of Ad Sponsor and Partisanship dichotomous coding provides some very preliminary support of a 3-way interaction not fully manifested in the current analyses. Future research should continue to explore multiple 2-way and 3-way interactions in studies of information processing and memory for political ads.

**Ad Type Moderated by Partisanship**

Because individual characteristics and ad features might create various emotional responses among individuals (and subsequently drive information processing and memory effects), Research Question 1 asked whether any 2- and 3-way interactions between and among Ad Type, Ad Sponsor, and Partisanship influenced memory for
information presented in 30-second political TV spots. Although the 3-way interaction was not significant, there was a statistically significant interaction between Ad Type and Partisanship, indicating that memory for Positive and Negative Ads differed significantly between Republicans and Democrats. Republicans remembered more from Positive relative to Negative ads (a statistically significant conditional effect), whereas Democrats remembered more from Negative relative to Positive ads (a marginally significant effect).

Researchers have proposed a number of theories (Jost et al., 2003; Tomkins, 1995) and conducted a number of empirical studies examining whether political ideology is related to different emotional predispositions. Researchers have examined whether conservatives and liberals differ in self-reported emotions (Huddy et al., 2005; Inbar, Pizzaro, & Bloom, 2009; Inbar, Pizzaro, Iyer, & Haidt, 2012), attention to emotional stimuli (Carraro et al., 2011), perception of emotional stimuli (Tomkins, 1965; Vigil, 2010), physiological responses to emotional stimuli (Dodd et al., 2012; Oxley et al., 2008), and even different volumes of brain structures known to process emotional stimuli (Kanai et al., 2011).

Conclusive evidence of differences in emotional sensitivity? In general, extant research on political ideology and emotional sensitivity tends to indicate that conservatives will be more sensitive to, perceptive of, and responsive to negative stimuli, objects, experiences, and events. This may seem to suggest that Republicans should remember more from Negative Ads relative to Democrats. Results of this dissertation demonstrate the opposite, such that Republicans remember from Positive ads and
Democrats remember more from Negative ads. What accounts for these discrepant results? What explains the seemingly anomalous findings of the present study?

**Speculations.** A number of theories described earlier suggest differences in emotional sensitivity between conservatives and liberals. However, the link between political ideology and emotional sensitivity is by no means a foregone conclusion. First, some propositions about emotional sensitivity differences between opposing ideologues is speculative in nature, without firm empirical evidence (e.g., Lakoff, 2008; Westen, 2007).

**Contradictory findings.** Second, theoretical accounts by various researchers and empirical results of various studies sometimes indicate contradictory findings. For instance, researchers have suggested that liberals have “an optimistic view of human nature and of human perfectibility,” whereas conservatives have “a more pessimistic view of human nature, believing that people are inherently selfish and imperfectible,” (Graham et al., 2009, p. 1029-30). On the other hand, research indicates that Democrats have lower perceived trust of peers and close affiliates relative to Republicans (Vigil, 2010). Although some research suggests that conservatives are more prone to aggression (Adorno et al., 1950, Altemeyer, 1996, 1998; Duckitt, 2001), other research finds that Democrats score higher on trait aggression (Vigil, 2010).

Huddy et al. (2005) measured feelings of threat and anxiety following the September 11 attacks. Authoritarianism was positively related to feelings of threat, but Republicans were less likely to report feelings of anxiety. Although some researchers suggest that left-wing individuals are more receptive to positive affects and right-wing
individuals are more receptive to negative affects (Tomkins, 1965), research also
indicates that conservatism is associated with greater self-reported life satisfaction
(Napier & Jost, 2008). In a review of Tomkins’ (1965) Ideological Polarity Theory, Stone
(1986) finds a number of empirical studies that both support and contradict the proposed
emotional differences associated with the liberalism-conservatism spectrum. Thus,
although theory and research may, at first glance, seem definitive in defining
conservatives as more prone to negative and liberals more prone to positive emotions, the
research is filled with conflicting evidence.

Discrete emotional responses. Third, much of the research on emotional
sensitivity differences between conservatives and liberals deals with discrete emotional
responses (rather than positivity and negativity dimensional aspects of emotion), or
emotional responses to a very constrained set of stimuli and political attitudes. “The focus
of this previous research is often on responses to reasonably narrow categories of stimuli
and equally narrow political attitudes (e.g., does a stronger disgust response correlate
with opposition to gay marriage?)” (Dodd et al., 2012, p. 640).

Although conservatives seem more sensitive to the particular emotion of disgust
compared to liberals (Inbar, Pizzaro, & Bloom, 2009; Inbar, Pizzaro, Iyer, & Haidt,
2012), ideology might not be so succinctly related to responsiveness to positive and
negative emotions in general. Furthermore, while conservatives may perceive some
stimuli, objects, and experiences as more negative than liberals, liberals may perceive
other events as more negative than conservatives. For instance, Feldman (2003) offered a
new conceptualization of authoritarianism in which the authoritarian personality tendency
results from a conflict between values of personal autonomy and social conformity. Thus, threats to social cohesion may generate stronger responses among conservatives, whereas threats to individual liberties should elicit stronger responses among liberals.

Furthermore, framing issues as a threat to liberal or conservative values may provoke more liberal or conservative attitudes, respectively. Nelson, Clawson, and Oxley (1997) studied the effects of message framing on political tolerance judgments. Participants watched one of two TV news broadcasts about a Klu Klux Klan speech or rally. One condition framed the story in terms of disruption of public order (threat to the conservative value of security), whereas the other condition framed the story as a free speech issue (threat to the liberal value of individual freedoms). Respondents viewing the free speech frame provided more tolerant (i.e., liberal) responses than those receiving the public order frame.

*Actual emotional and cognitive differences are relatively unexplored.* Fourth, much of the research suggesting emotional sensitivity differences between liberals and conservatives has focused on child rearing and socialization factors as precursors (as opposed to genetic or biological differences) (Adorno et al., 1950; Tomkins, 1965). Researchers approaching ideological differences from this perspective are more inclined to measure self-reported emotional and cognitive differences rather than to actually measure information processing, emotional, cognitive, or physiological responses. That is, research on emotional and physiological aspects of information processing that vary by ideology is a still relatively underdeveloped area. “[R]esearch focusing directly on the
physiological and especially cognitive differences of individuals with specific ideological leanings is still in its infancy,” (Dodd et al., 2012, p. 464).

**The liberal bias of academia.** Fifth, and a rather uncomfortable prospect for most scholars, research on the relationship between ideology and emotional and cognitive predispositions may be (intentionally or unintentionally) biased by the politically liberal ideology that predominates in academia. Inbar and Lammers (2012) provide an interesting picture of bias and discrimination against conservative social psychologists in contemporary academia. These researchers conducted two surveys of social psychologists, recruited by emailing all members of the *Society for Personality and Social Psychology* electronic mailing list.

In the first survey, political ideology (liberalism-conservatism) was assessed across three domains, including social issues, economic issues, and foreign policy. A small minority of respondents reported being conservative concerning social issues (3.9 percent of all respondents). However, conservatism was more widespread regarding economic (17.9 percent) and foreign policy issues (10.3 percent). Participants also believed that the average social psychologist was more liberal than the participants themselves on foreign policy and economic, but not social issues.

In the second survey, the researchers measured respondents’ political ideology, perceptions of a hostile climate in their field, and self-reported willingness to discriminate against conservative colleagues. Conservatism was positively related to respondents’ perceptions of a hostile climate (measured as a composite of three items, including how much respondents felt a hostile climate toward their political beliefs,
whether they were hesitant to express their political beliefs for fear of negative repercussions, and whether they thought their colleagues would discriminate against them because of their political beliefs. Respondents’ perceptions of a hostile climate toward conservatives (rather than the participants themselves) were also measured. Liberalism was associated with this measure, such that liberals were less likely to believe that conservatives were confronted with a hostile climate. Liberalism was also positively associated with self-reported willingness to discriminate against conservatives in four areas (reviewing a grant application, reviewing a paper, inviting a colleague to participate in a symposium, and hiring decisions).

That research on emotional dispositions of conservatives and liberals may be purposefully or unwittingly biased by those who are conducting this research is a thoroughly disconcerting consideration. One would hope that such bias, if it exists, occurs at a subconscious level. However, Inbar and Lammer’s (2012) finding of self-reported willingness to discriminate against their conservative colleagues when it comes to reviewing grants and papers, inviting scholars to participate in a symposium, and making hiring decisions, should give pause for concern.

Thus, the political beliefs of researchers can have large consequences for research. Critics have argued that social–personality psychologists are overwhelmingly politically liberal (left-wing) and that this lack of diversity leads to ideologically biased selection of research questions, selective interpretation of evidence, and even to discrimination against conservative (right-wing) students and faculty (Inbar & Lammers, 2012, p. 496).

One way in which a liberal bias might sneak into research findings is in the interpretation of empirical study results. Empirical studies on information processing differences between liberals and conservatives frequently measure basic responses, use
simple stimuli, and employ tasks substantially different from the ones performed in everyday life (e.g., locate a dot on a computer screen that follows the presentation of a positive or negative image; push a button in response to a particular stimuli). Although these simple stimuli and tasks may enhance the control of the study, it may also lead researchers to make extrapolations or inferences from their data that may not be warranted. An interesting critique of extrapolations made from social scientific lab research is given in a Slate magazine article by William Saletan (2007) titled “Liberal interpretation: Rigging a study to make conservatives look stupid.” In this article, Saletan provides a thoughtful criticism of a study conducted by Amodio, Jost, Master, and Yee (2007).

Amodio and colleagues (Amodio et al., 2007) examined differences in conflict monitoring between liberals and conservatives by measuring EEG recordings as participants performed a Go/No-Go task. Conflict monitoring is “a general mechanism for detecting when one’s habitual response tendency is mismatched with responses required by this situation,” (p. 1246). In the Go/No-Go task, participants must respond as quickly as possible to a frequently presented (Go) stimulus. The Go response is thus the habitual response. On a small number of trials, a No-Go stimulus appears, and the participant must (or should) suppress the habitual (Go) response. The researchers focused on two ERP components, the error-related negativity (ERN), which spikes about 50ms after an incorrect behavioral response, and the N2 component, which is associated with successful inhibition of a habitual response.
Results indicated that liberalism was positively associated with both ERN and N2 amplitudes on No-Go trials (that is, when response inhibition was required). These same ERP components during Go trials were not associated with political ideology. Larger ERP amplitudes were also associated with enhanced accuracy on No-Go (response inhibition) trials, but unrelated to accuracy on Go (habitual response) trials. The authors suggest that “conservatives show more structured and persistent cognitive styles, whereas liberals are more responsive to informational complexity, ambiguity, and novelty,” (p. 1246) and argue that their findings suggest, “that a more conservative orientation is related to greater persistence in habitual response pattern, despite signals that this response pattern should change,” (Amodio et al., 2007, p. 1247).

Saletan (2007) attacks the Amodio et al. (2007) study and its conclusion from a number of angles. First, the No-Go task involved presenting participants with a letter (an “M” or a “W”). For half of the participants the “M” was the Go stimulus (responses were made using a computer keyboard) and “W” the No-Go stimulus (no response), whereas the letters were switched for the other half of participants. The Go/No-Go task took about 15 minutes. Saletan comments, “Fifteen minutes is a habit? Tapping a keyboard is a way of thinking?” Second, Saletan questions whether exposure to a letter for one-tenth of a second is truly “information.”

Third, Saletan argues that the task, in which participants were shown either an “M” or a “W,” involves neither complexity nor ambiguity. Fourth, Saletan takes issue with the definition of conflict monitoring described by Amodio et al. (2007). Saletan states that whereas Amodio and colleagues define conflict monitoring as detecting that
one’s habitual response is objectively wrong, the original definition of conflict monitoring simply suggested that this system monitors for and evaluates the occurrence of conflicts. In other words, Saletan argues that in real life, sometimes the habitual response may be wrong, but at other times it may be right. Overall, Saletan argues that conservatism serves an important role in society, and that liberals focus on the bad in order to make conservatives look foolish.

The conservative case against this study is easy to make. Sure, we’re fonder of old ways than you are. That’s in our definition. Some of our people are obtuse; so are some of yours. If you studied the rest of us in real life, you’d find that while we second-guess the status quo less than you do, we second-guess putative reforms more than you do, so in terms of complexity, ambiguity, and critical thinking, it’s probably a wash... You’ve manufactured a tiny world of letters, half-seconds, and button-pushing, so you can catch us in clear errors and keep out the part of life where our tendencies correct yours. And now you feel great about yourselves. Congratulations. You haven’t told us much about our way of thinking. But you’ve told us a lot about yours. (Saletan, 2008)

The argument here is not that Amodio et al. (2007) devised a study to make conservatives look silly and/or stupid, nor that all of Saletan’s (2007) assessments are accurate. Rather, Amodio et al.’s study and Saletan’s critiques were described to underscore that extrapolations made from studies using simple experimental tasks and basic responses to examine information processing differences between liberals and conservatives may be overly broad or unfair, at least according to some individuals. Although the Amodio et al. study examined cognitive rather than emotional aspects of information processing, the study and its critiques illustrate some of the common limitations of extant empirical research on information processing differences between liberals and conservatives.
Contradictory or consistent results? Generally speaking, theories and empirical findings suggest that conservatives are more responsive and receptive to negativity, whereas liberals are more sensitive to positive emotions, which seem contradictory to the findings of this study (in which Republicans remembered more from Positive Ads and Democrats remembered more from Negative Ads). Above, it was suggested that the supposed link between conservatives and negativity (and liberals and positivity) may be an overly broad generalization that requires much more thorough research before definitive conclusions can be made, and this could account for the seemingly anomalous results of the present study. On the other hand, the results of the present study may not be as contradictory as they seem with theories speculating an enhanced sensitivity to negative information among conservatives.

Biased toward what information? Much of the research on ideological differences in emotional sensitivities, which tend to show a heightened negativity bias (stronger reactions, faster and prolonged attention) among conservatives compared to liberals, employs simple stimuli (words, images, loud noises). Information processing of these stimuli is generally automatic and/or necessary, either because the nature of the stimulus automatically generates attention, or the nature of the experimental task makes it impossible for participants to avoid the stimulus. For instance, if participants are sitting in front of a computer screen, and two images appear on the screen, attention should be automatically drawn to the stimuli (toward the negative image first and for a longer duration, according to the negativity bias). If the experimental task instructions involve rating still images, or locating a dot that quickly follows the presentation of images,
participants are required to look at the stimuli by the nature of the task. Indeed, any competent data cleaner would exclude data from individuals who did not seem to follow task instructions.

Political advertisements are much more complex messages than these simple stimuli. Political TV ads have both audio and visual information, both verbal and non-verbal cues. They may have structural features (edits, cuts), music, and sound effects. Verbal information may be printed or spoken by a narrator, candidate, political figure, or everyday citizen. Still images and videos might include shots of people, buildings, landscapes, or objects.

Of all of the information presented in a political ad, verbal information about issues may be least likely to automatically capture attention. As discussed earlier, humans are limited information processors. We cannot thoroughly process all of the information to which we are exposed, particularly if a message has many components (such as a political TV ad). In fact, when emotional cues (images, sound effects) capture and perhaps overload the information processing system, more complex information (such as candidate issue stances), or information less likely to automatically capture attention, may get the short shrift in processing.

Perhaps conservatives (Republicans) are indeed more sensitive to negative information, but this negativity bias may manifest as heightened attention to music, images, or sound effects of the political TV ads, leaving fewer information processing resources to process the verbal information in the ad pertaining to policy issues and stances. That is, while Republicans may pay more attention to specific negative aspects
of the ads, particularly those cues likely to generate automatic attention, Republicans may ultimately pay less attention to the issue content of the ad. Conversely, when watching a Positive ad, which is more likely to have positive emotional cues (pictures of babies, families), Republicans may be less distracted by these emotional cues and devote more information processing resources to the issue information in the ad. The opposite effect could occur for liberals (Democrats).

If Democrats are more prone to positive emotions, the positive emotional cues may generate stronger attentional biases, leaving fewer resources for processing the issues in these ads. When viewing Negative Ads, however, Democrats may be less attracted to the automatic attention-generating emotional cues, and pay more attention to the issue information presented in the ad. Thus, although an enhanced negativity bias among Republicans might suggest that they remember more from Negative relative to Positive ads, and an enhanced sensitivity to positive emotions among Democrats may suggest a memory advantage for Positive ads, this could depend crucially on what type of information is assessed in the memory test. Heightened sensitivity or attention to emotional cues that may automatically capture a viewer’s attention may detract from memory for more complex information, such as verbal information about political issues.

**Attentive but avoidant.** Although it may seem simple enough to state that conservatives are more sensitive to negative information, the picture is a bit more complex when it comes to information processing and memory. Heightened sensitivity to negative information may suggest that conservatives demonstrate an enhanced attentional bias toward negative relative to positive information (Carraro et al., 2011; Dodd et al.,
2012). However, this a heightened negativity bias among conservatives should also suggest that conservatives are more motivated to avoid stimuli, objects, or environments that seem negative or threatening. Janoff-Bulman (2009) suggests that conservatism is based on an avoidance motivation, whereas liberalism is founded on an approach motivation. “The Right seeks to prevent negative outcomes and losses; the Left seeks to advance positive outcomes and gains,” (p. 121).

Thus, at automatic levels of responses (when presented with an image while sitting in front of a computer screen), conservatives may show an uncontrollable tendency to respond more strongly to negative stimuli. However, with more controlled processing (i.e., processing verbal information about issues in political TV ads), conservatives, with enhanced motivation to avoid negativity, may “tune out” negative advertisements more so than liberals. If conservatives are more aversive to negative information, and try to avoid it, it would seem sensible that they would pay less attention (at least to information that does not automatically generate attention) and process less thoroughly information in Negative relative to Positive ads.

**Issues mentioned.** The issues covered in different ad types might account for memory differences between Republicans and Democrats for Positive and Negative ads. Democrats and Republicans may systematically differ in the issues they believe are most important, relevant, or meaningful. Relevancy or personal importance of an issue discussed in a political advertisement should influence the extent to which individuals pay attention to, process, and remember the content of that message. If Negative Ads emphasize issues perceived as more important by Democrats, whereas Positive Ads focus
on issues perceived as more important by Republicans, this could lead to the Ad Type and Partisanship interaction effect found in this study, in which Republicans remember more from Positive Ads and Democrats remember more from Negative Ads.

The issue public hypothesis suggests that individuals develop and hold a handful of personally important attitudes about public policy issues (Converse, 1964; Krosnick, 1990). Although the issues perceived as important by any particular individual may be based on idiosyncratic differences (e.g., genetics, upbringing, socioeconomic status, geographic area), issue importance may also differ systematically according to partisanship or political ideology.

**Issue handling by parties and issue importance by party supporters.** The issue ownership theory proposes that Republicans and Democrats own certain issues (Petrocik, 1996; Petrocik, Benoit, & Hansen, 2003/2004). That is, the public perceives each party as being more competent or capable of handling particular issues. The ownership of issues by parties is derived from two factors, including (1) the record of the incumbent and (2) the constituencies of the parties. The record of the incumbent can create short-term fluctuations in party ownership of performance issues. This occurs primarily when the party in power can be blamed for poor handling of particular issues, which has created or contributed to undesirable outcomes, current problems, or bad times. “[W]ars, failed international or domestic policies, unemployment and inflation, or official corruption can happen at any time and provide one party with a ‘lease’—short-term ownership—of a performance issue,” (Petrocik, 1996, p. 827). Performance issues tend to focus on foreign policy and the economy.
The constituencies of parties tend to create long-term ownership of issues. Although party constituency ownership is not completely immutable, it tends to be relatively stable over time because the basis of this type of ownership is founded on social bases and social structures. Social characteristics and social identities (whether religious, ethnic, socio-economic, geographical, or vocational) can create political disagreements with other social groups. These differences are, in part, reflected in the constituencies of political parties, who are perceived as representing particular interests and attracting individuals and groups with particular social characteristics. “The parties reflect and promote these conflicts because they are the politically organized face of the religious, economic, ethnic, linguistic, and regional conflicts endemic to all societies,” (Petrocik, 1996, p. 827). Constituent-based Democrat issues include education, health care, poverty, the elderly, jobs/labor, and the environment, whereas constituent-based Republican issues include defense, spending/deficit, taxes, religion/morality, crime, and drug abuse (Petrocik et al., 2003/4).

The issue ownership theory suggests that the Republican Party and the Democratic Party are perceived as more and less effective on particular issues. The issues perceived as most important to individuals should lead to support for the party seen as best able to handle these issues. Cyclically, because they attract certain groups with particular issue priorities, parties should be most responsive to issues of utmost concern to their supporters. Supporters of the Republican Party may be most receptive and sensitive to messages related to national defense, reducing the deficit, lowering taxes, and
controlling inflation. Supporters of the Democratic Party may be more responsive to messages related to education, Social Security, Medicare, and the environment.

**Enhanced processing of information important to the self.** Differences between Republicans and Democrats in perceived importance of issues should lead to differences in receptivity, attention, and thoroughness of information processing to issues presented in political TV ads, which should subsequently influence memory. A number of theories and research studies indicate that individuals should pay more attention and more extensively process information that is important or relevant to the self. Political issues perceived as highly important to an individual, or issues in which individuals are highly involved, should lead to enhanced processing during message exposure.

The Limited Capacity Model of Motivated Mediated Message Processing (LC4MP, described in-depth earlier) (A. Lang, 2000; A. Lang et al., 2006) suggests that during the encoding stage of information processing, selection of information for further processing is determined by automatic and controlled processing mechanisms. Message content that is relevant or important to an individual will be allocated processing resources through both automatic and controlled mechanisms. According to A. Lang (A. Lang et al., 2006), allocation of controlled resources “is related to a person’s ongoing goals and interests” (p. S59), and automatic allocation is elicited by “motivationally relevant stimuli” (p. S60).

Research suggests that self-relevant information automatically captures attention. In a Stroop task in which respondents were asked to report the color in which a stimulus word was written, response latencies were greater for self-relevant compared to neutral
words (Geller & Shaver, 1976). This suggests that self-relevant stimuli automatically captured participants’ attention. Moray (1959) conducted an experiment using a dichotic listening task, in which different stimuli are presented to a participant’s left and right ears simultaneously through headphones. Participants were asked to attend to one channel, “shadowing” or repeating the information presented, while information was simultaneously presented to the other channel. When the non-attended channel included a list of simple words or numbers, participants had no memory of that information. Only when the non-attended channel included self-relevant information (the participant’s name), did participants remember the information presented in the non-attended channel. “It is probably only material ‘important’ to the subject that will break through the barrier,” (Moray, 1959, p. 56).

Bargh (1982) examined both automatic and controlled processing of self-relevant stimuli using a dichotic listening task. Participants were asked to either attend to or ignore the channel in which the self-relevant stimuli was presented. Attentional capacity was measured using the probe reaction time (RT) technique (reaction time measures were discussed more thoroughly in an earlier section). The primary task involved shadowing the words presented to the attended channel. The more attention required by the shadowing task, the slower are responses to the probe stimulus. The secondary task involved pressing a button when the subject saw a light bulb turn on. Results indicated that fewer resources were required for processing self-relevant information when information was presented to the attended channel, but more processing resources were required when the self-relevant information was presented to the ignored channel.
“[A]utomatic processing of the self-relevant information facilitated the shadowing task when part of the attended channel, and inhibited performance when on the rejected channel,” (p. 433).

More thorough information processing of message content should also occur when individuals are highly involved with an issue. Enhanced processing related to high issue involvement should serve as an example of the more generalized pattern of increased processing of personally relevant, motivationally relevant, self-relevant, important, or meaningful information. Models from the persuasion literature suggest that persuasive influence may occur through more superficial or in-depth processing of persuasive content.

For instance, the well-known Elaboration Likelihood Model suggests that message processing differs in the amount of elaboration a message receives, or “the extent to which a person thinks about the issue-relevant arguments contained in a message,” (Petty & Cacioppo, 1986, p. 128). The central route to persuasion involves extensive consideration of persuasive message content, whereas the peripheral route to persuasion involves attitude change related to simple message cues (e.g., number of arguments in a message, others’ reaction to a message) (Petty & Cacioppo, 1984). Similarly, Chaiken (1980) suggests that systematic processing involves “considerable cognitive effort” and “detailed processing of message content” (p. 752), whereas heuristic processing involves reliance on heuristic cues (such as trustworthiness of the source or source attractiveness).
Research suggests that high issue involvement, which occurs when an issue has “intrinsic importance” (M. Sherif & Hovland, 1961, p. 197) or “personal meaning” (C. W. Sherif, Kelley, Rodgers, Sarup, & Tittler, 1973, p. 311), and high personal involvement, meaning “a person’s perceived relevance of the object based on inherent needs, values, and interests,” (Zaichkowsky, 1985, p. 342) can increase or enhance depth of information processing (Chaiken, 1980; Petty & Cacioppo, 1979). If Democrats and Republicans differ in perceived relevance, importance, or meaningfulness of issues (leading them to more extensively process ad content about these issues), and issue mentions differ among Positive, Negative, and Comparison ads, this could generate the interaction between Ad Type and Partisanship demonstrated in this study.

**Issues by ad type.** Extant research has examined party issue ownership by measuring perceptions of issue ownership by the public (i.e., which party the public perceives as better able to handle various issues) (Petrocik, 1996; Pope & Woon, 2009). Issue ownership has also been examined by content analyzing news stories generated by Democratic and Republican candidates (Petrocik, 1996), and candidates’ acceptance speeches and television commercials (Petrocik, 2003/4). However, content analyses of issues emphasized by Republican and Democratic campaigns have not examined whether issue emphasis differs according to Ad Type (i.e., Positive, Negative, Comparison).

In the selection of experimental stimuli, this author attempted to include ad spots that mentioned a range of contemporary social and political issues. However, no methodical effort was made to balance the issues discussed across Ad Types or Ad Sponsorship. An informal post-hoc examination of the issues mentioned in the
experimental stimulus ads was conducted to discern whether the Positive, Negative, and Comparison ads used in this study differed in the types of issues discussed. The issues to which each target recognition item from the memory test pertained were identified separately for Positive, Negative, and Comparison ads. Results are shown in Table 13 in Appendix T. The list of issue categories is identical to the Issue Category column shown in Table 10 in Appendix N, which identifies all issue stances mentioned in the initial pool of 56 ads, organized by issue category.

Although no formal or statistical analysis of issue mentions is provided here, a cursory glance at Table 13 in Appendix T reveals that no issues were mentioned a similar number of times across all ad categories or across Positive and Negative Ads (which should be expected given that particular issue mentions were not criteria used for stimulus selection). However, some issues were mentioned in both Positive and Negative Ads (although again, the number of times differed), whereas other issue mentions were exclusive to Negative or Positive Ads.

Wall Street bailouts, businesses/corporations, congressional pay, political ideology, and taxes were mentioned in both Positive and Negative ads. On the other

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43 Because the results of this analysis are based on accuracy of correct recognition of target items, it was deemed more appropriate to examine issues related to target items in each Ad Type category rather than all issues mentioned within the ad. If an ad mentions campaign finance, but campaign finance was not one of the items randomly selected for inclusion in the recognition memory test as a target item, individual receptivity to campaign finance should not directly affect memory accuracy for that ad.

44 In references to issue mentions being “exclusive” to Negative or Positive Ads in the discussion following, exclusive pertains to whether an issue is mentioned in a Negative/Positive Ad but absent from a Positive/Negative Ad. Comparison Ads are ignored for the present purposes, as the significant interaction between Ad Type and Partisanship emphasized a difference between Republicans and Democrats in memory for Positive and Negative Ads.
hand, issues related to target recognition items from Positive Ads but absent from Negative Ad target items include the debt/deficit, the economy, big government, immigration, jobs, spending, and troops/veterans. Interestingly, these issues tend to be those traditionally owned by the Republican Party. That is, The Republican Party traditionally owns many of the issues exclusive to Positive Ad item recognition measures. For instance, Petrocik (1996) suggests that national defense (e.g., troops/veterans), big government, and government spending are Republican-owned issues. Petrocik (1996) classifies foreign policy issues and the economy as performance-based rather than constituency-based issues. However, his analysis of public perceptions of issue ownership shows that citizens tend to believe the Republican Party is better at handling deficit/debt reduction and the economy in general. The issue of jobs is the only issue mentioned exclusively in Positive Ads that tends to be owned by the Democratic rather than Republican Party.

Target item issues from Negative Ads but absent from Positive Ads include the budget, constitutional freedoms, education, Medicare, party voting, Social Security, the economic stimulus plan, and women’s issues. In contrast to the issues mentioned in Positive Ads, the issues mentioned only in Negative Ads tend to fall into the camp of Democratic ownership. Petrocik (1996) finds that civil liberties (e.g., constitutional freedoms), education, women, Social Security, and social welfare generally (e.g., Medicare) are perceived as being more successfully handled by the Democratic Party. Of the issues mentioned exclusively in Negative Ads, none are explicitly classified as Republican-owned issues. However, one might suggest that Republican ownership of the
deficit/debt might indicate a Republican advantage on the budget, and Republican ownership of government spending could indicate an advantage on the specific issue of the economic stimulus plan.

This preliminary examination of the issues included in the Positive and Negative issue item memory test used in this study shows that although some issues were mentioned in both Positive and Negative Ads, other issues differed systematically between these two ad types. In particular, Positive ads were more likely to discuss issues owned by the Republican Party, and Negative Ads were more likely to mention issues owned by the Democratic Party.

The issue ownership theory not only suggests that parties own particular issues, but that Republican and Democratic constituencies differ in their beliefs about which contemporary political problems are of the utmost concern. An individual gravitates toward the party seen as best handling the issues most important to that particular individual. In this study, if Positive Ads were more likely to emphasize Republican-owned issues, these issues should resonate more strongly with Republican viewers, leading to enhanced processing (as self-relevant information automatically captures attention, and personal involvement and issue involvement lead to increased processing) of these messages. Negative Ads, more likely to focus on Democratic-owned issues, may have resonated more strongly with Democratic viewers, leading to increased processing of issues presented in Negative Ads.

It is unclear what has produced discrepancies in the target recognition items related to issues discussed in particular ad type categories. Target items were selected
randomly from all issues mentioned in an ad, so it is likely that the discrepancy emanates from differences in issues mentioned in ads rather than peculiarities in selection of target items for the recognition memory test. Perhaps differences in party-owned issues across ad types are consistently found in political advertising campaigns (which has not been thoroughly examined by extant research). Or, the differences in issues discussed across the various ad types revealed in this study could indicate a selection bias particular to the year (2010), level of election (federal), or type of election (U.S. House of Representatives). The particular sample of ads selected (from the population of 2010 U.S. House election ads) might have also produced this finding. A comprehensive content analysis of issues discussed in ad types at the local, state, and national level over a number of years could provide a more definitive answer to why issue differences across ad types was found in this study.

**Controlling for Self-Reported Emotional Arousal (RQ2)**

Beyond definitional inconsistencies, another culprit potentially producing mixed results in the research on Positive and Negative Ads may be emotional arousal. First, the negativity bias suggests that negative messages should have a memory advantage over positive messages, but only within a moderate arousal range. Positive messages should have a memory advantage at low levels of arousal (the positivity offset), and memory should be impaired for both types of ads at very high levels of arousal when processing capacities are overloaded (limited cognitive capacity models). This study coded an initial pool of 56 30-second political TV spots for level of emotional arousal. Only ads coded as moderately arousing were included as experimental stimuli.
Second, some researchers argue that it is emotional arousal, rather than positivity or negativity, which ultimately energizes depth and extent of message processing (M. M. Bradley, Greenwald, & Hamm, 1993; M. M. Bradley, Greenwald, Petry, & Lang, 1992; A. Lang et al., 1995). These scholars suggest that when controlling for individuals’ self-reported emotional arousal to a message (M. M. Bradley et al., 1992) or message arousal measured by averaging arousal ratings across participants (A. Lang et al., 1995), there may be no difference in memory for positive and negative messages, or positive messages may even have a memory advantage over negative messages.

Ad stimuli included in this study were selected to be moderately arousing. However, within this category of moderate emotional arousal, self-reported emotional arousal should still vary across individuals. Participants in this experiment were asked to make emotionality assessments (positivity, negativity, and arousal) after viewing each political advertisement. Research Question 2 asked whether main or conditional effects of Ad Type would remain statistically significant when individuals’ self-reported emotional arousal was controlled for in analyses.

Results indicated that self-reported emotional arousal was positively related to ad memory. However, even when controlling for arousal, the Ad Type X Partisanship interaction was still statistically significant. Thus, individuals’ self-reported emotional arousal to a message seems to play an important role in information processing and memory, although this effect did not reduce the conditional effects of Ad Type (at different levels of partisanship) on memory. Of course, as has been emphasized throughout this study, Ad Type was defined by the intended effect of the ad (promotional
or critical) rather than the emotions actually elicited (although previously reported post-
hoc analyses did indicate that Positive Ads elicited higher positivity ratings than Negative
ads, and Negative Ads generated higher negativity ratings than Positive Ads).

**Separating arousal and valence.** Future research should more clearly identify
how arousal and emotional valence may be theoretically and functionally separated.
Dimensional theories of emotion suggest that arousal indicates the extent or extremeness
of positivity and negativity. Motivational subsystem models of emotion propose that
arousal indicates the extent of activation of the appetitive and aversive motivational
systems. However, if valence and arousal are intricately interconnected in this fashion,
separately testing the effects of valence and arousal on various communication processes
and outcomes becomes an interesting challenge.

A. Lang et al. (1995) examined the distinct effects of valence and arousal on
memory. Participants watched video segments that were high arousal negative, high
arousal positive, low arousal negative, and low arousal positive. Experimental stimuli
were selected using a pre-test in which participants provided self-reported emotional
ratings of various TV clips. One-way ANOVAs using these pre-test ratings indicated that
arousing messages differed significantly in arousal scores from calm messages, and
negative messages differed significantly in valence ratings from positive messages.

Others argue that controlling arousal in this manner is an incorrect practice.
According to this argument, if arousal and valence are intimately interconnected, it may
not be possible to find two stimuli, messages, or material that are equal (but opposite) in
valence and also equal in arousal. Focusing on the A. Lang et al. (1995) experiment
described above, S. D. Bradley et al. (2007) suggest, “Controlling arousal in this fashion is somewhat misleading, however. Because of the negativity bias, television ads can be matched on only one dimension: valence or arousal,” (p. 125, *italics original*).

One demonstration of the negativity bias is shown by plotting a large selection of stimuli on a 2-dimensional space according to average valence and arousal ratings made by a large sample of individuals. When the correlation between arousal and valence is calculated separately for positive and negative stimuli, the slope for negative stimuli is shown to be steeper than the slope for positive stimuli. However, this illustration of the negativity bias shows that as a general trend, negative stimuli become more negative at a faster rate than positive stimuli become positive. It is still possible to find instances in which a positive stimulus and negative stimulus are equal in arousal yet comparable (but opposite) in valence. Indeed, in graphs showing plots of a large set of stimuli based on valence and arousal ratings, there are instances in which individual stimuli are rated as equally arousing while also equal (but opposite) in valence ratings (see M. M. Bradley & Lang, 2000a, 2000b).

Furthermore, rather than controlling for arousal by selecting stimuli based on average emotion ratings made by a group of individuals, emotional arousal and valence can be statistically controlled for in analyses. Post-hoc analysis included a model with self-reported positivity, negativity, and arousal as predictors of Memory. In this model, only self-reported emotional arousal was statistically significantly related to memory. Thus, self-reported positivity, negativity, and arousal were entered into three separate
models predicting recognition memory (results are shown in Appendix U). Results indicated that self-reported arousal was positively and significantly related to memory (coefficient for arousal = .06, \( p < .05 \)), whereas positivity and negativity were not statistically significant in these models. Future research should continue to explore whether emotional valence or arousal is driving information processing mechanisms involved in memory formation and retention, or which dimension of emotion is more critical in certain contexts and situations.

**Gamma and Memory (H3)**

As the field of communication expands and advances, understanding the mechanisms that intervene between message exposure and communication outcomes (e.g., attitudes, memory, beliefs, and behavior) becomes increasingly interesting and important. Communication scholars interested in information processing may select from a variety of methodologies to understand how individuals process and respond to a variety of communication messages.

Some of these techniques ask respondents to speculate on their own thoughts and feelings, such as think aloud (Duncker, 1945; Genest & Turk, 1981) and thought listing procedures (Brock, 1967; A. G. Greenwald, 1968; Cacioppo & Petty, 1981). Other methodologies for understanding the inner workings of the mind include behavioral measures such as response reaction times and psychophysiological recordings. Neuroscience techniques, such as EEG, MEG, MRI, fMRI, and TMS allow researchers to

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45 Self-reported emotional responses (i.e., ad positivity, negativity, and arousal) were entered uncentered into the HLM models. Centering the independent variables changed the coefficients, but did not alter the statistical significance of coefficients (results not shown here).
observe and measure reactions and responses of the brain. EEG is a particularly useful research tool that provides a direct measurement of brain activity by capturing voltage fluctuations at the surface of the scalp emanating from synchronously firing neurons of the brain.

This dissertation used electroencephalography (EEG) recordings to examine brain activity as individuals watched political TV ads. Hypothesis 3 predicted that Gamma Power (an index of semantic processing) served as a mediator between ad exposure and memory. Semantic processing is defined as the formation and strengthening of associations between and among concepts and elements that comprise these concepts, involving two sub-processes of matching and binding.

**Gamma power analysis.** Gamma Power was defined as activity in the range of 36 to 44 Hz, and calculated using Fast Fourier Transform. Electrodes of interest included areas over the midline and left side of frontal and anterior temporal cortical areas (Fz, F1, F3, F5, F7, FCz, FC1, FC3, FC5, FT7), known to play a role in language processes. Two different 1-second time epochs were examined (-.5 to 5 seconds, and .5 to 1.5 seconds). Epochs of interest were time-locked to stimulus presentation, such that pre-set trigger codes were inserted at the midpoint in time during which target items from the recognition memory test were presented in the ads viewed by participants.

Examining Research Question 1 (examining 3-way and 2-way interactions among/between Ad Type, Ad Sponsor, and Partisanship), results indicated that the best fitting modeling included a 2-way interaction between Ad Type and Partisanship. To test a mediating effect of gamma, a model testing mediated moderation was required.
Although there was an independent effect of Gamma Power on Memory, no evidence of mediated moderation was revealed by statistical analyses.

**Independent effect of gamma.** Evidence from this study for a direct effect of Gamma on Memory seems rather compelling. Gamma band power in the second 1-second time epoch (.5 to 1.5 seconds) was statistically significantly related to correct recognition of issues in a particular at 8 out of the 10 predicted electrode sites. Previous research indicates that gamma plays a role in aspects of semantic processing, such as visual process binding (C. M. Gray & Singer, 1989), object representation (Tallon-Bertrand, 1999), retrieval or spreading activation of words (Pulvermueller et al., 1996, 1999), unification of words in sentence comprehension (Hagoort et al., 2004), elaboration or rumination following stimulus presentation (Siegle et al., 2010), and memory encoding and retrieval (Osipova et al., 2006). However, much of the extant research uses very simple stimuli (e.g., words). In contrast, this dissertation demonstrates that gamma band power is related to memory for issues and candidates presented in political TV ads. Unlike previous research on gamma and memory, the stimuli used in this dissertation represent the types of complex messages in which communication researchers are generally interested.

**Timing.** The present study also demonstrated the importance of time in information processing. Earlier communication research using EEG recordings may average brain activity over an entire episode, such as a TV commercial (e.g., Appel et al., 1979). Averaging over long periods of time is useful in some contexts. For instance, if the information processing of interest is known or suspected to occur throughout message
viewing, averaging over longer time intervals may be more appropriate. However, the technique of averaging EEG signals over long time periods fails to capitalize on a primary advantage of EEG data, its high temporal resolution. Furthermore, critical information processes may occur during very short time intervals, as shown by Reeves et al.’s (1985) study on movement, scene changes, and attention (alpha inhibition).

This study calculated gamma power in two 1-second time epochs surrounding the events of interest (the issues included as target items in the recognition memory test). In the first time epoch (-.5 to .5), gamma was related to memory accuracy at only three of the ten electrode sites of interest, whereas in the second time epoch, gamma power at eight electrode sites was related to memory. This research demonstrates the importance of coordination and precision in the timing of communication stimulus presentation and epochs for physiological data analysis.

Failure to time-lock analyses of physiological recordings to the presentation of specific events during stimulus presentation could generate null results between variables that do indeed have a relationship, but only when the precision of event timing is taken into account. For instance, in this study, if gamma power had been calculated over the entire political TV ad (rather than for 1-second time epochs for each of the three target recognition items), perhaps no relationship between gamma and memory accuracy for target items would have been found. Information processing certainly occurs beyond initial exposure to the information, and future research might examine time epochs exceeding 1.5 seconds after information onset. However, this research suggests that the
second following information exposure may be particularly crucial to semantic processing and memory.

**No support for mediating role of gamma.** No evidence of mediated moderation was found in this study. Mediated moderation was statistically tested using the strategy suggested by Muller and colleagues (Muller et al., 2005). Evidence of mediated moderation requires an overall moderation effect, which was found earlier in the models suggesting that the effect of Ad Type on Memory is moderated by an individual’s Partisanship. However, the other requirements of mediated moderation were not established in this study. Why would gamma power directly impact ad issue memory, but not mediate the moderating effect of Ad Type and Partisanship on Memory?

**EEG mediation absent from previous research.** It should be noted that extant communication research using EEG has only examined the relationship between stimulus characteristics and brain activity, or between brain activity and message outcomes (such as memory). From a psychophysiological perspective, physiological measurements recorded during message viewing represent information processing that intervenes between message exposure and communication effects (such as evaluations, attitudes, and memory). However, researchers have not formally modeled neurological activity elicited during stimulus viewing as a mediator between message exposure and message effects.

Appel et al. (1979) examined the relationship between commercial recall and evoked alpha activity. Simons et al. (2003) studied the impact of image motion, emotional arousal, and emotional valence on attention (measured as a decrease in alpha
activity). Reeves et al. (1985) examined the effects of movement and scene changes on attention (measured as alpha activity inhibition). Memory recognition and recall measures were included in this study. However, the memory measures were used to establish the validity of alpha as a measure of attention (results showed that alpha was related to memory), rather than to show attention (alpha) as a mediator between the effects of scene changes and movement on memory.

Smith and Gevins (2004) found that three alpha components were distinctly related to the number of scene changes, subjective interest, and memory recall for 30-sec TV commercials. Participants watched 26 commercials while their brain activity was recorded using EEG. Self-reported interest in the commercial was measured after each commercial, and averaged over participants to create a subjective interest measure. The number of scene changes was counted for each commercial. Participants also performed a recall memory test after viewing the commercials, in which they were asked to list as many product and brand names as they could.

Analyses focused on a lower (8 to 9.5 Hz) and upper (10 to 11.5 Hz) alpha frequency range at posterior and frontal electrode site locations. Of the three outcome measures (scene changes, interest, recall), results indicated that the posterior alpha component was only related to scene change changes, whereas the lower frontal alpha component was only related to subjective interest, and the upper frontal alpha component was only related to recall. It is interesting to note that none of the three alpha components was related to two or three of the “outcome,” measures, which would suggest against mediating role of alpha between, for instance, self-reported interest and recall memory.
It is interesting that although a psychophysiology approach suggests that physiological measurements index patterns of information processing that should intervene between message exposure and effects, few studies propose and model EEG recordings as mediators. This makes the present study results (in which a direct effect of gamma on memory was found, but no evidence of mediation was shown), even more difficult to interpret. That is, not only is gamma relatively understudied in communication research using complex message stimuli, but EEG studies of any frequency band in communication research have not tested mediating roles of EEG signals (let alone a mediating role in a mediated moderation model).

Holistic rather than issue-specific processing? The results from this study suggest that the moderating effect that leads Republicans to remember more from Positive ads (and Democrats to remember more from Negative ads, although only a marginally significant conditional effect) does not occur through neurological activity in the gamma band frequency range. In other words, although Republicans remember more from Positive ads, they do not show increased gamma power activity during presentation of the specific policy stances included in the recognition memory measure.

This might suggest that whatever mechanism leads Republicans to remember more from Positive ads occurs at a more holistic level. Rather than showing increased gamma band activity during presentation of the specific policy issues that appear in the recognition memory test, Republicans may show deeper or more extensive semantic processing throughout the Positive ad (or at specific time points but not those during
presentation of the target recognition items), which then helps them recognize the specific issue stances in the recognition memory test. For instance, consider the transcript below for one of the Positive ads included in the experiment. The target items from the recognition memory test are written in bold.

This is our future. They look to us to protect America’s legacy of liberty, and our spirit of strength. Husband, father, and coach, Mo Brooks sees the challenges facing our country. He will take on those in Washington who threaten America’s great promise. Mo will fight for **free enterprise** and a **smart immigration policy** that create and protect **American jobs**. Mo Brooks, leadership for America, and north Alabama. I’m Mo Brooks, and I approve this message.

Perhaps Republicans watching this ad pay increased attention to this positive ad relative to the negative experimental ads. Although Republicans are not processing more deeply the specific policy mentions, throughout the ad they are making the assessment that based on the information presented in the ad, Mo Brooks is likely a Republican. When shown the recognition memory test, perhaps these Republicans are able to infer which issues were likely presented in the ad. This could occur even though the specific issue items do not generate more extensive processing among Republicans during ad presentation.

Perhaps particular partisans “remember” more from one type of political ad or another not because they exhibit enhanced semantic processing of the specific policy stances presented in the political advertisement, but because they are more apt to form gestalt impressions. Individuals may then rely on these aggregate memories, which integrate political candidates and information from political ads, to infer the issues or policy stances presented in a particular candidate’s ad.
Beyond encoding, storage, and retention of specific issues in political advertisements, the formation of a holistic impression of a candidate or ad, the inferences or elaboration made about a candidate while watching an ad, and the emotional responses of a viewer that might be associated with a candidate or an ad are elements of semantic processing. Recall that semantic processing is defined as the formation and strengthening of associations between and among concepts and elements that comprise these concepts, which plays a role in information encoding, comprehension, and elaboration. However, enhanced semantic processing related to impression formation, rather than idea unit storage, need not occur at the exact time that specific policy issues are presented in a political TV ad.

This may seem to contradict the arguments on precision in timing discussed above. That is, if the interaction effect shown in this study is moderated by viewers’ forming holistic impressions during ad viewing, and making inferences about issue mentions subsequently, perhaps a more appropriate analysis would focus on semantic processing (gamma power) across the entire ad rather than in small time epochs surrounding and immediately following issue presentation. Indeed, previous research might find it useful to include both averaged EEG signals as well as time-specific EEG measures in analyses.

**Study Limitations**

**Number of ads viewed.** The number of ads viewed by participants during an experimental session varies substantially. In the study by Ansolabehere et al. (1994) described earlier, participants viewed only one political advertisement (in addition to two
other non-political ads). Focusing on the literature reviewed earlier on political TV ads and memory, participants viewed 28 experimental ads (plus one practice ad) in the study by S. D. Bradley et al. (2007), 28 political ads in the experiment conducted by Newhagen and Reeves (1991), 12 ads in the study by Basil et al. (1991), 8 political ads in the study by Lang et al. (1991), 5 experimental ads (in addition to 6 filler ads) in the study by Hitchon and Chang (1995), and 5 political ads (plus 8 ads for commercial products) in the study conducted by Thorson et al. (1991).

In the current study, participants viewed 24 political ads. A collection of 24 ads falls toward the high end of the spectrum of political TV ads viewed during an experimental session. On the one hand, this is a limitation because the inundation of ads during a short amount of time may have prevented individuals from remembering much information from any of the ads. On the other hand, showing participants a large quantity of ads may more accurately mirror the real world than showing participants only one or two ads. During campaign season, particularly in areas with competitive races and as Election Day draws near, there is a nearly constant stream of political TV ads during commercial breaks.

**Viewing context.** The artificial viewing situation is another limitation of this study. For purposes of ecological validity, research studies should mimic real world conditions as closely as possible. Any experimental session located in a laboratory automatically creates an artificial situation. Even experiments held in the comfort of an individual’s own home disrupt the natural viewing context simply because individuals are aware of their participation in a research study. However, the artificiality of the research
setting is exacerbated in the current study because of the psychophysiological measurement recordings.

This experiment differed substantially from the TV viewing situations individuals experience in their everyday lives. Participants viewed ads in solitude, in a participant chamber, with electrodes emanating from the top of their head (EEG cap) and their face (electrodes used to correct for eye blinks). Studies that approximate actual viewing contexts more closely might have participants view ads in their homes, or a more domestic or comfortable research laboratory, such as those with more space, better lighting, comfortable couches, and snacks. Since individuals in real life watch TV alone and also in groups, studies might include both single-viewing and group-viewing ad contexts.

Some of these conditions would be difficult, if not impossible, to mirror in an EEG study. However, neuroscience recording technology continues to advance. Portable EEG systems are now available. Researchers can pack up their EEG systems and take them to homes, schools, movie theaters, or commercial centers. Other experimental practices sometimes implemented to mimic real world viewing contexts cannot be employed in EEG research. For instance, some mass media viewing experiments will provide participants with snacks and drinks. However, allowing participants to crunch on cookies, pretzels, and chips would prevent any usable EEG data from being attained. Similarly, although in real life citizens may chat about TV programs and commercials as they are being viewed, talking, nodding, and moving one’s gaze back and forth from a discussion partner to the TV would also spoil EEG data.
**Campaign context.** Participants in this study viewed 24 political TV ads, each from one U.S. House race in the 2010 elections. First, it is unclear if the ads selected for inclusion in this experiment are representative of the larger body of political TV ads. Peculiarities or particularities of the particular year or level of race might mean study results are not generalizable to political TV ad viewing as a whole. As discussed earlier, a more thorough content analysis of different races in different years at different levels could provide a better indication of whether and how TV ads change over time, in different geographical locations, and at the local, state, and federal levels.

Second, participants viewed ads from the 2010 midterm elections in the spring of 2012. Quite obviously, this diverges from the real world because candidates, political parties, and political organizations do not pay money to air ads for a particular race after that election has passed. Studies more closely approximating real world conditions might show participants political ads during an actual election campaign. Research studies using political ads relevant to an ongoing campaign would also illuminate how individuals’ interest in the campaign, attitudes toward salient campaign issues, attitudes toward particular candidates, and knowledge about political candidates influence processing and responses to political ads.

Third, citizens do not generally view ads from 24 different U.S. House of Representatives races. Election districts, of course, do not overlap perfectly with media markets. Citizens are thus likely to see advertisements about candidates and races for which they will not have the opportunity to vote. However, the viewing of ads from 24 different races is a particularly unrealistic scenario. Rather than showing participants ads
from various races at the same level, researchers may be interested in presenting ads from a mix of races for the president, U.S. Senate, U.S. House, governor, mayor, and state legislative seats.

Fourth, in the present viewing situation, participants watched all 24 ads in a row (except for time during which emotional responses ratings were made and for brief 5-second baseline periods used for the normalization of EEG data). Other researchers may more surreptitiously insert political TV ads among other advertisements (e.g., Hitchon & Chang, 1995; Thorson et al., 1991) or other TV content, such as TV news broadcasts (Ansolabehere et al., 1994), or game shows, sports, talk shows, or cartoons (Lang et al., 1991).

Sample characteristics. This study focused on whether and how political partisanship moderated the effect of ad types (positive, negative, comparison) on memory. To examine the impact of partisanship while achieving a sample size realistic for an EEG study, only self-identified Republicans and Democrats were included in the study. In the future, a more comprehensive study should examine the potentially moderating influence of partisanship using a sample that includes not only Democrats and Republicans, but also independents, individuals who identify with a third party, and individuals with no political affiliation.

Non-partisans. Including non-partisans in a study sample might provide a natural reference group for statistical analyses. In this study, partisanship was modeled using a dichotomous code, in which one partisan group was scored as 1, and the other group scored as 0. If non-partisans had been included, partisanship might have been modeled
using dummy codes, in which non-partisans served as the reference group. Furthermore, independents or swing voters, rather than party loyalists, often determine the outcome of a political election. A more inclusive sample would allow researchers to not only compare how opposing partisans respond to the same message, but also whether partisans and non-partisans differ in the processing of political advertisements.

**Strength of partisanship.** Future research should also explicitly model the influence of strength of partisanship. In this study, those who identified as leaning Republicans/Democrats, Republicans/Democrats, or strong Republicans/Democrats were classified as Republicans/Democrats. The initial intent of this study was to include only strong Republicans and Democrats. However, the realities of study recruitment and the timeline for data collection demanded that this requirement be relaxed, and leaning and moderate partisans were also included in the sample. A larger sample of partisans would allow researchers to directly examine whether strength of partisanship impacts information processing of various types of political advertisements.

**Non-student sample.** The student-only sample employed in this study may also serve as a limitation of this study. Critiques and affirmations of the use of non-probability samples generally, and college student samples in particular, has a long history in social science and communication research (Basil, 1996; W. J. Potter, Cooper, & Dupagne, 1993; Sears, 1986; Visser, Krosnick, & Lavrakas, 2000). Certainly, any researcher knows that one cannot survey the attitudes, beliefs, and behaviors of college students and then generalize these findings to the rest of the population. However, in experimental research, it may be acceptable to generalize findings from a college student sample if there is no
reason to believe that the *processes* being examined differ between students and non-students.

It would make little sense to examine how college students respond to an anti-binge drinking public service announcement (PSA) and then generalize these results to the population at large. Individual factors that directly impact or moderate message effectiveness among college students may be irrelevant for the general population (e.g., residing in a fraternity or sorority) or may be more or less consequential (e.g., peer pressure). On the other hand, in a study examining how the number of edits and cuts used in a PSA enhance and detract from memory, it may be appropriate to generalize findings from a college sample to the general public. Still, the ever-changing media environment may suggest that younger adults have been acclimated to process fast-paced messages more effectively than older adults. Researchers may reasonably identify factors that may make studies of college students more or less generalizable to the larger public. Unfortunately, however, it may be impossible to definitively know whether cognitive and emotional processes of students and non-students differ until studies have examined this explicitly.

On the one hand, there is no research explicitly proposing that Democrat and Republican students process political TV ads in a manner systematically different from Democrats and Republicans in the general population. On the other hand, college students differ markedly from the general population in a number of respects, some of which should impact the processing of political TV advertisements. Social psychological research suggests that students have “less-crystallized attitudes” and “stronger cognitive
skills” (Sears, 1986, p. 515) than the general population. Additionally, the stability of partisan preferences may differ between students and non-students, as college students are “still forming their political selves” (Niemi & Hamner, 2010, p. 302). This may suggest that moderating influences of partisanship on the processing of political TV ads differs for students and non-students. Furthermore, lack of demographic variability on certain characteristics among college students prevents researchers from effectively modeling the impact of potentially important factors. For instance, college students tend to be homogenous in age and education, making it impossible to examine how these factors influence the processing of political messages.

**Statistical power.** If a 3-way interaction among Ad Type, Ad Sponsor, and Partisanship does indeed exist (or a mediating role of Gamma in a mediated moderation model), it may not have been revealed in the present study because of inadequate statistical power. Tests of 3-way interactions and mediated moderation both require much statistical power (Aiken & West, 1991; Muller et al., 2005).

Power is the probability that a statistical test will provide support for an effect or relationship that truly exists. Or, more accurately, power is the probability that a null hypothesis (e.g., no relationship between x and y) that is false (e.g., there actually is a relationship between x and y) is rejected by a statistical test. Factors that affect the power of a statistical test include the significance level, the size of the effect, and the size of the sample. The significance level indicates the likelihood of a Type I error, or the probability of finding a statistically significant relationship when in fact such a relationship does not exist. Significance levels frequently selected in research studies
include .1, .05, .01, and .001. A significance level of .05 means that if there is no actual relationship, a statistically significant relationship will be found 5 out of 100 times (or 1 out of 20 times). This dissertation used a significance level of .05. However, significance levels of .10 were also indicated in tables and referred to as marginally significant.

As reviewed in the methods section on sample size, the expected effect size for recognition memory differences between positive and negative political TV ads was approximately 10 percent, based on previous research. However, an expected effect size for semantic processing differences (or differences in gamma band power) between positive and negative ads could not feasibly be calculated. Studies using EEG to study communication phenomena are few and far between, and none directly examine memory for different types of televised political ads.

Most of the extant communication research using EEG recordings focuses on the alpha frequency band. Research in cognitive neuroscience and neurolinguistics have studied differences in how various stimuli influence gamma band power. However, these studies tend to use very precise, clean, and simple manipulations and stimuli (e.g., auditory tones that differ in pitch, words that represent nouns or verbs, strings of letters that represent words or non-words). An expected difference in gamma band power in response to different types of complex media messages, such as positive and negative political TV ads, could not be inferred from previous research.

Identifying an expected 10 percent recognition memory difference for positive and negative TV ads might require a sample size of up to 80 participants. However, such a large sample size is not particularly feasible in EEG research because of the financial
and time resources required for the acquisition of neurological data. The goal of this dissertation was to collect 30 usable datasets. Data were collected from 47 individuals, with data from 35 participants used in the final analyses. A sample of 35 participants is more than an adequate for most EEG studies. Many EEG studies may include as few as 10 or 15 individuals.

At first glance, this may suggest that a small sample size would make it nearly impossible to reveal statistically significant true effects in EEG studies. However, neurological recordings have the capacity to capture infinitesimal changes in brain activity. The amplitudes of the EEG signal are frequently recorded, measured, and discussed in microvolts (mV), where one microvolt equals \(0.000001\) volt (or \(1 \times 10^{-6}\)). Statistical tests using EEG recordings are often adept at revealing statistically significant effects when various experimental conditions elicit very tiny differences in electrical potentials. Indeed, this is one of the reasons EEG studies (and psychophysiological studies more generally) tend to employ much smaller sample sizes than is the norm in more traditional social scientific experiments.

**Directions for Future Research**

**Manipulating political ad messages.** To create experimental manipulations for Positive and Negative (and Comparison) ads, researchers may create their own ads (Chang, 2001; Christ, Thorson, & Caywood, 1994; Geer & Geer, 2003; Thorson et al., 1994) or select messages from the existing body of political advertisements in the real world (Basil et al., 1991; S. D. Bradley et al., 2007; Hitchon & Chang, 1995; A. Lang,
Both techniques have their respective advantages and disadvantages.

The use of ads actually produced for and aired during election campaigns enhances the ecological validity of the study. However, the use of real ads in political advertising experiments limits the control researchers have over message manipulations. This study used existing political TV ads from 2010 U.S. House races as message stimuli. Ads were coded and selected for two particular characteristics (moderate level of arousal and similar number of idea units). However, ads assigned to the different Ad Type categories may have varied on a number of characteristics extraneous to their promotional or critical objective, and these factors could potentially impact the processing of and memory for political ads.

Experiments are most advantageous for their ability to isolate and control experimental variables. Studies using ads created specifically for research purposes are advantageous in that substantial experimental control over manipulations can be implemented, enhancing the validity for causal inferences produced by experimental conditions. Unfortunately (and discussed at length previously), creating two ads differing only in promotional or critical intent (and still retaining characteristics of actual political TV ads) may be nearly impossible. In an example of one of the cleanest and simplest manipulations, Ansolabehere and colleagues (Ansolabehere & Iyengar, 1995; Ansolabehere, Iyengar, Simon, & Valentino, 1994) altered only a small set of words (e.g., proposed/opposed; rejected/accepted) between positive and negative TV ads. However, if all other aspects of the ads were kept identical (e.g., narrator tone, video, images, sound
effects), these ads may differ substantially from ads produced in actual political campaigns.

Researchers should still continue to create clean and tight experimental manipulations by producing their own TV ads (or extensively editing existing ads). The challenge for researchers is clearly defining positive and negative ads, and then creating realistic ads while keeping all other relevant factors similar.

**Isolating positive and negative ad factors.** One possible tactic for producing realistic yet closely comparable positive and negative ad manipulations, which would simultaneously allow for the identification of precise message characteristics that produce (or do not produce) memory differences, would be to create multiple versions of Positive and Negative messages. These ad versions could employ and combine various dimensions of promotional and critical messages.

For instance, an “auditory verbal” Positive and Negative Ad manipulation could be created by manipulating only a few words (e.g., helped/hurt, corrupt/honest, supported/opposed) in the narrator script. Both messages could employ the same (e.g., neutral) visual images and omit any additional verbal and non-verbal information, such as sound effects, music, or printed text on screen. A “written verbal” manipulation could alter written text that appears on the screen in the same manner. “Still image” versions could use emotional images more appropriate to Positive and Negative ads (i.e., those that elicit positive and negative emotions, respectively46), and “video” versions could

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46 It should be noted that although this study defined Positive and Negative ads by their intended objective rather than elicited emotional response, the latter is not a fundamentally incorrect practice. Rather, consistency in conceptual and operational
replace the static images with emotional video clips. “Music” versions could include upbeat, heartwarming songs in Positive Ads and jarring music in Negative Ads.

Analyses could then examine which, if any, of the messages characteristics representing the promotional or critical objective of the ad create memory differences. Simple manipulations could also be combined to produce more complex manipulations, such as “auditory and written verbal” or “auditory verbal and image.” Analyses comparing more complex manipulations could then determine whether combinations of ad features, rather than any single characteristic, produce information processing and memory differences.

One study is unlikely to employ the numerous versions of Positive and Negative ads as described above. Identifying which factors may be most useful to study may prove challenging. The list factors of Positive and Negative Ad messages described above is certainly not exhaustive. Other manipulations might include a neutral, upbeat, or downtrodden tone of the narrator; a bland, warmly smiling, or concerned expression on the face of a candidate; or the calmly leaning, confidently standing, or hunched over body language of everyday citizens featured in ads.

**Comparing positive and negative messages to what?** Manipulation of all of the various factors that could create differences in the processing of negative and positive ads definitions within and across studies is of critical importance. Furthermore, defining ads by their intended objective does not preclude the selection and manipulation of words, images, sounds, and music according to their propensity to produce positive and negative emotional responses. On the contrary, realistic ads are likely to include emotion-eliciting message factors. However, researchers should more carefully manipulate these factors to understand what message characteristics are driving information processing differences during political TV ad viewing.
will, in some cases, involve creating only two messages that differ along one dimension. For instance, in manipulating the verbal information of ad versions, it makes sense to have one condition in which a candidate supports something, and another condition in which a candidate opposes something, but it would be nonsensical to include a condition in which a candidate is said to “neither support nor oppose” an issue, value, or social group. In other cases, it might make sense to include a baseline or neutral condition. For instance, in ad manipulations involving images, it might make sense to have a condition with a positive image, a condition with a negative image, and condition with a neutral image. Whether a baseline or reference message is required will depend on the emphasis of the research study and the realism of the manipulation.

**Clarifying the role of emotion.** Future research should seek to clarify the role of emotion in the processing of TV ads. As discussed earlier, research should focus on the different roles of arousal, positivity, and negativity in information processing and memory, and how inclusion of particular emotional stimuli (i.e., images, music) in Positive and Negative Ads influences messages processing. Furthermore, future research might employ a variety of measures capturing emotional responses, account for varying emotional responses throughout the course of a message presentation, examine differences between dimensional and discrete emotions, examine emotion as a potential mediator, and model the various factors that might produce emotional responses to political advertisements.

**Measures of emotion.** Future research examining emotion, information processing, and memory for political TV ads might consider measuring emotional
responses using a variety of methods. This study included self-reported measures of positivity, negativity, and arousal (although positivity and negativity are only included in post-hoc analyses) using semantic differential scales. Research has found that emotional responses may differ when using different measurement techniques, and different methods may perhaps capture different aspects of emotional responses. Instead of (or in addition to) using self-report semantic differential scales, future research might ask respondents to describe their emotional responses to messages or measure their physiological responses. For instance, facial EMG could be used to capture emotional valence, and skin conductance recordings could be used to assess emotional arousal.

Changing emotions. Researchers should also take into account the dynamic nature of emotions in ad messages. Within a 30-second political TV ad, the intended emotional response of an ad may vary dramatically. Ads intended to induce negative emotional responses are unlikely to be identical in negative extremity throughout the ad. Consider Johnson’s notorious Daisy Girl ad, in which the ad opens with a young girl standing in a field, counting as she picks off the petals of a daisy, and ends with a nuclear explosion.

Many positive or promotional ads are designed to first introduce problems and then offer the sponsoring candidate as a solution to those problems. These ads may introduce negative information initially, followed by positive information about how the candidate sponsoring the ad will solve these problems for the American people. The transcript from a Positive Republican ad used in this experiment, which demonstrates this problem-solution format, is shown below.
Are you angry with what’s going on in Washington right now? I sure am. So I decided to run for Congress. I’m upset because they’re spending our money on programs we don’t want, and we don’t need. Let’s repeal the recent health care legislation, gain control of our borders, and stem the tide of illegal immigration. Cut taxes, and let the American people get the economy moving again. I’m Jesse Kelly, and I approve this message. Jesse Kelly, for Congress.

In other words, political TV ads are dynamic in nature. Intended and evoked emotional responses may be constantly developing and changing. Researchers interested in understanding the role of emotion in the processing of political ads should more carefully content analyze, design, and select political ads to understand how varying emotional states influence message processing and responses.

**Nuanced emotions.** Beyond arousal and valence, researchers should consider how discrete emotional responses influence information processing. Researchers have found that emotional appeals typically found in positive ads include hope, pride, compassion, empathy, and trust, whereas those common to negative ads include anger, fear, and uncertainty (Kaid & Johnston, 1991; M. Kern, 1989). Although dimensional approaches to emotion categorize affect as either positive or negative (varying in extremity or arousal), various emotions classified as positive (or negative) might not influence information processing in the same manner or to the same extent. Although positive emotions tend to be less discrete (Fredrickson, 1998), substantial variation occurs within the category of negative emotions. For instance, anger, fear, and sadness (all of which are generally categorized as negative emotions) may have very different precursors, correlates, and outcomes.

Different negative emotions may be caused by a distinct set of factors. Cognitive appraisal theories of emotion suggest that emotion is produced through cognitive
assessments. C. A. Smith and Lazarus (1993) suggest that anger involves an “other-blame” cognitive assessment, whereas fear/anxiety involves “danger/threat,” and sadness is related to appraisals of “irrevocable loss, helplessness about harm or loss” (p. 238). Different negative emotions may also have different motivational foundations. Although anger is considered to involve approach motivation, anxiety is related to avoidance motivation (Caver & Harmon-Jones, 2009). Negative emotions such as fear, sadness, and anger may also correspond to distinct patterns of physiological responses (Ax, 1953; Schwartz, Weinberger, & Singer, 1981) and observed facial expressions (Ekman & Friesen, 1971; Ekman et al., 1982).

Research on political communication also suggests that negative emotions may differentially impact memory, evaluations, and information seeking. Newhagen (1998) examined memory for TV news images that induce anger, fear, and disgust. Memory was greatest for images that produced anger, followed by those that induced fear. Memory was worst for images that elicited disgust.

Parker and Isbell (2010) examined how fear and anger impacted information seeking and reliance on this information in evaluating political candidates. When participants in the fear condition agreed more with one candidate relative to the other, they were more likely to vote for the candidate with whom they shared greater agreement on issue positions. However, for participants in the anger condition, relative agreement with the candidates’ issue positions did not influence voting.

Valentino, Hutchings, Banks, and Davis (2008) examined how fear, anger, and enthusiasm influenced information seeking as well as learning political information. The
results of this study are particularly interesting because they reveal that although individuals in the anger condition claim that they will pay more attention to political campaigns, they actually spend less time perusing the online information. In Study 1, findings indicated that although anger, enthusiasm, and anxiety all led people to self-report increased attention to a campaign, anger actually led to a decrease in total information sought. In Study 2, only anxiety lead to increased information seeking and learning.

Emotions grouped together from a dimensional perspective may generate significantly different physiological reactions, information processing strategies, and final message outcomes such as evaluations, attitudes, and learning. Researchers interested in political ads may find it profitable to study how particular emotional appeals to fear, anger, anxiety, or sadness influence how individuals process and what they remember from political ads.

**Emotion as a mediator.** If emotion is driving information processing mechanisms, emotional responses should serve as mediating variables in models predicting memory formation and information retention from different types of ads. This study tested for 3-way interactions and mediated moderation (with two “treatment” effects, or two Ad Type dummy codes) using multi-level modeling. Including an additional mediator seemed beyond the scope of the present study. However, future research should examine the role of emotions as mediators between communication exposure and message effects.
**Modeling emotional responses.** Future research should also formally model how ad variables and individual difference variables might interact to influence emotional responses to political ads. Post-hoc analyses for this study included running the most complex model from earlier analyses but using emotional response ratings rather than memory as the outcome variable. That is, the model testing for 3-way interactions among Ad Type, Ad Sponsor, and Partisanship (Model 2 from above) was run with self-reported Positivity, Negativity, and Arousal as the dependent variables, respectively. For each emotion rating, four versions of the 3-way interaction model were run. Results are found in Appendix V (the results for models predicting Positivity, Negativity, and Arousal are shown in Tables 15, 16, and 17, respectively).

Interestingly, unlike the models predicting memory, the models with emotional response ratings as the outcome variables did reveal significant 3-way interactions. The

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47 These four versions include all combinations of dichotomous coding of Ad Sponsor and Partisanship. For instance, in the first column of Tables 15, 16, and 17, the Partisanship variable is coded such that Republicans are scored as 1 and Democrats are scored as 0. The Ad Sponsorship variable is coded such that Republican-sponsored ads are scored as 1 and Democratic-sponsored ads are scored as 0. In the second column, Democrats are scored as 1, and Republican-sponsored ads are scored as 1. In the third column, Republicans are scored as 1, and Democratic-sponsored ads are scored as 1. In the fourth column, Democrats are scored as 1, and Democratic-sponsored ads are scored as 1. Performing this reverse coding for the Partisanship and Ad Sponsor variables for each emotion response rating outcome allows observation of the statistical significance of conditional effects of the Ad Type dummy codes for each combination of Ad Sponsorship and Partisanship. To fully probe the 3-way interactions, the dummy coding of Ad Type would need to be recoded twice (once with Negative Ads as the reference group, and once with Comparison Ads as the reference group), and the four models would need to be run again with each type of dummy coding. Adding these 8 additional models for each emotional response outcome would allow examination of conditional effects of Ad Sponsor and Partisanship for each Ad Type (Positive, Negative, Comparison).
3-way interaction among Ad Type, Ad Sponsor, and the Comparison Ad Type dummy code was statistically significant in the models predicting Positivity and Arousal and marginally significant in the models predicting Negativity. As the emphasis of this study is on memory, not emotional responses, the summary below provides only a preliminary analysis of the Ad Positivity models.

In the models with Ad Positivity as the outcome variable, the coefficients for the Negative and Comparison Ad Type dummy codes are negative and significant in all models. This indicates that Negative (relative to Positive) ads are rated as less Positive regardless of individual Partisanship or Ad Sponsor. The coefficients for the Comparison dummy code are also negative, but smaller than those comparing Negative to Positive ads. Ad Sponsor is significant in the models in which Republicans are scored as 1 for the Partisanship variable. That is, for Positive Ads (the reference group in the Ad Type dummy coding), Republican-sponsored ads lead to a decrease in Positivity ratings among Democrats (and Democratic-sponsored ads leads to an increase in Positivity ratings among Democrats). Partisanship is significant in the models in which Democratic-sponsored ads are coded as 1. That is, for Positive Ads that are Republican-sponsored, being a Republican leads to an increase in Positivity ratings (and being a Democratic leads to a decrease in Positivity ratings).

The 2-way interactions between the Negative Ad Type dummy code and Ad Sponsor, and between the Comparison Ad dummy code and Ad Sponsor are significant in the models in which Republicans are coded as 1 on the Partisanship variable. When an ad is Republican-sponsored rather than Democratic-sponsored, the decrease in Positivity
ratings is smaller among Democrats when the ad is a Negative (relative to Positive) Ad, but greater among Democrats when the ad is a Comparison (relative to a Positive) Ad.

The results for the models predicting Negativity and Arousal are not explored here, although the results for each of the four models for each emotional response rating are shown in Appendix V. As described earlier, fully probing the 3-way interaction to examine the statistical significance of the conditional effects of Ad Sponsorship and Partisanship at each level of Ad Type would require different variations of dummy coding and running additional models. Suffice it to say that emotional responses appear to depend on not only the intended objective of the ad (i.e., Ad Type), but also interactions with the party affiliation of the individual viewing the ad and the party for whom the ad has been produced.

**Factors beyond emotion.** If these 3-way interactions are demonstrated in models predicting emotional responses, but not in models predicting memory, perhaps factors other than emotion are more critical to information processing of and memory for political ads. Research indicates that in addition to emotional content, structural features of media messages influence information processing and memory.

Researchers have examined how structural features (e.g., production pacing, cuts, edits, pans, zooms, movement) impact physiological responses, information processing, and memory for TV news, TV programs, movies, and commercials (Grabe, Lang, & Zhao, 2003; Grabe, Zhou, Lang, & Bolls, 2000; A. Lang, 1990; A. Lang et al., 1999; A. Lang et al., 2000, A. Lang et al., 2003; A. Lang, Potter, & Bolls, 1999a), how related and unrelated television cuts influence heart rate, reaction times, and memory (A. Lang,
Geiger, Strickwerda, & Sumner, 1993), and how chronological presentation of TV news
influences recognition and recall memory (A. Lang, 1989).

Future research should explore the use of structural features in political TV ads,
and how these various production techniques influence information processing and
memory. Lang and Lanfear (1990) suggest that factors likely to impact processing of
political TV ads include structural complexity (e.g., visual structural features such as cuts
and edits), audio-video redundancy (match or mismatch between audio and visual
channels), message difficulty (e.g., familiarity with information), organization of
information presented, and emotion.

**The congeniality effect and candidate familiarity.** The congeniality effect
suggests that memory should be heightened for attitude-consistent information (Eagly et
al., 1999). A congeniality effect in the current study would be demonstrated by a
significant interaction between Ad Sponsor and Partisanship, such that Democrats
remember more from Democratic-sponsored (attitude-consistent) ads, and Republicans
remember more from Republican-sponsored (attitude-consistent) ads. Other research
finds an attitude-incongruity effect, which would also be demonstrated by a statistically
significant interaction between Ad Sponsor and Partisanship, but one in which Democrats
remember more from Republican-sponsored ads, and Republicans remember more from
Democratic-sponsored ads. Although neither an attitude-consistent nor attitude-
inconsistent effect was found in the present study, this might have occurred because of
the use of unfamiliar candidates, which could hinder participants’ ability to expand and
elaborate upon message content using previous knowledge of candidates.
Research on memory for political TV messages may use real or fictitious political candidates. This study used ads about real but unfamiliar political candidates (candidates from the 2010 U.S. House races), to attenuate the possibility of prior candidate preferences generating variable emotional responses among viewers. Indeed, research suggests that viewing pictures of a candidate elicits more positive emotional responses among respondents who identify with the same party as that candidate compared to respondents who identify with the opposing party, and more negative responses among individuals who identify with the opposing party compared to respondents who identify with the same party as the candidate (Kaplan et al., 2007). However, use of unfamiliar candidates may also have prevented individuals from elaborating, ruminating, and counter-arguing ad content based on familiarity with candidates and prior knowledge of candidates’ issue stances. Future research might be more likely to find a significant Ad Sponsor and Partisanship interaction using well-known political candidates.

**EEG and message processing.** Explaining, predicting, and understanding communication processes necessitates probing into the workings of the human mind. Measuring the activity of the brain may be particularly useful for communication scholars interested in examining the black box of message processing. In the field of communication, EEG research is still in its infancy. However, there exists immense potential for communication scholars to deepen our understanding of message processing by integrating insights from neuroscience research and EEG technology into communication studies. This study used EEG to examine the role of neurological activation in the gamma band frequency range on memory for political TV ads. Future
research on information processing of political TV ads might focus on other frequency bands, other electrode sites, and more complex analyses (such as time-frequency analysis).

**Other frequency bands.** Of that extant literature on EEG in communication studies, the emphasis has mainly focused on the alpha band (Appel, Weinstein, & Weinstein, 1979; Reeves et al., 1985; Simons, Detenber, Cuthberg, Schwartz, & Reiss, 2003; M. E. Smith & Gevins, 2004). Alpha is frequently used as a measure of inattention or cognitive inactivity.

The present study provides encouraging results that a less well-known frequency band (gamma) could index semantic processing and play a critical role in memory. Although gamma power was the main emphasis of this study, future research would find it profitable to examine how power in other frequency bands corresponds to information processing mechanisms and memory for political TV ads (or complex media messages in general). In research on memory in particular, examining theta and gamma power simultaneously may provide interesting insights about memory formation and processing. Lisman and Idart (1995) have proposed a model in which gamma oscillations are nested within theta oscillations. Research has indicated that theta is critical to memory formation and retention. Examining theta and gamma band power in tandem may help scholars further understand how information is stored in the brain.

**Electrodes.** Gamma power analysis in this study focused on 10 electrode sites on the midline and left side of the brain over frontal and anterior temporal cortical areas (Fz, F1, F3, F5, F7, FCz, FC1, FC3, FC5, FT7 using a 64-channel cap with electrode
placement based on the International 10/20 system). Knowledge acquisition from political TV ads was gauged using a recognition memory test. Participants were shown a picture of a candidate featured in an ad and were asked to identify, from a list of 6 issue positions, which had been mentioned in the ad featuring that candidate.

Because participants had to visually identify written issue statements, the 10 electrodes of interest selected for this study focused on scalp areas overlying brain regions known to play a role in language and semantic processing. Researchers have suggested that the left inferior frontal gyrus (LIFG) is critical to binding or unification in language processing (Hagoort, 2005), that Brodmann’s Area 45 and 47 are involved in semantic processing (Martin & Chao, 2001), and that the medial temporal lobe (MTL) and prefrontal cortex (PFC) are involved in declarative memory (Squire, Stark, & Clark, 2004).

Future research might examine how different aspects of memory are related to power in various frequency bands at various EEG electrode sites. Verbal semantic memory may depend predominantly on neurological activity in frontal and temporal cortical areas. Auditory verbal memory may also involve neurological activation at the junction of temporal and parietal cortices. Memory for video or visual images may depend mainly on activity in the occipital cortex (which includes the primary and secondary visual cortices). Memory for movement or orientation may mostly depend on motor and parietal cortices. Exploring how memory for various aspects of messages relate to neurological activity in different regions of the brain could contribute
significantly to communication theories on information integration, memory formation, and retention.

**Coherence and time-frequency analysis.** Future research might also conduct analyses extending beyond spectral power analysis to gain a richer picture of brain activity during the viewing of political TV commercials, and how these neurological measures correspond to information processing of and memory for information presented in these televised advertisements. For instance, in addition to examining the amplitude or power occurring at particular neurological oscillation frequencies, researchers might employ measures of coherence (or coherency) to study the correspondence of activity between two EEG channels.

Coherence and coherency measures calculate the consistency in EEG signals between two electrode channels. These measures of signal consistency are typically computed by calculating the linear relationship between two signals at a particular frequency. This process is similar to the calculation of the Pearson product-moment correlation coefficient (Roach & Mathalon, 2008). EEG consistency measures based on signal magnitude (i.e., wave or oscillation amplitude) are referred to as “coherence,” whereas consistency measures based on both amplitude and phase information of the EEG signal are known to as “coherency” measures.

As described earlier in the section on electroencephalography, the EEG signal can be thought of as an oscillator. This oscillating EEG signal is represented (in the time domain) as a waveform, in which voltage fluctuations of the electrical charge are illustrated over time. At any point in time, the EEG signal can be defined in terms of its
frequency, amplitude, and phase. Frequency refers to the speed of the wave, or the number of complete cycles that occur within a given time frame. The unit of frequency typically used to describe an EEG signal is Hertz (Hz), where 1 Hz is equivalent to 1 cycle per second. This study focused on gamma band frequency, operationalized as activity in the 36-44 Hz frequency range.

Amplitude of the EEG signal refers to the amount of electrical charge, demonstrated by the height of the wave signal. Amplitude is used in the calculation of power frequency analysis, which ascertains the amount of activity within a particular frequency range. A measure of coherence calculates the consistency in amplitude or magnitude between signals from two EEG channels at a particular frequency. Coherence may capture, for instance, whether neurological activity in a particular frequency band at a frontal EEG channel systematically increases or decreases with activity over the occipital cortex. Phase indicates where, at a particular point in time, a signal is at within the cycle of the wave. Coherency measures are based on consistency in magnitude as well as phase information, where phase consistency measures the degree of synchrony in phase angles between two channels at a particular frequency at a given point in time.

Coherence and coherency measures could be helpful to researchers studying cognitive and emotional processing of political TV ads, particularly in examining how information received or processed in different areas of the brain are integrated and stored. “[T]here is a long tradition of analyzing the consistency between the EEG from pairs of electrodes in an attempt to address the brain’s regional connectivity and interregional interaction,” (Roach & Mathalon, p. 914). For instance, coherence and coherency
measures could help researchers understand how redundant or non-redundant information conveyed to different sensory channels (such as audio and visual) are integrated during and after information processing. For instance, differences in memory for information presented in political TV ads (or portions of ads) that vary in audio-video redundancy may be mediated by coherence or coherency between EEG channels overlying the occipital and temporal cortices.

Researchers interested in using EEG data to study the processing of messages (political advertisements or otherwise) may also consider using techniques which fall under the category of time-frequency analysis. Traditional frequency decomposition of the EEG signal, such as the Fast Fourier Transform (used in the current study to compute gamma power), allow researchers to examine signal amplitude or power within a particular frequency band for a given period of time (this study used 1-second time windows). Time-frequency analyses allow researchers to examine neurological activity in various frequency bands simultaneously, and also are particularly beneficial in the study of changes in neurological activity over time.

In the study of information processing of complex messages, such as political TV advertisements, time-frequency analyses may be best suited (at least initially) for exploratory purposes. One might consider conducting time-frequency analyses across an entire political TV ad. The results of such an analysis would show power across a wide range of neurological frequencies (for instance, 0 to 100 Hz), and how power within these frequency ranges changes over time. One might then create a second-by-second storyboard with the visual and audio information presented throughout the ad, or code the
ad for particular characteristics (e.g., issues mentioned, candidate faces, music, emotional expressions, emotional visuals, etc.), and examine how patterns of activity in various frequency bands increase or decrease upon or immediately following exposure to various ad features.

**Sample.** Researchers interested in understanding how individuals process and respond to political advertisements may profitably employ student samples. However, future research should include a non-student sample. Including individuals from a range of age groups, educational and economic backgrounds could also help illuminate how citizens process and respond to political advertisements. Future research might also include a range of partisans and non-partisans from a range of geographical areas. As discussed earlier, what it means to be a Democrat in Texas may not be comparable to what it means to be a Democrat in New York.


Technology in mental health care delivery systems (pp. 119–137). Norwood, NJ: Ablex.


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Appendix A: Participant Recruitment Flier

Researchers at the Communication and Psychophysiology (CAP) Lab of the School of Communication at the Ohio State University are seeking individuals interested in participating in a study titled, “Brain Responses to Political TV Messages.” This study will use recordings of brain activity to examine how partisans (or those who identify strongly with a political party) respond to political mass media messages.

In this study, your brain waves will be recorded using electroencephalography (EEG). EEG is a non-invasive procedure, and is completely safe and pain-free. In EEG recording experiments, an elastic (or stretchy) cap is placed on the head of the participant, and electrodes are plugged into the cap (shown in the figure on right). These electrodes, or sensors, record changes in neurological activity (or voltage fluctuations), revealing brain waves at different sites on the scalp.

For this experiment, you will be asked to come into the CAP Lab for an experimental session lasting approximately 1.5 hours. In this time, the researcher will go over the informed consent process with you and get you fitted into the stretchy cap. You will then watch a series of political TV messages while sitting in front of a computer monitor. Following the viewing of these messages, the researcher will remove the cap, and you will be asked to fill out some post-exposure questions.

Recording brain waves using EEG electrodes requires the use of some salty gel. This gel will still be in your hair upon removal of the cap. The lab will provide you with shampoo, a towel, and a hair dryer if you wish to wash your hair after the experiment. Or, you may just want to bring a hat or hair band, and wash your hair when you get home.

Participation in this study is completely voluntary. You will be provided with $20 compensation. If you are an undergraduate student enrolled in a class through the School of Communication that is offering this study as an extra credit opportunity, you will receive $20 in addition to course extra credit. If you choose to participate, you may choose to stop at any time. All of your information will be kept confidential.
This research experiment will take place in the Communication and Psychophysiology (CAP) Lab, located in the Journalism Building on the OSU main campus: CAP Lab, 391 Journalism, Building 046, 242 W. 18th Ave., Columbus, OH 43210.

If you are interested in participating in this study, or have any questions or concerns, please email or call Alyssa Morey. Email: alymorey@gmail.com. Phone number: (614) 940-6959. Also, if you have any strong partisan friends who might be interested in participating in this study, please pass along this recruitment flier to them.
Appendix B: Pre-screening Questions

Pre-Screening Phone Script

Hello, my name is [insert researcher’s name here]. I am calling on behalf on the Communication and Psychophysiology Lab, or CAP Lab, from the School of Communication at Ohio State University. I have received your email [or phone call] indicating that you might be interested in participating in the study titled “Brain Responses to Political TV Messages.”

Are you still interested in participating? (circle one)

☐ (1) Yes
☐ (2) No

If answer is “no”:
Thank you for your time. Have a good day.

If answer is “yes”:
If you have a few minutes, I’d like to ask you a few questions to see if you are a good match for the study. If you are a good match, I will provide you with a brief overview of the study and the collection of electroencephalogram (EEG) data. We will then try to schedule a date and time for your experimental session. Do you have a few minutes right now to answer some questions?

If answer is “no”:
Is there another time that would be good to reach you?

Note availability for phone screening:

If answer is “yes”, proceed to ask Phone Screening Questions:
Great.

Question 1: Are you right or left handed? (check one)

☐ (1) Right-handed
☐ (2) Left-handed
☐ (3) Ambidextrous

Note: To qualify for participation, an individual must be right-handed

**Question 2:** How old are you? (write in)

Age:

Note: To qualify for participation, an individual must be between 18 and 40 years old.

**Question 3:** Do you have normal vision? (circle one)

☐ (1) Yes
☐ (2) No

If answer is NO, ask **Question 3.1:** Do you have corrected-to-normal vision? That is, do you wear glasses or contacts?

☐ (1) Wears glasses
☐ (2) Wears contacts
☐ (3) Both
☐ (4) Neither

**Question 3.2:** Is your current prescription adequate?

☐ (1) Yes, adequate prescription
☐ (2) No, prescription NOT adequate

NOTE: To qualify for participation, an individual must have normal or corrected-to-normal vision.

**Question 4:** Do you have normal hearing?

☐ (1) Yes
☐ (2) No

If answer is NO, ask **Question 3.3:** Do you have corrected-to-normal hearing? That is, do you wear a hearing aid?

☐ (1) Yes
☐ (2) No

NOTE: To qualify for participation, an individual must have normal or corrected-to-normal hearing.
**Question 5**: What do you consider to be your political party affiliation?

- □ (1) Strong Democrat
- □ (2) Democrat
- □ (3) Leaning Democrat
- □ (4) Leaning Republican
- □ (5) Republican
- □ (6) Strong Republican
- □ (7) Independent
- □ (8) Some other party
- □ (9) No party affiliation

*NOTE: To qualify for participation, an individual must self-identify as a Republican or Democrat.*

**Pre-Screening Form**

**NAME:**

**PHONE NUMBER:**

**Question 1**: Are you right or left handed?

(1) Right-handed
(2) Left-handed
(3) Ambidextrous

**Q1 ANSWER:**

**Question 2**: How old are you?

**Q2 ANSWER:**

**Question 3**: Do you have normal vision?

(1) Yes
(2) No

**Q3 ANSWER:**

If NO to Question 3,
**Question 3.1:** Do you have corrected-to-normal vision? That is, do you wear glasses or contacts?

(1) Wear glasses
(2) Wear contacts
(3) Both
(4) Neither

**Q3.1 ANSWER:**

If you wear glasses and/or contacts,

**Question 3.2:** Is your current prescription adequate?

(1) Yes, adequate prescription
(2) No, prescription NOT adequate

**Q3.2 ANSWER:**

**Question 4:** Do you have normal hearing?

(1) Yes
(2) No

**Q4 ANSWER:**

If NO to Question 4,

**Question 4.1:** Do you have corrected-to-normal hearing? That is, do you wear a hearing aid?

(1) Yes
(2) No

**Q4.1 ANSWER:**

**Question 5:** What do you consider to be your political party affiliation?

(1) Strong Democrat
(2) Democrat
(3) Leaning Democrat
(4) Leaning Republican
(5) Republican
(6) Strong Republican
(7) Independent
(8) Some other party
(9) No party affiliation

Q5 ANSWER:
Appendix C: Confirmation Email

Hi [insert participant's name here],

Thank you for your interest in participating in the study titled “Brain Responses to Political TV Messages” conducted by the Communication and Psychophysiology (CAP) Lab of the School of Communication at the Ohio State University. This email is a confirmation of your experimental session. It includes the following information: (1) the date and time of your scheduled experimental session; (2) the address of the lab; (3) some basic guidelines to follow on the day of your experimental session, and (4) post-experiment information.

(1) Experimental Session Date and Time

Your scheduled experimental session is ______ at ______. It should last approximately 1.5 hours.

(2) Lab Location

The experiment will be held at the following address:

Communication and Psychophysiology Lab
391 Journalism
Building 046
242 W 18th Ave.
Columbus, OH 43210

(3) Guidelines for Participation

We ask that you please follow a few simple instructions prior to your participation in the experiment.

1. Please minimize your drug intake (e.g., alcohol, nicotine, caffeine, etc.) in the 24 hours prior to your participation. This does not mean you cannot consume any drugs. Engage in any behavior that is typical for you on a normal day. For instance, if you normally drink a cup of coffee in the morning, do so on the morning of the experiment. However, please try to avoid using any drugs in
excess (e.g., slamming 10 Red Bulls right before coming to the session), as body- and mind-altering substances will influence electroencephalogram (EEG) recordings.

2. Please leave adequate time to arrive at the CAP Lab. Also, please plan on getting to the lab a few minutes early. Exercise (e.g., walking to the lab) changes your body’s physiology, so it is important that you have a few minutes to adjust back to a normal, resting body state before your experimental session.

3. Please wash your hair in the morning and avoid using any hair products before coming to the lab. Hair products (e.g., gels, mousse, sprays, leave-in conditioners) will prevent clear EEG data recordings. Also, make sure your hair is dry when you come to the lab.

4. Please try to layer clothing (e.g., sweatshirt or sweater over short-sleeve shirt) before coming to the lab. Body temperature can influence EEG recordings, and layering clothes will give you more control over your body temperature during the experiment.

5. If you have corrected-to-normal vision and have the option of wearing either glasses or contacts, please wear your contacts on the day of the experiment. If you only have glasses that will still be fine, but contacts make application of the sensors a bit easier.

(4) Post-Experiment Information

Recording brain waves using EEG electrodes requires the use of some salty gel. This gel will still be in your hair upon removal of the cap. The lab will provide you with shampoo, a towel, and a hair dryer if you wish to wash your hair after the experiment. Or, you may just want to bring a hat and clean off when you get home.

If you have any additional questions, please feel free to contact Graduate Associate Alyssa Morey (morey.27@osu.edu) or Dr. Stacie Powers (powers.283@osu.edu). Thank you very much for your time, and we look forward to seeing you at the CAP Lab.

Sincerely,
Alyssa Morey
Appendix D: Coding Instructions

Arousing Content Coding Instructions
Messages differ in the extent to which they elicit emotional arousal.

**Conceptual Definition:**
Dimensional approaches to emotion often identify two primary factors of emotion, including valence and arousal. Valence indicates the direction of the emotion (i.e., positive or negative), whereas arousal indicates the intensity or extent of activation. Thus, arousal can be thought of as the energy or intensity of an emotional state or response.

**Operational Definitions:**
Self-reported emotional responses or message content arousal is often rated using semantic differential scales. The following six semantic differential pairs are often used to measure emotional arousal. These adjectives further describe the meaning of emotional arousal.

- Relaxed—Stimulated
- Calm—Excited
- Sluggish—Frenzied
- Dull—Jittery
- Sleepy—Wide awake
- Unaroused—Aroused

The Self-Assessment Manikin (SAM) has also been used to measure emotional responses. Arousal is measured using a nine-point pictorial scale that ranges from a very calm manikin to an extremely excited manikin. Thus, physiological states of excitement and stimulation can also be considered to indicate emotional arousal.

**Contributing Factors:** There are a number of factors that might influence the emotional arousal or intensity of a message.

- **Visual structural features**
  - Cuts, edits, pacing, movement, scene changes, zooms
  - Color images or video, unusual color
  - Visual special effects
  - Soft focus
  - Slow motion
Visual content features
  o Emotionally evocative symbols
  o Graphic, intense, or emotional images (pictures of families, babies, erotica, war, disaster, mutilation)
  o Images of risky products (drugs, condoms, alcohol)
  o Portrayals of events traditionally associated with emotion (e.g., holidays, weddings, death, fighting)

Audio structural features
  o Audio pacing
  o Special auditory/sound effects
  o Music onset
  o Production effects
  o Voice changes, vocal processing
  o Voices of actors/characters
  o Saturation of background sound

Audio content features
  o Genre or type of music, background music, and unusual music

Language and linguistics (audio and visual content)
  o Use of emotional words
  o Emotional intensity of the issues in the ads

People
  o Facial expressions
  o Facial movement (blinking, mouth movement)
  o Gestures
  o Body movement

Coding instructions:
Please watch each ad and indicate which of the following categories best describes the arousing content of the message: (1) low arousal, (2) moderate arousal, or (3) high arousal. Ads should be assigned to arousal level categories based on an overall or holistic impression of the ad. Although all of the factors described above may contribute to your overall impression, you need not focus on any particular aspect. Rather, it is the combination of all of these elements that should inform your overall evaluation of arousing content.

Low arousal ads are ads that you may find difficult to pay attention to because of their slow visual or audio pace, lack of controversial issues, and/or banal graphics, images, animations, and video clips. These ads might make you feel sleepy or bored, and fail to captivate and keep your interest attention. High arousal ads are ads in which you may find it difficult to process all of the information presented because the video and/or audio
track are fast paced. These ads may present emotional issues, vivid pictures, video, or continual animation. These ads might include quick-tempo music. In highly arousing ads, information processing is difficult because of the complex, or quick-paced structure of the ad and/or inclusion of emotionally arousing audio or visual content. Moderately arousing ads are all ads in between low and high arousal. The majority of ads will most likely be moderately arousing. These ads manage to capture and keep your attention through the use of arousing content and structure, but are not so overwhelming that you feel you could not process most of the message.

Idea Unit Coding Instructions

Political TV ads present different amounts of verbal information through the auditory track of the ad. One way to quantify the amount of auditory verbal information presented in an ad is to count/code the number of idea units presented in a message.

Definitions:
An idea unit can be thought of as the smallest unit of information that includes a complete idea or meaningful thought.

- An idea unit includes no more and no less than a single complete idea
- An idea unit may consist of a whole sentence or parts of a sentence (e.g., clause, phrase, proposition)
- An idea unit is a prose segment that express a single action, event, state, or relationship
- An idea unit contains a predicate and one or more arguments
- An idea or pause unit may be indicated by identifying where a reader or speaker might pause to catch a breath, to give emphasis to the story, or to enhance meaning

Definition for Present Purposes:
An idea unit expresses one action or event or state, and generally corresponds to a single verb clause. Each idea unit contains a predicate, and should be identified by inclusion of a verb.

Coding: Using the transcripts provided, please indicate each idea unit presented in the ad by placing a slash mark in between idea units. Count up the total number of idea units for each ad.
## Appendix E

<table>
<thead>
<tr>
<th></th>
<th>Mean (SD)</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Republican Positive</strong></td>
<td>13.50 (.74)</td>
<td>12.75</td>
<td>14.25</td>
</tr>
<tr>
<td><strong>Democratic Positive</strong></td>
<td>13.31 (2.10)</td>
<td>10.50</td>
<td>15.25</td>
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<tr>
<td><strong>Republican Negative</strong></td>
<td>13.19 (1.34)</td>
<td>11.50</td>
<td>14.50</td>
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<tr>
<td><strong>Democratic Negative</strong></td>
<td>13.56 (2.09)</td>
<td>11.75</td>
<td>16.50</td>
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<tr>
<td><strong>Republican Comparison</strong></td>
<td>13.81 (.94)</td>
<td>13.00</td>
<td>14.75</td>
</tr>
<tr>
<td><strong>Democratic Comparison</strong></td>
<td>13.75 (0.68)</td>
<td>12.75</td>
<td>14.25</td>
</tr>
<tr>
<td><strong>All Ads</strong></td>
<td>13.52 (1.29)</td>
<td>10.50</td>
<td>16.50</td>
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</tbody>
</table>

Table 7. Number of Idea Units by Ad Type.

Note: Table 7 shows the mean, standard deviation (in parentheses), minimum, and maximum number of idea units presented across the four ads in each political ad type category included as experimental stimuli.
### Appendix F

<table>
<thead>
<tr>
<th>Ad Category</th>
<th>Ad Number</th>
<th>Race</th>
<th>Democratic Candidate</th>
<th>Republican Candidate</th>
<th>Link</th>
</tr>
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<tbody>
<tr>
<td>Positive Republican</td>
<td>1</td>
<td>AL5</td>
<td>Steve Raby</td>
<td>Mo Brooks</td>
<td><a href="http://www.youtube.com/watch?v=LLQQ8yxin38">http://www.youtube.com/watch?v=LLQQ8yxin38</a></td>
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<tr>
<td></td>
<td>2</td>
<td>AZ8</td>
<td>Gabrielle Giffords</td>
<td>Jesse Kelly</td>
<td><a href="http://www.youtube.com/watch?v=aRoI496UxCU">http://www.youtube.com/watch?v=aRoI496UxCU</a></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>VA5</td>
<td>Tom Perriello</td>
<td>Robert Hurt</td>
<td><a href="http://www.youtube.com/watch?v=2uA5GkCQg2o">http://www.youtube.com/watch?v=2uA5GkCQg2o</a></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>MA4</td>
<td>Barney Frank</td>
<td>Sean Bielat</td>
<td><a href="http://www.youtube.com/watch?v=h77voJD1cn4&amp;feature=relmfu">http://www.youtube.com/watch?v=h77voJD1cn4&amp;feature=relmfu</a></td>
</tr>
<tr>
<td>Positive Democratic</td>
<td>5</td>
<td>AZ1</td>
<td>Ann Kirkpatrick</td>
<td>Paul Gosar</td>
<td><a href="http://www.youtube.com/watch?v=eYcEvSOEjdE">http://www.youtube.com/watch?v=eYcEvSOEjdE</a></td>
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<td></td>
<td>6</td>
<td>NE2</td>
<td>Tom White</td>
<td>Lee Terry</td>
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<tr>
<td></td>
<td>7</td>
<td>TX23</td>
<td>Ciro Rodriguez</td>
<td>Quico Canseco</td>
<td><a href="http://www.youtube.com/watch?v=aODR707Dq4Y">http://www.youtube.com/watch?v=aODR707Dq4Y</a></td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>MA5</td>
<td>Niki Tsongas</td>
<td>Jon Golnik</td>
<td><a href="http://www.youtube.com/watch?v=exoNxGP2kxQ">http://www.youtube.com/watch?v=exoNxGP2kxQ</a></td>
</tr>
</tbody>
</table>

Table 8. Experimental Ad Stimuli.

Note: Table 8 shows the ad type, ad number, race (state, district), Democratic candidate, and Republican candidate for each of the 24 experimental ad stimuli. A link to each ad is also presented.
Table 8 continued

<table>
<thead>
<tr>
<th>Negative Republican</th>
<th>9</th>
<th>ID1</th>
<th>Walt Minnick</th>
<th>Raul Labrador</th>
<th><a href="http://www.youtube.com/watch?v=pCNAjTQqUk">http://www.youtube.com/watch?v=pCNAjTQqUk</a></th>
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<tr>
<td></td>
<td>10</td>
<td>PA11</td>
<td>Paul Kanjorski</td>
<td>Lou Barletta</td>
<td><a href="http://www.youtube.com/watch?v=dcn-njM_Dc">http://www.youtube.com/watch?v=dcn-njM_Dc</a></td>
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<tr>
<td></td>
<td>11</td>
<td>IA2</td>
<td>Dave Loebtack</td>
<td>Mariannette Miller-Meeks</td>
<td><a href="http://www.youtube.com/watch?v=f76Ur6nW0Zw">http://www.youtube.com/watch?v=f76Ur6nW0Zw</a></td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>IN8</td>
<td>Trent Van Haaften</td>
<td>Larry Bucshon</td>
<td><a href="http://www.youtube.com/watch?v=vFiU9oHX9Y">http://www.youtube.com/watch?v=vFiU9oHX9Y</a></td>
</tr>
<tr>
<td>Negative Democratic</td>
<td>13</td>
<td>FL8</td>
<td>Alan Grayson</td>
<td>Daniel Webster</td>
<td><a href="http://www.youtube.com/watch?v=o2KEcni6ggs">http://www.youtube.com/watch?v=o2KEcni6ggs</a></td>
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<tr>
<td></td>
<td>14</td>
<td>PA3</td>
<td>Kathy Dahlkempe</td>
<td>Mike Kelly</td>
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<td></td>
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<td>AZ5</td>
<td>Harry Mitchell</td>
<td>David Schweikert</td>
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<tr>
<td></td>
<td>16</td>
<td>FL2</td>
<td>Allen Boyd</td>
<td>Steve Southerland</td>
<td><a href="http://www.youtube.com/watch?v=xWyKy-yapJs">http://www.youtube.com/watch?v=xWyKy-yapJs</a></td>
</tr>
<tr>
<td>Comparison Republican</td>
<td>17</td>
<td>GA2</td>
<td>Sanford Bishop</td>
<td>Mike Keown</td>
<td><a href="http://www.youtube.com/watch?v=O8MH8yVMR38">http://www.youtube.com/watch?v=O8MH8yVMR38</a></td>
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<tr>
<td></td>
<td>18</td>
<td>RI1</td>
<td>David Cicilline</td>
<td>John Loughlin</td>
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<td></td>
<td>19</td>
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<td>Allyson Schwartz</td>
<td>Dee Adcock</td>
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<tr>
<td></td>
<td>20</td>
<td>NY2</td>
<td>Steve Israel</td>
<td>John Gomez</td>
<td><a href="http://www.youtube.com/watch?v=mM3KCKYPSg">http://www.youtube.com/watch?v=mM3KCKYPSg</a></td>
</tr>
<tr>
<td>Comparison Democratic</td>
<td>21</td>
<td>FL24</td>
<td>Suzanne Kosmas</td>
<td>Sandy Adams</td>
<td><a href="http://www.youtube.com/watch?v=4XdgyyVD5QM">http://www.youtube.com/watch?v=4XdgyyVD5QM</a></td>
</tr>
<tr>
<td></td>
<td>22</td>
<td>NDAL</td>
<td>Earl Pomeroy</td>
<td>Rick Berg</td>
<td><a href="http://www.youtube.com/watch?v=3O">http://www.youtube.com/watch?v=3O</a> VesZ0O8qk</td>
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<tr>
<td></td>
<td>23</td>
<td>NY25</td>
<td>Dan Maffei</td>
<td>Ann Marie Buerkle</td>
<td><a href="http://www.youtube.com/watch?v=BAtnaL_5Is">http://www.youtube.com/watch?v=BAtnaL_5Is</a></td>
</tr>
<tr>
<td></td>
<td>24</td>
<td>AZ7</td>
<td>Raul Grijalva</td>
<td>Ruth McClung</td>
<td><a href="http://www.youtube.com/watch?v=LEF3xiyGBy4">http://www.youtube.com/watch?v=LEF3xiyGBy4</a></td>
</tr>
</tbody>
</table>
Appendix G: Presentation Orders

The six political ad categories included the following: (1) Positive Republican (PR); (2) Positive Democratic (PD); (3) Negative Republican (NR); (4) Negative Democratic (ND); (5) Comparison Republican (CR); and (6) Comparison Democratic (CD). Six presentation orders were constructed using the balanced Latin squares design to counterbalance the six types of ad messages shown in each block. The order of ad types within each block for the six presentation orders is shown below.

Presentation Order 1: PR, PD, CD, NR, CR, ND
Presentation Order 2: PD, NR, PR, ND, CD, CR
Presentation Order 3: NR, ND, PD, CR, PR, CD
Presentation Order 4: ND, CR, NR, CD, PD, PR
Presentation Order 5: CR, CD, ND, PR, NR, PD
Presentation Order 6: CD, PR, CR, PD, ND, NR

For each ad category, the particular ad shown in each block was randomly selected. In the orders presented below, ads 1 through 4 represent Positive Republican ads, 5 through 8 represent Positive Democratic ads, 9 through 12 represent Negative Republican ads, 13 through 16 represent Negative Democratic ads, 17 through 20 represent Comparison Republican ads, and 21 through 24 represent Comparison Democratic ads.

Presentation Order 1: PR, PD, CD, NR, CR, ND
  Block 1: 3, 7, 22, 10, 17, 13
  Block 2: 4, 5, 24, 12, 20, 15
  Block 3: 2, 6, 23, 9, 19, 16
  Block 4: 1, 8, 21, 11 18, 14

Presentation Order 2: PD, NR, PR, ND, CD, CR
  Block 1: 7, 9, 2, 13, 21, 19
  Block 2: 6, 11, 4, 16, 23, 18
  Block 3: 8, 10, 1, 14, 24, 20
  Block 4: 5, 12, 3, 15, 22, 17

Presentation Order 3: NR, ND, PD, CR, PR, CD
  Block 1: 10, 16, 5, 17, 1, 24
Block 2: 12, 13, 7, 19, 3, 23
Block 3: 11, 15, 6, 18, 2, 21
Block 4: 9, 14, 8, 20, 4, 22

Presentation Order 4: ND, CR, NR, CD, PD, PR
Block 1: 16, 19, 11, 21, 7, 4
Block 2: 15, 20, 12, 23, 5, 1
Block 3: 13, 18, 9, 24, 6, 2
Block 4: 14, 17, 10, 22, 8, 3

Presentation Order 5: CR, CD, ND, PR, NR, PD
Block 1: 20, 22, 16, 2, 9, 6
Block 2: 19, 21, 13, 3, 11, 7
Block 3: 17, 24, 14, 1, 10, 8
Block 4: 18, 23, 15, 4, 12, 5

Presentation Order 6: CD, PR, CR, PD, ND, NR
Block 1: 21, 4, 20, 5, 15, 11
Block 2: 23, 2, 18, 6, 13, 9
Block 3: 22, 1, 17, 7, 16, 10
Block 4: 24, 3, 19, 8, 14, 12
Appendix H: Ad Viewing Instructions

(Instruction Page 1)
Thank you for participating in the study ‘Brain Responses to Political TV Messages.’ You are about to watch a series of political advertisements. At the end of each message, you will be asked to make THREE ratings regarding the emotional content of the message. You will indicate your response by using the keyboard in your lap. The three ratings will correspond to the positivity, negativity, and arousing content of the message.

Please press “Enter” to continue.

(Instruction Page 2)

POSITIVITY refers to how much the message content makes you feel happy, pleased, satisfied, and/or hopeful.

NEGATIVITY refers to how much the message content makes you feel unhappy, annoyed, unsatisfied, and/or despairing.

AROUSAL refers to how much the message content makes you feel stimulated, excited, frenzied, jittery, and/or wide awake.

The rating scales will be provided for you each time you make the ratings.

Please press “Enter” to continue.

(Instruction Page 3)
In between the rating of one ad and the viewing of the next ad, there will be a short window during which the screen will be black. A white cross will appear at the center of the screen. Please fix your gaze on this cross while you wait for the next message to appear. Keep your gaze focused at the center of the screen, relax, and wait for the next ad to begin.

Lastly, please remember to try to limit any movement during the viewing of the ads.
If you have any questions, please ask the researcher at this time. Otherwise, please press “Enter” to begin the experiment.
Appendix I: Post-Exposure Questionnaire Instructions

OVERVIEW INSTRUCTIONS:

Thank you for participating in the study titled "Brain Responses to Political TV Messages."

We would like to ask you some questions about the ads you just viewed. These questions will ask you to identify issues discussed in the ads you watched, and to indicate your prior familiarity with the candidates featured in the ads.

Lastly, you will be asked to provide some information about yourself, including your demographic and political characteristics.

Please press "Continue" to begin.

RECOGNITION MEMORY INSTRUCTIONS:

For the next part of the experiment, the name and picture of a candidate featured in an ad you just watched will appear on the screen. For ads that featured two candidates, both candidates’ names and pictures will appear.

You will be asked to complete 2 tasks for each candidate (or candidate pair) who appears on the screen.

(1) Beside the candidate’s name and picture will be a list of 6 issue problems, policy stances, or past actions. Please mark ALL items that were mentioned in the ad featuring the candidate shown on the screen.

(2) You will also be asked to indicate how familiar you were with each of the candidates PRIOR to participating in this experiment.

If you have any questions, please ask the researcher now. Otherwise, please press "Continue" to begin.

DEMOGRAPHIC AND POLITICAL VARIABLES INSTRUCTIONS:
Lastly, we would like you to provide some information about your demographic and political characteristics. Please press "Continue" to begin.
Appendix J: Emotional Ratings

On a scale of 1 to 7, please indicate how positive the message was.
1 2 3 4 5 6 7
(1 = not at all positive, 7 = extremely positive)

On a scale of 1 to 7, please indicate how negative the message was.
1 2 3 4 5 6 7
(1 = not at all negative, 7 = extremely negative)

On a scale of 1 to 7, please indicate how arousing the message was.
1 2 3 4 5 6 7
(1 = not at all arousing, 7 = extremely arousing)
Appendix K: Demographic and Political Variables

*Gender*
Question: Please indicate your gender
Responses: Male, Female

*Age*
Question: Please indicate your age in years

*Race*
Question: Please indicate the racial group with which you most closely identify
Responses: 1 = Caucasian, 2 = Black/African American, 3 = Asian/Pacific Islander, 4 = Hispanic, 5 = Native American, 6 = Multi-Racial

*Education*
Question: Please indicate the highest level of education you have completed.
Responses: 1 = Less than high school, 2 = High school diploma or equivalent, 3 = Some college, 4 = Associate or technical degree, 5 = Bachelor’s degree, 6 = Some graduate school, 7 = Graduate degree

*Class*
Question:
Which of the following would best describe the household in which you were raised?
Responses:
1 = Lower class
2 = Lower-middle class
3 = Middle class
4 = Upper-middle class
5 = Upper class

Income
Question:
Please indicate which category represents your family’s income in 2010.
Responses:
1 = Less than $14,999
2 = $15,000 - $24,999
3 = $25,000 - $49,999
4 = $50,000 - $74,999
5 = $75,000 - $100,000
6 = More than $100,000

Political Interest
Question: How interested are you in politics and public affairs?
Responses:
1 = Not at all
2 = Very little
3 = Somewhat
4 = Quite a bit
5 = A great deal

Political Party Affiliation
Question: What do you consider to be your political party affiliation?
Responses:
1 = Strongly Democrat
2 = Democrat
3 = Leaning Democrat
4 = Leaning Republican
5 = Republican
6 = Strongly Republican
7 = Independent
8 = Some other party
9 = No affiliation

Social liberal-conservatism
Question:
How liberal or conservative do you consider yourself to be in regards to social issues?
Responses:
1 = Very liberal
2 = Moderately liberal
3 = Slightly Liberal
4 = Neither liberal nor conservative
5 = Slightly conservative
6 = Moderately conservative
7 = Very conservative

Economic liberal-conservatism
Question:
How liberal or conservative do you consider yourself to be in regards to economic issues?
Responses:
1 = Very liberal
2 = Moderately liberal
3 = Slightly Liberal
4 = Neither liberal nor conservative
5 = Slightly conservative
6 = Moderately conservative
7 = Very conservative

Political Knowledge
From Delli Carpini & Keeter’s (1993) 5-item index of political knowledge.

Here are a few questions about the government. Many people don't know the answers to these questions, so if there are some you don't know please indicate that in the response.

1. Do you happen to know what job or political office is now held by Joe Biden?

2. Whose responsibility is it to determine if a law is constitutional or not . . . is it the president, the Congress, or the Supreme Court?

3. How much of a majority is required for the U.S. Senate and House to override a presidential veto?

4. Do you happen to know which party has the most members in the U.S. House of Representatives in Washington?

5. Would you say that one of the parties is more conservative than the other at the national level? If so, which party is more conservative?
Appendix L: Example of Recognition Memory Task

Figure 2. Example of Recognition Memory Task.
Appendix M: Ad Transcripts and Issues Mentioned

<table>
<thead>
<tr>
<th>Ad Number</th>
<th>Ad Transcript</th>
<th>Issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>This is our future. They look to us to protect America’s legacy of liberty, and our spirit of strength. Husband, father, and coach, Mo Brooks sees the challenges facing our country. He will take on those in Washington who threaten America’s great promise. Mo will fight for free enterprise and a smart immigration policy that create and protect American jobs. Mo Brooks, leadership for America, and north Alabama. I’m Mo Brooks, and I approve this message.</td>
<td>Free enterprise</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Immigration policy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>American jobs</td>
</tr>
<tr>
<td>2</td>
<td>Are you angry with what’s going on in Washington right now? I sure am. So I decided to run for Congress. I’m upset because they’re spending our money on programs we don’t want, and we don’t need. Let’s repeal the recent health care legislation, gain control of our borders, and stem the tide of illegal immigration. Cut taxes, and let the American people get the economy moving again. I’m Jesse Kelly, and I approve this message. Jesse Kelly, for Congress.</td>
<td>Spending money</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unnecessary programs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Repeal health care</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Control borders</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Stop illegal immigration</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cut taxes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Get economy moving</td>
</tr>
</tbody>
</table>

Table 9. Ad Transcripts and Issues

Note: Table 9 shows the transcripts for each of the experimental stimuli ads. The issues or policy stances in each ad are shown in the far-right column, with bold typeface indicating issues included as target items in the recognition memory test.
<table>
<thead>
<tr>
<th>Ad Number</th>
<th>Ad Transcript</th>
<th>Issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Our family’s lived here for generations. Back then, hard work led to opportunity. But today, the American dream is in trouble. I’m Robert Hurt. Washington gives us trillion dollar deficits, tax increases, a stimulus that grows government, not jobs. I’ve pledged to fight any tax increase, and make Washington stop spending money it doesn’t have and start creating jobs. I’m Robert Hurt. I approve this message because the American dream is worth fighting for.</td>
<td>Trillion dollar deficits Tax increases Stimulus that grows government Fight tax increases Stop spending Job creation</td>
</tr>
<tr>
<td>4</td>
<td>We need jobs. How can we create more jobs? If we want to grow jobs in this country, we need leadership in Washington that understands what it takes to do that. We gotta stop these job killing regulations so that businesses can start hiring again. We have leadership who’s never worked in the real world, who haven’t had to grow companies. I have. We need people in Washington who are going to say no to unnecessary spending and who are gonna give us our money back and grow this economy. I’m Sean Bielat, and I approve this message.</td>
<td>Job creation Stop job killing regulations Stop spending Grow economy</td>
</tr>
<tr>
<td>5</td>
<td>Even if they don’t pass this, you are taking the first step, right? I am, I’m already giving 5 percent of my salary, and dedicating it to the public debt. We need to restore some fiscal discipline, and take responsibility. Ann Kirkpatrick cut her own pay, and is pushing to cut congressional salaries, until they balance the budget. Even broke with her own party to oppose the Wall Street bank bailout. Independent, like Arizona. I’m Ann Kirkpatrick, and I approve this message.</td>
<td>Public debt Fiscal discipline Cut own pay Cut congressional salaries Balanced budget Against Wall Street bailouts Independent</td>
</tr>
</tbody>
</table>
Table 9 continued

<table>
<thead>
<tr>
<th>Ad Number</th>
<th>Ad Transcript</th>
<th>Issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>When you look at the debt that both parties in Washington keep piling on our kids, it’s just wrong. Tom White. He worked his way through college and law school, working construction. A different kind of leader for Nebraska. Tom White worked to pass the largest tax cut in state history, and cut millions in state government waste to balance the government, without raising taxes. I’m Tom White, and I approve this message, because Washington may not get it, but Nebraska does.</td>
<td>Debt&lt;br&gt;Cut taxes&lt;br&gt;Cut waste</td>
</tr>
<tr>
<td>7</td>
<td>I know this road like the back of my hand. Good morning. Hi. What about Wall Street? We’ve got to hold them accountable. Ciro Rodriguez, stood up to party leaders, voting against the billion dollar bank bailout. Tax payers shouldn’t be stuck with the bill for Wall Street’s mess. Instead, Rodriguez voted for tax credits to help small business create jobs here. I’m Ciro Rodriguez, and I approve this message because it’s Texas families, not big corporations, that need relief.</td>
<td>Wall Street accountability&lt;br&gt;Against Wall Street bailouts&lt;br&gt;Tax credits for small business</td>
</tr>
</tbody>
</table>
### Table 9 continued

<table>
<thead>
<tr>
<th>Ad Number</th>
<th>Ad Transcript</th>
<th>Issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Democrat Walt Minnick isn’t telling the truth. He says he’s against amnesty, but wouldn’t send illegals back. Can’t have it both ways Walt. Minnick voted with Obama/Pelosi over 70 percent. Voted for 68 billion in more stimulus. And Minnick won’t commit to repealing Obamacare. Bottom line: Minnick’s hiding his liberal Obama/Pelosi record. I’m Raul Labrador. I approve this message because I’m a conservative Republican, who will stand up to Barack Obama and Nancy Pelosi.</td>
<td>Amnesty&lt;br&gt;<strong>Voted with Obama/Pelosi</strong>&lt;br&gt;<strong>More stimulus</strong>&lt;br&gt;Won't repeal health care&lt;br&gt;<strong>Liberal record</strong></td>
</tr>
<tr>
<td>10</td>
<td>Washington liberals like Paul Kanjorski have betrayed Pennsylvania seniors. He voted for Nancy Pelosi’s big government health care plan that cost a trillion dollars, that raises taxes, and cuts 500 billion from Medicare. Seniors could lose their doctors, and millions could even lose their current Medicare plans. Washington is spending money we don’t have, and cannot afford. Paul Kanjorski, you cut our Medicare, and this November, you’re fired. 60 Plus Association is responsible for the content of this advertising.</td>
<td>Voted for health care plan&lt;br&gt;<strong>Raise taxes</strong>&lt;br&gt;<strong>Medicare cuts</strong>&lt;br&gt;Seniors lose doctors&lt;br&gt;Lose Medicare plans&lt;br&gt;Spending money</td>
</tr>
<tr>
<td>11</td>
<td>Dave Loebsack, more lies and distortions. Why? Loebsack wasted one trillion of our tax dollars in failed stimulus that created jobs in China, and gave hundreds of millions to Wall Street fat cats. Loebsack voted for an energy tax that will kill jobs, cost you 1,300 dollars a year. And now Loebsack says higher taxes and Medicare cuts are on the table. November 2nd, fix Congress. Fire Loebsack. I’m Mariannette Miller-Meeks, and I approve this message.</td>
<td>Failed stimulus&lt;br&gt;Jobs in China&lt;br&gt;<strong>Millions to Wall Street</strong>&lt;br&gt;Energy tax&lt;br&gt;<strong>Higher taxes</strong>&lt;br&gt;Medicare cuts</td>
</tr>
</tbody>
</table>

Continued
Table 9 continued

<table>
<thead>
<tr>
<th>Ad Number</th>
<th>Ad Transcript</th>
<th>Issues</th>
</tr>
</thead>
</table>
| 12        | Who’s this sound like? A lawmaker who resorted to gimmicks to pass a bloated budget that resulted in a massive 740 million dollar shortfall. Supported higher taxes on business that could kill jobs. And voted to nearly double his own salary at your expense. Nancy Pelosi? Barack Obama? Harry Reid? No, it’s Trent van Haafken who wants to go to Congress. With his bad habits, he’d fit right in. The National Republican Congressional Committee is responsible for the content of this advertising. | Bloated budget  
Higher taxes on business  
Increased own salary |
| 13        | I’m Congressman Alan Grayson, and I approve this message. Daniel Webster’s Washington backers are attacking Alan Grayson on women’s issues. The facts on Webster’s record. Fact: Webster sponsored a bill to create a form of marriage that would trap women in abusive relationships. Fact: Webster is an advocate for a group that teaches that mothers should not work outside the home. Fact: Webster would force victims of rape and incest to bear their attacker’s child. Those are the facts. Don’t let Daniel Webster make the laws we will have to live with. | Trapped in abusive relationships  
Mothers should not work  
No abortions for rape victims |

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<table>
<thead>
<tr>
<th>Ad Number</th>
<th>Ad Transcript</th>
<th>Issues</th>
</tr>
</thead>
</table>
| 14        | I’m Kathy Dahlkemper, and I approve this message. In these tough times, pity the multi-millionaires, like car salesman Mike Kelly. He’s got millions invested in Wall Street, and big gas and oil companies. No wonder he supports the bailout, and wants a flat national income tax that would end deductions for mortgages, retirement, and even charity. The Kelly plan helps millionaires, like him, at the expense of families, like yours. Mike Kelly, you get squeezed. He gets the cash. | Supports bailout  
Flat national income tax  
End deductions for mortgages                                                                 |
| 15        | Arizona schools are facing serious cuts, teacher layoffs, overcrowded classrooms, and David Schweikert would make it even worse. Schweikert opposed funding to keep thousands of Arizona teachers in the classroom. Schweikert would abolish the department of education, crippling our public schools. And Schweikert even opposes college aid for middle class families. David Schweikert, wrong for our schools, wrong for Arizona. The NEA fund for children and public education is responsible for the content of this advertising. | Teacher layoffs  
Overcrowded classrooms  
Opposed teaching funding  
Close Department of Education  
Opposes college aid                                                                                   |
Table 9 continued

<table>
<thead>
<tr>
<th>Ad Number</th>
<th>Ad Transcript</th>
<th>Issues</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Who is Steve Southerland? He called Medicare a train wreck. He’d take away Social Security benefits from our most vulnerable citizens. End Social Security for folks with disabilities. Southerland even wants to repeal the 17th Amendment. The one that allows us to elect our own senators. Yup, Southerland, wants the Florida legislature to choose our Senators for us. Steve Southerland. He’d cut Social Security, and repeal part of the constitution. And that’s just the beginning. I’m Allen Boyd, and I approve this message.</td>
<td>Medicare&lt;br&gt;End Social Security for the disabled&lt;br&gt;Repeal 17th amendment</td>
</tr>
<tr>
<td>16</td>
<td>For Congress, it’s clear. Sanford Bishop sided with liberal Nancy Pelosi, voting for billions in wasteful spending to bailout Wall Street. Even supporting Pelosi’s big government takeover of health care. Raising taxes on small businesses. Cutting Medicare benefits for seniors. Mike Keown will fight the liberals in Washington, to end the reckless spending, lower taxes, and defend our Georgia values. A common sense conservative. Mike Keown for Congress. I’m Mike Keown, and I approve this message.</td>
<td>Wasteful spending&lt;br&gt;Wall Street bailout&lt;br&gt;Government takeover of health care&lt;br&gt;Taxes on small business&lt;br&gt;Medicare cuts&lt;br&gt;Reckless spending&lt;br&gt;Lower taxes&lt;br&gt;State values</td>
</tr>
<tr>
<td>17</td>
<td>Under Mayor Cicilline, jobs lost, Providence, a sanctuary for illegals. Now Cicilline wants to team up with Nancy Pelosi in Congress. We need a change in course. Fast. John Loughlin flew helicopters in the military. He’ll fight for lower taxes, less spending, more jobs. John Loughlin will say no to illegal immigration, and put Rhode Island back to work. I’m John Loughlin, and I approve this message.</td>
<td>Job loss&lt;br&gt;Sanctuary for illegals&lt;br&gt;Lower taxes&lt;br&gt;Less spending&lt;br&gt;More jobs&lt;br&gt;Illegal immigration</td>
</tr>
</tbody>
</table>
Table 9 continued

<table>
<thead>
<tr>
<th>Ad Number</th>
<th>Ad Transcript</th>
<th>Issues</th>
</tr>
</thead>
</table>
| 19        | Compare the candidates for Congress. Allyson Schwartz is an author of the Obama/Pelosi health care plan. Dee Adcock will work to repeal the Obama/Pelosi health care plan. Allyson Schwartz voted for higher taxes, out of control spending, and massive debt. Dee Adcock will work to cut taxes, reduce spending, and eliminate debt. Allyson Schwartz is the problem. Dee Adcock is the solution. The choice is clear. Dee Adock for Congress. I’m Dee Adock, and I approve this message. | **Authored health care plan**  
**Repeal health care**  
**Higher taxes**  
**Out-of-control spending**  
**Massive debt**  
**Cut taxes**  
**Reduce spending**  
**Eliminate debt** |
| 20        | Who would you rather have in Congress? Career politician Steve Israel? Or Long Island businessman John Gomez. Steve Israel votes 99 percent of the time with Nancy Pelosi, paving the way for the largest tax increase in history. John Gomez will cut your taxes. Steve Israel voted for Obamacare, cutting half a trillion dollars from Medicare, reducing benefits for seniors. John Gomez will repeal Obamacare. He’ll vote the way you would in Congress. I’m John Gomez, and I approve this message. | **Voting with Pelosi**  
**Tax increases**  
**Cut taxes**  
**Voted for health care plan**  
**Medicare cuts**  
**Reduce senior benefits**  
**Repeal health care** |

Continued
<table>
<thead>
<tr>
<th>Ad Number</th>
<th>Ad Transcript</th>
<th>Issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>Sandy Adams has some strange ideas. Can you think of any amendments to the U.S. Constitution you think should be repealed? Fifteen to seventeen. We need to go back to the way our forefathers planned on us having senators. Adams would take away our right to vote and let Tallahassee politicians pick our Senators? Susan Kosmas has different priorities. People in this district are mad, and I’m mad too. One of the first things I did was to oppose the annual pay raise for congressional members. I think it’s not only my job, but it’s my nature to fight for people. I’m Susan Kosmas, and I approve this message.</td>
<td>Repeal parts of Constitution Take away right to vote Oppose Congress pay raise</td>
</tr>
<tr>
<td>22</td>
<td>When George Bush proposed a Medicare prescription drug plan, Earl Pomeroy voted yes, putting seniors before party. Rick Berg would roll back prescription drug coverage. Earl joined Republicans to fight Internet predators, protecting kids. Berg actually voted against background checks for daycare providers, helping criminals hide their past. Berg sided with those who thought that background checks to protect kids were a burden. Earl never would. That’s the difference. I’m Earl Pomeroy, and I approve this message.</td>
<td>Medicare prescription drug plan Fight Internet predators Background check for child care providers</td>
</tr>
</tbody>
</table>

Continued
Table 9 continued

<table>
<thead>
<tr>
<th>Ad Number</th>
<th>Ad Transcript</th>
<th>Issues</th>
</tr>
</thead>
</table>
| 23        | We must get back our country. We have to get back back, back, back. Ann Marie Buerkle talks a lot about going back. But her ideas are flat out backward. She calls global warming a myth, wants to close the Department of Education, and reverse investments in green technology. Dan Maffei believes the way forward is through new industries. He’ll keep fighting for businesses to create American jobs. For our families, and our future, Dan Maffei. I’m Dan Maffei. And I approve this message. | Global warming a myth  
Close Department of Education  
Reverse green technology investments  
New industry  
Fight for business  
Job creation                                                                                                                   |
| 24        | For many Arizonans, Social Security is our lifeline. But Ruth McClung would cut that lifeline. McClung wants to privatize Social Security, reducing benefits while risking our retirement in the stock market. She even called Social Security a Ponzi scheme. There’s a better choice. Raul Grijalva voted to stop increases in Medicare premiums. And Raul’s always voted to protect Social Security. Because Raul Grijalva stands with us, every time. I’m Raul Grijalva, and I approve this message. | Privatize Social Security  
Reduce Social Security benefits  
Risking retirement  
Social Security a ponzi scheme  
Medicare premiums  
Protect Social Security                                                                                                           |
### Appendix N: List of Issues and Issue Stances

<table>
<thead>
<tr>
<th>Issue Category</th>
<th>Issue Stances</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banks/Wall Street Bailouts</td>
<td>Against bank bailouts</td>
</tr>
<tr>
<td></td>
<td>Against Wall Street bailouts</td>
</tr>
<tr>
<td></td>
<td>Crack down on Wall Street</td>
</tr>
<tr>
<td></td>
<td>Millions to Wall Street</td>
</tr>
<tr>
<td></td>
<td>More bailouts</td>
</tr>
<tr>
<td></td>
<td>Stop Wall Street bailouts</td>
</tr>
<tr>
<td></td>
<td>Supports bailout</td>
</tr>
<tr>
<td></td>
<td>Wall Street accountability</td>
</tr>
<tr>
<td></td>
<td>Wall Street bailout</td>
</tr>
<tr>
<td>Budget</td>
<td>Against trillion dollar budget</td>
</tr>
<tr>
<td></td>
<td>Balanced budget</td>
</tr>
<tr>
<td></td>
<td>Balanced budget amendment</td>
</tr>
<tr>
<td></td>
<td>Bloated budget</td>
</tr>
<tr>
<td></td>
<td>Irresponsible budget</td>
</tr>
<tr>
<td></td>
<td>Nancy Pelosi’s budget</td>
</tr>
</tbody>
</table>

Table 10. Issue Stances.

Note: Table 10 lists all of the issues, issue problems, candidate objectives, policy stances, and past policy-relevant behavior across all of the 56 ads in the initial pool of stimuli (right column), grouped together by issue category (left column).
Table 10 continued

<table>
<thead>
<tr>
<th>Issue Category</th>
<th>Issue Stances</th>
</tr>
</thead>
<tbody>
<tr>
<td>Businesses/Corporations</td>
<td>Business growth</td>
</tr>
<tr>
<td></td>
<td>Companies that scam families</td>
</tr>
<tr>
<td></td>
<td>Encourage investment</td>
</tr>
<tr>
<td></td>
<td>Fight for business</td>
</tr>
<tr>
<td></td>
<td>Higher taxes on business</td>
</tr>
<tr>
<td></td>
<td>Job killing regulations</td>
</tr>
<tr>
<td></td>
<td>Lower taxes for Wall Street</td>
</tr>
<tr>
<td></td>
<td>New industry</td>
</tr>
<tr>
<td></td>
<td>Remove hiring mandates</td>
</tr>
<tr>
<td></td>
<td>Small businesses struggling</td>
</tr>
<tr>
<td></td>
<td>Tax breaks for big oil</td>
</tr>
<tr>
<td></td>
<td>Tax credits for creating jobs</td>
</tr>
<tr>
<td></td>
<td>Tax credits for small business</td>
</tr>
<tr>
<td></td>
<td>Taxes on small business</td>
</tr>
<tr>
<td>Campaign Finance</td>
<td>Tough campaign finance</td>
</tr>
<tr>
<td>Children</td>
<td>Against child healthcare</td>
</tr>
<tr>
<td></td>
<td>Background check for child care providers</td>
</tr>
<tr>
<td></td>
<td>Fight Internet predators</td>
</tr>
<tr>
<td>Concealed Carry</td>
<td>Concealed carry</td>
</tr>
<tr>
<td>Congress Pay</td>
<td>Cut congressional salaries</td>
</tr>
<tr>
<td></td>
<td>Cut own pay</td>
</tr>
<tr>
<td></td>
<td>Increased own salary</td>
</tr>
<tr>
<td></td>
<td>Oppose Congress pay raise</td>
</tr>
<tr>
<td></td>
<td>Raise own pay</td>
</tr>
</tbody>
</table>

Continued
<table>
<thead>
<tr>
<th>Issue Category</th>
<th>Issue Stances</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constitution/Freedoms</td>
<td>American freedoms</td>
</tr>
<tr>
<td></td>
<td>Assault on Constitution/freedoms</td>
</tr>
<tr>
<td></td>
<td>Constitutional freedoms</td>
</tr>
<tr>
<td></td>
<td>Repeal 17th amendment</td>
</tr>
<tr>
<td></td>
<td>Repeal parts of Constitution</td>
</tr>
<tr>
<td></td>
<td>Take away right to vote</td>
</tr>
<tr>
<td>Debt/Deficit</td>
<td>Debt</td>
</tr>
<tr>
<td></td>
<td>Eliminate debt</td>
</tr>
<tr>
<td></td>
<td>Exploding national debt</td>
</tr>
<tr>
<td></td>
<td>Increased debt limit</td>
</tr>
<tr>
<td></td>
<td>Lower national debt</td>
</tr>
<tr>
<td></td>
<td>Massive debt</td>
</tr>
<tr>
<td></td>
<td>Mountains of debt</td>
</tr>
<tr>
<td></td>
<td>Obama/Pelosi bankrupting country</td>
</tr>
<tr>
<td></td>
<td>Public debt</td>
</tr>
<tr>
<td></td>
<td>Reckless debt</td>
</tr>
<tr>
<td></td>
<td>Reduce debt</td>
</tr>
<tr>
<td></td>
<td>Reduce deficits</td>
</tr>
<tr>
<td></td>
<td>Trillion dollar deficits</td>
</tr>
<tr>
<td>Earmarks</td>
<td>End pork barrel spending</td>
</tr>
<tr>
<td></td>
<td>Pork barrel politics</td>
</tr>
</tbody>
</table>

Continued
Table 10 continued

<table>
<thead>
<tr>
<th>Issue Category</th>
<th>Issue Stances</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economy</td>
<td>Foreclosures</td>
</tr>
<tr>
<td></td>
<td>Free enterprise</td>
</tr>
<tr>
<td></td>
<td>Grow economy</td>
</tr>
<tr>
<td></td>
<td>Get economy moving</td>
</tr>
<tr>
<td></td>
<td>Renew economy</td>
</tr>
<tr>
<td></td>
<td>Strengthen economy</td>
</tr>
<tr>
<td>Education</td>
<td>Close Department of Education</td>
</tr>
<tr>
<td></td>
<td>College out of reach</td>
</tr>
<tr>
<td></td>
<td>Education reform</td>
</tr>
<tr>
<td></td>
<td>Opposed teaching funding</td>
</tr>
<tr>
<td></td>
<td>Opposes college aid</td>
</tr>
<tr>
<td></td>
<td>Overcrowded classrooms</td>
</tr>
<tr>
<td></td>
<td>Teacher layoffs</td>
</tr>
<tr>
<td>Energy</td>
<td>Addiction to foreign oil</td>
</tr>
<tr>
<td></td>
<td>Cap-and-trade energy tax</td>
</tr>
<tr>
<td></td>
<td>Cap-and-trade legislation</td>
</tr>
<tr>
<td></td>
<td>Dependence on foreign oil</td>
</tr>
<tr>
<td></td>
<td>Energy tax</td>
</tr>
<tr>
<td></td>
<td>Investing in clean energy</td>
</tr>
<tr>
<td></td>
<td>National energy tax</td>
</tr>
<tr>
<td></td>
<td>New energy technology</td>
</tr>
<tr>
<td></td>
<td>Reverse green technology investments</td>
</tr>
<tr>
<td>Environment</td>
<td>Air and water protection</td>
</tr>
<tr>
<td></td>
<td>Global warming a myth</td>
</tr>
<tr>
<td></td>
<td>Protect the Bay</td>
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</tbody>
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Continued
<table>
<thead>
<tr>
<th>Issue Category</th>
<th>Issue Stances</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health Care</td>
<td>Against health care plan</td>
</tr>
<tr>
<td></td>
<td>Authored health care plan</td>
</tr>
<tr>
<td></td>
<td>Government takeover of health care</td>
</tr>
<tr>
<td></td>
<td>Health care system</td>
</tr>
<tr>
<td></td>
<td>Pelosi health care plan</td>
</tr>
<tr>
<td></td>
<td>Repeal health care</td>
</tr>
<tr>
<td></td>
<td>Voted for health care plan</td>
</tr>
<tr>
<td></td>
<td>Won't repeal health care</td>
</tr>
<tr>
<td>Government</td>
<td>Bigger government</td>
</tr>
<tr>
<td></td>
<td>Government corruption</td>
</tr>
<tr>
<td></td>
<td>More government</td>
</tr>
<tr>
<td></td>
<td>Protection from government</td>
</tr>
<tr>
<td></td>
<td>Reform Washington</td>
</tr>
<tr>
<td></td>
<td>Unnecessary programs</td>
</tr>
<tr>
<td></td>
<td>Washington accountability</td>
</tr>
<tr>
<td>Ideology</td>
<td>Conservative values</td>
</tr>
<tr>
<td></td>
<td>Liberal record</td>
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<tr>
<td></td>
<td>Independent</td>
</tr>
<tr>
<td></td>
<td>Independent route</td>
</tr>
<tr>
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<td>Insurance</td>
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Continued
### Table 10 continued

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<td>Control borders</td>
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<td>Illegal immigration</td>
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<td>Stop illegal immigration</td>
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<td>Sanctuary for illegals</td>
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<td>Secure borders</td>
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<td><strong>Jobs</strong></td>
<td>American jobs</td>
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<td>Better jobs</td>
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<td></td>
<td>Getting people back to work</td>
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<td></td>
<td>Grow jobs</td>
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<td>Job creation</td>
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<td>Job loss</td>
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<td>More jobs</td>
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<td><strong>Job Outsourcing</strong></td>
<td>Companies that outsource jobs</td>
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<tr>
<td></td>
<td>Jobs to China</td>
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<td></td>
<td>Loopholes that outsource jobs</td>
</tr>
<tr>
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<td>Outsourcing jobs</td>
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<td><strong>Lobbyists/Special Interests</strong></td>
<td>Money from special interest groups</td>
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<td>Sides with special interests</td>
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<td></td>
<td>Take on lobbyists</td>
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<td>Lose Medicare plans</td>
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<td>Protect Medicare</td>
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</tr>
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<td>Seniors lose doctors</td>
</tr>
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<td>Voted with Obama/Pelosi</td>
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<td>Voting with Pelosi</td>
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<td>Voting with party</td>
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<td>Reduce Social Security benefits</td>
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<td>Control spending</td>
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<td>Cut spending</td>
</tr>
<tr>
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<td>Cut waste</td>
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<td>Fiscal discipline</td>
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<td>Increased spending</td>
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<td>Less spending</td>
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<td>Massive spending</td>
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<tr>
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<td>More spending</td>
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<tr>
<td></td>
<td>Oppose spending</td>
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<tr>
<td></td>
<td>Out-of-control spending</td>
</tr>
<tr>
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<td>Reckless spending</td>
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<td></td>
<td>Reduce spending</td>
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<tr>
<td></td>
<td>Rein in spending</td>
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<td>Spending money</td>
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<td>Wasteful spending</td>
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<td>Stimulus that grows government</td>
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<td>Supported stimulus</td>
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<td>Cut taxes</td>
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<tr>
<td></td>
<td>End deductions for mortgages</td>
</tr>
<tr>
<td></td>
<td>Fight tax increases</td>
</tr>
<tr>
<td></td>
<td>Flat national income tax</td>
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<tr>
<td></td>
<td>Higher taxes</td>
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<td></td>
<td>Increased sales taxes</td>
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<td>Low taxes</td>
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<td>Lower taxes</td>
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<td>Low taxes for middle class</td>
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<td>More fees</td>
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<td>Opposed middle class tax cuts</td>
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<td>Raise property taxes</td>
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<td>Raise taxes</td>
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<td>Sales tax</td>
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<td></td>
<td>Saved taxpayers money</td>
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<td>Tax cuts for wealthy</td>
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<td>Tax increases</td>
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<td>Trade</td>
<td>Praising NAFTA</td>
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<td>Unfair trade deals</td>
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<td>Troops/Veterans</td>
<td>Body armor for troops</td>
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<td></td>
<td>Health care for veterans</td>
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<td>Supports veterans</td>
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<td>Unemployment</td>
<td>High unemployment</td>
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Continued
Table 10 continued

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<th>Issue Category</th>
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<td></td>
<td>Nancy Pelosi’s values</td>
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<tr>
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<td>Values back to Washington</td>
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<td>Women</td>
<td>Ban right to choose</td>
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<td>Mothers should not work</td>
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<td></td>
<td>No abortions for rape victims</td>
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<td>Trapped in abusive relationships</td>
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</table>
Appendix O: Candidate Pictures from Recognition Memory Test

Photo 1. Sanford Bishop. Test Item 1 (Ad 17).
Photo 2. Mike Keown. Test Item 1 (Ad 17).


Photo 5. Daniel Webster. Test Item 3 (Ad 13).

Photo 8. Mike Kelly. Test Item 6 (Ad 14).

Photo 10. Trent Van Haaften. Test Item 8 (Ad 12).


Photo 13. Dee Adcock. Test Item 10 (Ad 19).

Photo 15. Rick Berg. Test Item 11 (Ad 22).

Photo 17. Suzanne Kosmas. Test Item 13 (Ad 21).


Photo 22. Steve Israel. Test Item 16 (Ad 20).

Photo 24. Mo Brooks. Test Item 17 (Ad 1).

Photo 25. Walt Minnick. Test Item 18 (Ad 9).


Photo 29. Dave Loebsack. Test Item 21 (Ad 11).
Photo 30. Robert Hurt. Test Item 22 (Ad 3).

Photo 32. Paul Kanjorski. Test Item 24 (Ad 10).
### Table 11. Target and Foil Items

Note: Table 11 shows all of the target and foil items in the recognition memory test for each experimental ad stimuli. Each row represents one political TV ad. The first column lists the order in which the ads appeared in the recognition test. The second column shows the original ad number. The third column shows the name(s) of the candidate(s) featured in the ad. The far-right column shows the items in the recognition memory test. Bold typeface indicates target items.
Table 11 continued

<table>
<thead>
<tr>
<th>Recognition Test Item Number</th>
<th>Ad Number</th>
<th>Candidate Name(s)</th>
<th>Memory Items (target items in bold)</th>
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</thead>
<tbody>
<tr>
<td>5</td>
<td>2</td>
<td>Jesse Kelly</td>
<td>Air and water protection&lt;br&gt;<em>Cut taxes</em>&lt;br&gt;Protect Medicare&lt;br&gt;<em>Stop illegal immigration</em>&lt;br&gt;Take on special interests&lt;br&gt;<em>Unnecessary programs</em></td>
</tr>
<tr>
<td>6</td>
<td>14</td>
<td>Mike Kelly</td>
<td>Against health care plan&lt;br&gt;Cut waste&lt;br&gt;<em>End deductions for mortgages</em>&lt;br&gt;<em>Flat national income tax</em>&lt;br&gt;Reckless debt&lt;br&gt;<em>Supports bailout</em></td>
</tr>
<tr>
<td>7</td>
<td>7</td>
<td>Ciro Rodriguez</td>
<td><em>Against Wall Street bailouts</em>&lt;br&gt;Balanced budget&lt;br&gt;Companies that outsource jobs&lt;br&gt;<em>Tax credits for small business</em>&lt;br&gt;Voting with Pelosi&lt;br&gt;<em>Wall Street accountability</em></td>
</tr>
<tr>
<td>8</td>
<td>12</td>
<td>Trent Van Haafiten</td>
<td><em>Against child healthcare</em>&lt;br&gt;<em>Bloated budget</em>&lt;br&gt;Cap-and-trade energy tax&lt;br&gt;Foreclosures&lt;br&gt;<em>Higher taxes on business</em>&lt;br&gt;<em>Increased own salary</em></td>
</tr>
<tr>
<td>9</td>
<td>15</td>
<td>David Schweikert</td>
<td>Bigger government&lt;br&gt;Health care for veterans&lt;br&gt;Mothers should not work&lt;br&gt;<em>Opposes college aid</em>&lt;br&gt;<em>Overcrowded classrooms</em>&lt;br&gt;Teacher layoffs</td>
</tr>
</tbody>
</table>

Continued
<table>
<thead>
<tr>
<th>Recognition Test Item Number</th>
<th>Ad Number</th>
<th>Candidate Name(s)</th>
<th>Memory Items (target items in bold)</th>
</tr>
</thead>
</table>
| 10                           | 19        | Allyson Schwartz, Dee Adcock | Authored health care plan  
Cut taxes  
Higher insurance rates  
Out-of-control spending  
Protect Medicare  
Reduce senior benefits |
| 11                           | 22        | Earl Pomeroy, Rick Berg | Background check for child care providers  
Exploding national debt  
Fight Internet predators  
Medicare prescription drug plan  
Oppose spending  
Small businesses struggling |
| 12                           | 6         | Tom White          | Cut taxes  
Cut waste  
Debt  
Jobs to China  
More bailouts  
Nancy Pelosi's values |
| 13                           | 21        | Suzanne Kosmas, Sandy Adams | Encourage investment  
More fees  
Oppose Congress pay raise  
Remove hiring mandates  
Repeal parts of Constitution  
Take away right to vote |
| 14                           | 5         | Ann Kirkpatrick    | Against Wall Street bailouts  
Companies that outsource jobs  
Constitutional freedoms  
Cut congressional salaries  
Independent  
Tough campaign finance |
| 15                           | 18        | David Cicilline, John Loughlin | Balanced budget  
Illegal immigration  
Independent route  
Investing in clean energy  
Less spending  
Sanctuary for illegals |

Continued
Table 11 continued

<table>
<thead>
<tr>
<th>Recognition Test Item Number</th>
<th>Ad Number</th>
<th>Candidate Name(s)</th>
<th>Memory Items (target items in bold)</th>
</tr>
</thead>
</table>
| 16                           | 20        | Steve Israel, John Gomez | Job killing regulations  
|                              |           |                    | Supported stimulus  
|                              |           |                    | National energy tax  
|                              |           |                    | **Repeal health care**  
|                              |           |                    | Tax increases  
|                              |           |                    | **Voted with Pelosi**  |
| 17                           | 1         | Mo Brooks          | **American jobs**  
|                              |           |                    | Free enterprise  
|                              |           |                    | **Immigration policy**  
|                              |           |                    | Opposed middle class tax cuts  
|                              |           |                    | Renew economy  
|                              |           |                    | Take on lobbyists  |
| 18                           | 9         | Walt Minnick       | Business growth  
|                              |           |                    | Higher insurance rates  
|                              |           |                    | **Liberal record**  
|                              |           |                    | **More stimulus**  
|                              |           |                    | Praising NAFTA  
|                              |           |                    | **Voted with Obama/Pelosi**  |
| 19                           | 4         | Sean Bielat        | Education reform  
|                              |           |                    | **Grow economy**  
|                              |           |                    | Nancy Pelosi's values  
|                              |           |                    | **Stop job killing regulations**  
|                              |           |                    | **Stop spending**  
|                              |           |                    | Take on lobbyists  |
| 20                           | 23        | Dan Maffei, Ann Marie Buerkle | **Close Department of Education**  
|                              |           |                    | College out of reach  
|                              |           |                    | **Global warming a myth**  
|                              |           |                    | **Job creation**  
|                              |           |                    | Phase out Social Security  
|                              |           |                    | Reckless spending  |
| 21                           | 11        | Dave Loesbuck      | Exploding national debt  
|                              |           |                    | **Failed stimulus**  
|                              |           |                    | Higher taxes  
|                              |           |                    | Illegal immigration  
|                              |           |                    | **Millions to Wall Street**  
|                              |           |                    | New energy technology  |

Continued
<table>
<thead>
<tr>
<th>Recognition Test Item Number</th>
<th>Ad Number</th>
<th>Candidate Name(s)</th>
<th>Memory Items (target items in bold)</th>
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<tbody>
<tr>
<td>22</td>
<td>3</td>
<td>Robert Hurt</td>
<td>American freedoms</td>
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<td>Balanced budget amendment</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Companies that scam families</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Fight tax increases</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Job creation</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Stop spending</strong></td>
</tr>
<tr>
<td>23</td>
<td>16</td>
<td>Steve Southerland</td>
<td><strong>End Social Security for the disabled</strong></td>
</tr>
<tr>
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<td><strong>Medicare</strong></td>
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<td><strong>Repeal 17th amendment</strong></td>
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<td>Paul Kanjorski</td>
<td>Government corruption</td>
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<td></td>
<td>Irresponsible budget</td>
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<td></td>
<td><strong>Lose Medicare plans</strong></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Medicare cuts</strong></td>
</tr>
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<td></td>
<td></td>
<td><strong>Seniors lose doctors</strong></td>
</tr>
<tr>
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<td>Supported stimulus</td>
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</table>
Appendix Q: Models

Model 1
Level 1

Level 2

Model 2
Level 1

Level 2

Model 3
Level 1
Level 2

Model 4
Level 1

Level 2

Model 5
Level 1

444
Level 2

Model 6
Level 1 Model

Level 2 Model

Model 7
Level 1 Model

Level 2 Model

Model 8
Level 1 Model

Level 2 Model
Model 9
Level 1 Model

Level 2 Model

Model 10
Level 1 Model

Level 2 Model

Model 11
Level 1 Model

Level 2 Model
Model 12

Level 1 Model

Level 2 Model
Appendix R: Mediated Moderation Equations

Muller et al.’s (2005) three equations for establishing mediated moderation are shown below.

(1)

(2)

(3)

To establish mediated moderation, the following should occur. There should be an overall moderation effect. That is, in Model 1, should be significant. In the second and third models, one or both of the following should occur. First, and are both significant. Second, and are both significant.

The three equations required to test mediated moderation (applied to the current study) are shown below.

(1)

(2)

(3)

There should be an overall moderation effect. That is, in Model 1, (or ) should be significant. In the second and third models, one or both of the following should occur. First, (or ) and are both significant. Second, (or ) and are both significant.
Appendix S: Comparison vs. Positive Ads

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<td>1.58** (.14)</td>
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<td>-.30* (.13)</td>
<td>.25* (.12)</td>
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<td>.17# (.10)</td>
<td>.17# (.10)</td>
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<td>Partisanship</td>
<td>.30# (.17)</td>
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<td>.30# (.17)</td>
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<td>.28* (.14)</td>
<td>-.28* (.14)</td>
<td>-.28* (.14)</td>
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<td></td>
</tr>
<tr>
<td>Comparison X</td>
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<td>.27# (.14)</td>
<td>-.27# (.14)</td>
<td>.27# (.14)</td>
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Table 12. Comparison vs. Positive Ads.

Note: The four models in Table 12 include an interaction effect between Ad Type and Ad Sponsor and an interaction effect between Ad Type and individual-level Partisanship. The dependent variable is accurate recognition memory. Comparison Ads are represented using a dichotomous code (1 = Comparison Ad, 0 = Positive Ad). Ad Sponsor and Partisanship are both coded using dichotomous variables. Coding of these two variables for each model is indicated across the columns of the first row. For example, in Column 1, Democrats are coded as 0, Republicans are coded as 1, Democratic-sponsored ads are coded as 0, and Republican-sponsored ads are coded as 1. The conditional effect of
Comparison Ads on Memory at different levels of Ad Sponsor and Partisanship are shown across the four models.

# = $p < .10$

* = $p < .05$

** = $p < .001$
## Appendix T: Issues Mentioned by Ad Type

<table>
<thead>
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<th>Issue</th>
<th>Positive</th>
<th>Negative</th>
<th>Comparison</th>
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<tr>
<td>Banks/Wall Street</td>
<td>3</td>
<td>2</td>
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<tr>
<td>Bailouts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Budget</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Businesses/Corporations</td>
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### Table 13. Issues Mentioned by Ad Type

Note: Table 13 shows the number of target items in the recognition memory test pertaining to specific issue categories for each type of ad (Positive, Negative, and Comparison).
Table 13 continued

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Appendix U: Emotion Ratings

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<th>Arousal</th>
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Table 14. Emotion Ratings

Note: Table 14 shows the effect of self-reported Positivity, Negativity, and Arousal on Memory. The effect of self-reported Positivity, Negativity, and Arousal is shown in three separate models (indicated across the columns of the first row). The dependent variable is accurate recognition memory. The original measurement scales of the emotional response ratings (1 to 7) were converted to scales 0 to 6.

* = p < .05
** = p < .001
### Appendix V: Emotion as Outcome

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Table 15. Positivity as Outcome.
Table 15 continued

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<tr>
<td>N (Level 2)</td>
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Note: The four models in Table 15 include a 3-way interaction among Ad Type, Ad Sponsor, and individual-level Partisanship (as well as first order terms and 2-way interactions between these three variables) on participants’ self-reported emotional Positivity ratings of political ads. Ad Type is represented by dummy codes (with Positive Ads as the reference group). Ad Sponsor and Partisanship are both coded using dichotomous variables. Coding of these two variables for each model is indicated across the columns of the first row. For example, in Column 1, Democrats are coded as 0, Republicans are coded as 1, Democratic-sponsored ads are coded as 0, and Republican-sponsored ads are coded as 1.

# = p < .10
* = p < .05
** = p < .001
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Table 16. Negativity as Outcome.

Note: The four models in Table 15 include a 3-way interaction among Ad Type, Ad Sponsor, and individual-level Partisanship (as well as first order terms and 2-way interactions).
interactions between these three variables) on participants’ self-reported emotional Negativity ratings of political ads. Ad Type is represented by dummy codes (with Positive Ads as the reference group). Ad Sponsor and Partisanship are both coded using dichotomous variables. Coding of these two variables for each model is indicated across the columns of the first row. For example, in Column 1, Democrats are coded as 0, Republicans are coded as 1, Democratic-sponsored ads are coded as 0, and Republican-sponsored ads are coded as 1.

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Table 17. Arousal as Outcome

Note: The four models in Table 15 include a 3-way interaction among Ad Type, Ad Sponsor, and individual-level Partisanship (as well as first order terms and 2-way
interactions between these three variables) on participants’ self-reported emotional Arousal ratings of political ads. Ad Type is represented by dummy codes (with Positive Ads as the reference group). Ad Sponsor and Partisanship are both coded using dichotomous variables. Coding of these two variables for each model is indicated across the columns of the first row. For example, in Column 1, Democrats are coded as 0, Republicans are coded as 1, Democratic-sponsored ads are coded as 0, and Republican-sponsored ads are coded as 1.

# = p < .10
* = p < .05
** = p < .001