

The Importance of Interactions in Campaigns

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Abstract

I argue that campaigns are characterized by two kinds of interactions: between candidates and voters, and between opposing candidates. The campaign effects literature generally treats the relationship between candidates and voters as unidirectional, with campaign strategies presumed to affect voter attitudes. The literature on candidate strategy emphasizes factors exogenous to the campaign rather than the possibility that a candidate's strategy depends on the opponent's strategy. I discuss why interaction should exist and focus on the domain of negative campaigning to test for the presence of interaction. Using polling and advertising data from the 2000 presidential races, as well as advertising data from the 2000-2002 House and Senate races, I show that while shifts in the tone of a candidate's or party's campaign do not derive from, or lead to, shifts in the polls, they often depend on a previous shift in the tone of the opposing campaign.

“...my starting presumption is a simple one: a complete understanding of what ordinary citizens think about politicians will be out of reach until political psychologists take into account the strategic interplay between elites and the mass public”

- McGraw (2003: 395)

“When someone comes after you, you have to go back at them.”

- Bill Clinton, on “The Daily Show,” August 9, 2004

Introduction

Political campaigns involve what McGraw calls a “strategic interplay between elites and the mass public.” Public opinion shapes the campaign strategy, and parties and candidates intend their strategic decisions to influence public opinion. At the same time, campaigns involve one candidate’s or party’s responding to the other candidate or party. Campaigns thus involve two kinds of interaction—that between the public and the candidates and parties, and that between the opposing candidates and parties. The fundamental question addressed in this paper is whether the tone of a campaign—its negativity or positivity—manifests evidence of interaction. If so, a candidate’s decisions about the appropriate mix of positive and negative campaigning will depend on his or her standing in the polls and on the opponent’s tone. The candidate’s strategy at any point in time may then have later consequences for how both the public and the opponent responds.

Political scientists know comparatively little about the incidence and extent of interaction among opposing candidates, parties, and the public. Research on the relationship between campaign strategy and public opinion focuses mostly on the effects of the former on the latter, and does not show how strategy might actually respond to opinion. Moreover, theories of candidate strategy focus not on interaction but on factors that are already “in place” before the campaign begins, such as the presence of an incumbent and the record of competing parties and candidates. These factors are undoubtedly important but are not well-suited to a dynamic conceptualization of campaign strategy and effects. Thus, a more fully developed theory of campaign strategy should incorporate

both exogenous factors and the interplay among elites and the mass public during the campaign itself.

Extant Theories of Negative Campaigning

Theories of candidate strategy tend to accentuate factors exogenous to the campaign and rarely take into account the possibility of interaction during the campaign itself. This generalization is evident in much research on negative campaigning.¹ Its central prediction is that front-runners should engage in less negative campaigning than underdogs (Harrington and Hess 1996; Skaperdas and Grofman 1995).² As Jacobson (2004: 91) puts it, “Challengers certainly hope to convince people of their own virtues...but they are not likely to get far without directly undermining support for the incumbent.” This depiction is borne out in empirical investigations of negative campaigning in U.S. elections (Damore 2002; Kahn and Kenney 1999; Lau and Pomper 2004; Sigelman and Buell 2003; Theilman and Wilhite 1998).³

Extant models, however, do not build in Clinton’s admonition to “go back at them.” In Harrington and Hess’ (1996) model, “candidates choose their campaign strategies simultaneously” (216). Although Skaperdas and Grofman’s (1995) model does allow for strategic interaction—see their Figure 1 (p.53)—their closed-form equilibrium solution generates comparative statics that do not capture whether one candidate’s strategy should hinge on the other’s.⁴ At least three empirical

¹ Prominent accounts of candidate’s position-taking (Downs 1957) and issue emphasis (Petrocik 1996) also tend to emphasize exogenous factors—in these cases, the position of the proverbial median voter and the historical record of political parties, respectively. However, the possibility of interaction has been incorporated the decision to run for office in the first place (Carson 2003) and the dynamics of campaign fundraising (Himmelberg and Wawro 1998; Krasno, Green and Cowden 1994).

² Polborn and Yi’s (2006) model generates different kinds of predictions about when candidates campaign negatively—principally, when either they or their opponents are “weak” on the dimensions stipulated in the model. They do not engage the question of interaction.

³ One study of two Russian campaigns (Sigelman and Shiraev 2002) finds mixed support for the idea that the frontrunner will attack less than his opponent.

⁴ Instead, the volume of negative campaigning depends on the fraction of undecided voters, the opponent’s initial support, and the effectiveness of negative campaigning in damaging the opponent (see their proposition 4, p. 53).

studies, however, have found that the volume of negativity in a candidate's campaign depends on the opponent's volume of negativity (Carsey et al. 2006; Damore 2002; Lau and Pomper 2004). Lau and Pomper conclude: "It is clear from this analysis that Senate candidates, at least from 1992 to 2002, believed they had to retaliate against attacks on almost a one-to-one basis" (36).⁵ However, none of these studies, with the exception of Carsey et al. (2006), employ over-time data that allow a dynamic portrait of interaction. For example, Lau and Pomper analyze aggregated measures of negativity over the entire campaign.

With regard to the interaction between candidates and voters, studies of campaign tone have focused largely on how negative campaigning affects voters—e.g., voter turnout (*inter alia*, Ansolabehere and Iyengar 1995a; Lau et al. 1999), vote choice (Lau and Pomper 2004), and electoral outcomes (Lau and Pomper 2004). No study has incorporated public opinion as both a cause and consequence of negative campaigning, beyond using pre-election polls as a measure of a race's competitiveness (Kahn and Kenney 1999). By contrast, this paper engages this kind of interaction: do shifts in the polls lead candidate to adjust their tone, and do these adjustments in turn affect the polls?

Why Incorporate Interaction between Candidates?

Do candidates attend to what their opponents are saying? Several pieces of evidence suggest that they do. First, as noted above, there is an association between the volume of attacks by opposing Senate candidates. Second, anecdotal evidence abounds, as indicated by the epigraph from President Clinton.⁶ Scholars and observers describe a similar dynamic. For example, Ansolabehere

⁵ Kahn and Kenney (1999) do not find similar evidence of interaction, though their measure of the opponent's strategy is based on an interview with the campaign manager, not on any measurable campaign output, such as advertising.

⁶ In the "Daily Show" interview, Clinton elaborated more on the need to counter-attack. First, he suggested that John McCain should have responded more directly to the accusations leveled at him during the 2000 presidential primary: "Senator McCain, whom I admire very much, made a big mistake not bashing the Bush campaign over the attacks on his

and Iyengar (1995b) argue that the effects of one candidate's advertising will "depend to a great degree upon characteristics of the opponent's advertisements" (110). Their advice to candidates is to "design advertisements after anticipating the opponent's moves" (111). Others also characterize campaigns as fundamentally interactive:

Campaigns have become a blitz of competing ads, quick responses, and counter-responses. Ads have become serial in nature, with each ad building thematically on previous spots. Electoral campaigns feature strategic interactions that are as important as the individual ads themselves. (West 2005: 20)

[O]ne day's set of TV ads for one candidate [is] followed soon after by his opponent's set of counterads, and the process [is] repeated several times in an intricate series of tactical moves. (Alan Ehrenalt, quoted in Jacobson 2004: 88)

Incumbents also adjust to opponents' campaign tactics once their effectiveness has been demonstrated. For example, counterattack or, better yet, preemptive assaults on the challenger's character and credibility has replaced the older practice of ignoring personal attacks. (Jacobson 2004: 97)

Although these kinds of observations are commonplace, it is important to consider carefully the origins of interaction, especially with regard to negative campaigning. Why would candidates respond to negative campaigning with attacks of their own? One reason is arguably expressive in nature, while another is instrumental. First, candidates are invested in their own experiences, values, and policy positions and dislike having them criticized by their opponent. They may feel compelled to respond to an attack, irrespective of whether they believe the attack or the response will affect their election prospects. The second, instrumental motivation derives from the familiar portrayal of candidates as seekers of (re)election. Guided by this motivation, candidates tend to believe that responding to an attack is a must.

service...He made a huge mistake in not bashing them for that calling operation saying that he had adopted a black baby." Clinton also characterized his presidential campaign, famous for its war room, as better at rebutting attacks: "In 1992 we were very good at it, and it worked. Whenever they hit me, I hit them back. Whenever they came up with a charge didn't believe was true, I answered back." Referring to the Democratic campaign in 2004, he continued, "And that's what we have to do this time."

The existence of expressive motives is well-known characteristic of mass behavior—e.g., the role of civic duty in the calculus of voting (Riker and Ordeshook 1968)—and also candidate behavior, e.g., the influence of commitments to policy (Wittman 1983; Calvert 1985). More broadly, candidates are personally invested in who they are, what they believe, and what they have accomplished. They have an intrinsic commitment to their experiences, values, and record. When criticized by opponents, candidates may feel compelled to defend their honor and correct what they perceive as insults, misrepresentations, or even outright lies. Even when the costs of an attack or counter-attack are high—as in actual warfare—expressive motives affect behavior. Historian Donald Kagan writes, “The reader may be surprised how small a role...considerations of practical utility and material gain...play in bringing on wars, and how often some aspect of honor is decisive” (quoted in O’Neill 1999: 85-86). O’Neill (1999) argues that both challenges to honor and insults can provoke interstate conflicts. A similar process—again, absent any ostensible material benefits—could be part of an electoral campaign.

Candidates also engage in attacks and counter-attacks because of instrumental concerns. I argue that candidates tend to believe that ignoring attacks is detrimental to their chances of winning. Even though candidates who are considering a counter-attack exhibit uncertainty about its consequences, they are willing to take the risk that it may fail or backfire. Basic findings from prospect theory (Tversky and Kahneman 1991) help explain this result.

When attacked, a candidate’s first task is to determine whether the attack is likely to damage his or her campaign. Scholarly evidence suggests no definitive answer to this question. Lau and Pomper (2004: 53) write, “A full accounting of the evidence suggests that, as often as not, attacking the opponent can be as dangerous in campaigns as throwing a boomerang in the wilderness.” In other words, the attack could just as likely backfire on the candidate as it could hurt the opponent; this backlash may even be the most common outcome (Lau et al. 1999). However, despite this

evidence, those involved in the day-to-day campaign decision-making, specifically professional consultants, are likely to believe that attacks work. Indeed, negative campaigning exists in general because of its perceived effectiveness. As one campaign consultant put it, “People say they hate negative campaigning. But it works. They hate it and remember it at the same time. The probability with positive is that you have to run it again and again to make it stick. With negative, the poll numbers will move in three or four days” (quoted in Jacobson 2004: 93). Perloff and Kinsey’s (1992) survey of consultants revealed that consultants tend to agree that “people remember negative information better than positive information.” This idea serves to create a general belief that an attack causes damage.⁷

The question then becomes whether to counter-attack. There is no definitive answer to this question. A counter-attack could blunt the original attack, resulting in no net gain or loss for either candidate. It could fail to blunt the attack, advantaging the opponent. It could even exacerbate the attack by drawing attention to the opponent’s claims, by giving the impression that those claims merit a response, or because it is perceived as desperate, ill-conceived, or petty.⁸

Thus, candidates face the following situation. Having been attacked, they and their advisors believe that the attack will cause damage. For the sake of illustration, assume that, absent any

⁷ One might counter that in most campaigns, the outcome is never in doubt—e.g., because House incumbents win the vast majority of their races—and thus candidates have no reason to fear that their opponent’s attacks will have serious consequences. Yet, despite the well-known advantages of incumbency, Fenno (1978: 10-11) describes members of Congress as perennially running scared: “House members see electoral uncertainty where outsiders would fail to unearth a single objective indicator of it.” Even those virtually assured of reelection “can always find some reasons to feel insecure” (14; see also Maestas 2003; Kingdon 1966: 86-89). On the general role that uncertainty plays in candidate strategy, see, *inter alia*, Burden (2003) and Downs (1957).

⁸ John Kerry’s 2004 presidential campaign exemplifies uncertainty about how to respond to an attack, in this case the ads aired by the Swift Boat Veterans for Truth (*Newsweek* 2004). Kerry’s pollster, Mark Mellman, and former campaign manager, Jim Jordan, believed that the Swift Boat ads were hurting Kerry. But Kerry’s campaign manager, Mary Beth Cahill, and media consultant, Bob Shrum, believed that “to respond to the ads would be to dignify them” (92). Stephanie Cutter, the director of communications, believed that “the campaign didn’t need to give the Swift Boat vets any more attention than they were already getting” (92). Meanwhile, John Edwards “wanted to take a swipe at the Swifties.” Kerry’s daughters were “frustrated.” Kerry’s first wife was even ready “to speak out and personally answer the Swift Boat charges” (92). Kerry himself “wanted to blister the Swift Boat vets” in a speech before the Veterans of Foreign Wars, but Cahill and Shrum worried that doing so would make him “seem too bitter and angry” (92). Ultimately, the Kerry campaign’s failure to respond forcefully—even as his poll standing dropped in the weeks when these ads made headlines—gave rise to the belief that a quick counterattack would have been the better strategy.

response, the candidate will lose 5 points in the polls. Launching a counter-attack could succeed, in which case assume that the candidate is no worse off than before the attack—a shift of 0 points in the polls. On the other hand, the counter-attack could make the candidate worse off. Thus, the result of the counter-attack would be an even greater loss, say, 10 points in the polls.

Thus the candidates face a choice between a loss of 5 points, and the chance either to lose 0 points or to lose 10 points by counter-attacking. Assume for the moment that there is an equal probability of the counter-attack's success or failure—i.e., a .50 probability of no net gain or loss, and a .50 probability of a 10-point loss. What then would a candidate do? If expected utility theory were operative, the candidate would be indifferent between responding and not responding. However, Tversky and Kaheman (1991) argue that people tend to be risk-averse when in the domain of gains and risk-acceptant in the domain of losses. For example, faced with a certain \$100 gain or a lottery with an equal chance of winning \$0 or \$200, people tend to take the \$100, but faced with a \$100 loss or a lottery with an equal chance of losing \$0 or \$200, they tend to take their chances with the lottery. In the electoral context, the belief that negative campaigning works means that the attacked candidate is in the domain of losses, and will thus be willing to accept the risks that a counter-attack will fail for the possibility that it will succeed.⁹

In practice, the likelihood of counter-attacking is probably even greater than this example suggests. Although the example assumes that the counter-attack will fail or succeed with equal probability, conventional wisdom among political consultants is that a direct response to a counter-attack is almost always necessary, implying that they believe the positive consequences of counter-attacking are much more likely than any negative consequences. When confronted with the statement that “A candidate should ignore attack ads made by an opposing candidate,” the political

⁹ A similar logic may explain why candidates raise and spend considerable sums of money, even though the effectiveness of campaign expenditures is much debated (see, e.g., Green and Krasno 1988, 1990; Jacobson 1978, 1990). If candidates believe that additional dollars procure additional votes, then candidates should try, as much as possible, to match their opponent's fundraising.

consultants surveyed by Perloff and Kinsey (1992) almost unanimously endorsed counter-attacking. Writings by consultants themselves echo this viewpoint. In *Campaigns and Elections*, the professional magazine of political consultants, counter-attacks are routinely advised. Sweitzer (1990) advises a fellow consultant whose boss will not take the opponent's negative attacks seriously to "do everything you can to talk your boss into responding, and pray that the day before the election, mailboxes aren't filled with direct mail pieces shaped like coffins." Confronted with a similar question, Varoga (1999) writes, "Time warp alert: sounds like Michael Dukakis. The only solution (and conventional wisdom everywhere but your campaign): counterpunch, counterpunch, counterpunch. When you fail to respond, you lose." Pollack (2006) echoes this sentiment: "As we tell all of our candidates, one of the first rules of politics is to never let an attack go unanswered."¹⁰ The author of a book on campaign strategy puts it more bluntly: "If you are attacked and do not respond, you are assumed guilty" (Shaw 2000: 223). If candidates take their consultants' advice, we should observe, on average, a positive relationship between the tone of opposing candidate's campaigns.

Data and Measurement

To test whether and when candidate attacks interact, and how public opinion affects and is affected by candidate strategy, the data must be ordered over time within a campaign, not just summaries of candidate behavior over the entire campaign or summary measures of public opinion such as vote shares. To investigate the relationship between strategy and public opinion, I focus on the 2000 presidential general election. The public opinion data are internal tracking polls conducted

¹⁰ Of course, there is no consensus among consultants that every attack deserves a response. Doak (1995) argues that no response is necessary if the attack is not hurting the candidate it is targeting. The challenge, of course, is ascertaining with certainty that the attack is not working.

by the campaign of George W. Bush.¹¹ On August 20 or thereabouts, the Bush campaign began monitoring opinion in numerous battleground states. In 9 states (Florida, Illinois, Iowa, Louisiana, Michigan, Missouri, New Mexico, West Virginia, and Wisconsin) there are adequate polling data over the course of the fall.¹² These internal polls contain more respondents in these states than the public tracking polls.¹³ Moreover, the Bush campaign ascertained the media market in which each respondent lives, which enables a match of advertising strategy in each market to public opinion in that market. Finally, and perhaps most importantly, these are the data that at least one of the candidates and his team were looking at when devising strategy. Assuming that the Gore and his team were looking at roughly comparable data, these polls best capture the information likely to influence the candidates' decision-making. I measure opinion as Gore's percentage of the two-party vote in the standard vote intention question, averaged across the polls for that week.¹⁴

To gauge candidate strategy, I employ television advertising data from the 2000 presidential campaign and from House and Senate general election campaigns in both 2000 and 2002. These data were collected by the Wisconsin Advertising Project, which monitored the top 75 media markets in 2000 and the top 100 markets in 2002.¹⁵ For the House and Senate, I focus on the 209 campaigns in 2000-2002 where both parties and/or candidates aired advertisements. The

¹¹ I thank Daron Shaw for generously sharing these data.

¹² In several states, the polling data covers only a handful of days: Arizona, Arkansas, Georgia, Kentucky, Maine, North Carolina, Ohio, Oregon, Tennessee, and Washington. I was unable to obtain a complete data file for Pennsylvania. Unfortunately, similar data is not available for House and Senate races, which is why I focus only on the presidential race.

¹³ For example, the Gallup tracking poll, which was in the field from September 4 until November 6, had 4,603 respondents in Florida, whereas the Bush polls (fielded August 27 to October 25) had 6,077. The gap is even larger in small states—e.g., in West Virginia, Gallup had 654 respondents and the Bush campaign 3,111.

¹⁴ Two other details about this measure are in order. First, for the occasional week when the Bush campaign did not poll in a particular state, I replace the missing data with the value for the previous week. This assumes that the campaign would consider the old polling data in making any strategic decisions during the week they did no polling. Second, in computing Gore's percentage of the vote, I weight by turnout intention, using a measure developed by the Bush campaign team that captures the likelihood of turnout on a 0-1 scale. I assume that the campaigns care more about likely voters than respondents as a whole.

¹⁵ The data collection was under the direction of Professor Kenneth Goldstein and Joel Rivlin of the University of Wisconsin-Madison. These data also include media tracking data from the Campaign Media Analysis Group. The Wisconsin Advertising Project was sponsored by a grant from The Pew Charitable Trusts. The opinions expressed in this article are the author's and do not necessarily reflect the views of the Campaign Media Analysis Group, the Wisconsin Advertising Project, Professor Goldstein, Joel Rivlin, or The Pew Charitable Trusts.

advertising data include not only the volume of ads but also their content (in this case, their tone). The further advantage of the House and Senate data is that the large number of campaigns allows for more generalizable findings than would a study of any single campaign.¹⁶

Television advertising is not the only window into candidate strategy. One could employ the statements of candidates and their campaign spokespersons in newspapers, as do Lau and Pomper (2004) and Sigelman and Buell (2003, 2004). However, newspapers and television news do not necessarily provide an accurate picture of what candidates did and said (see, *inter alia*, Patterson 1993). There are two particular disadvantages of using media coverage to measure the interaction between candidates. First, the kind of interaction that appears in the news media costs candidates very little. Candidates can easily dispatch spokespersons to speak to reporters and contradict claims made by their opponents; indeed, campaigns have developed “war rooms” and “rapid response” teams to do so quickly. But unless candidates invest significant resources in these rebuttals, this pattern of claim and counter-claim may reflect only a superficial ebb-and-flow of tactics, rather than a true strategic shift. By contrast, responding to an opponent by including a message in televised advertising signifies greater investment. Second, candidates may not have intended interactions observed in the context of a news story. In the spirit of objectivity, reporters will typically consult with the opposing sides of any conflict and allow each to air its views. Thus, a particular instance of “interaction”—in which, for example, a reporter quotes Candidate A making an accusation and a spokesperson for Candidate B rebutting it—may have arisen only because the reporter called B’s campaign and asked for a response. Journalists, not the candidates, have induced the apparent interaction. Television advertising does not suffer from this problem, as journalistic norms do not affect its content and volume.

¹⁶ The CMAG data do not capture races whose ads aired in small media markets, which excludes a few states altogether, such as South Dakota. However, the “missing” races in the CMAG data are likely mostly races that had no advertising at all.

To measure campaign tone, I rely on a variable created by the Wisconsin Advertising Project, whose coders ascertained whether the ad’s “primary purpose” was to “promote a specific candidate,” “attack a candidate,” or “contrast the candidates.”¹⁷ I refer to these types of ads as “positive,” “negative,” and “contrast,” respectively. For the 2000-2002 House and Senate campaigns that featured advertising from both sides, 55% of candidate ads were positive, 27% were negative, and only 18% were negative. The party committees’ ads were predominantly negative (61%) or contrast (20%), confirming Jacobson’s (2004: 93) observation that candidates are more likely to “take the high road,” while parties “do the dirty work.” In approximately two-thirds of races, challengers aired a higher proportion of negative and contrast ads than their incumbent opponents. Challengers also tended to air the first negative or contrast advertisements. This bears out the notion that underdogs attack more than front-runners.¹⁸

Using this variable, I generated an overall measure of tone. This formula is the difference between the number of positive airings and the number of negative airings, with a “weighted” number of contrast airings added to the number of positive and negative airings because contrast ads contain both positive and negative themes. In 2002, the Wisconsin Advertising Project asked coders, “If the ad is a contrast ad, what proportion of the ad promotes (as opposed to attacks) a candidate?” Approximately 25% of contrast airing were considered “more promote than attack,” 43% “more attack than promote,” and 32% “about equal promote and attack.”¹⁹ This measure is not available in 2000, but assuming that similar proportions obtained in that year, the omnibus measure of tone is:

¹⁷ In the 2000 dataset, this is the variable q14; in 2002, it is the variable “ad_tone.”

¹⁸ I also compared the winners of open-seat races to the losers of these races, under the assumption that the latter were likely the underdogs and the former the front-runners. However, the 63 open-seat races were evenly divided between those that featured more negative and contrast advertising from underdogs, and those that featured more such advertising from front-runners. Two other findings are also worth mentioning: the fraction of negative and contrast ads is higher in more competitive races (see also Damore 2002; Kahn and Kenney 1999; Lau and Pomper 2004) and tends to increase over time as the campaign progresses (see also Damore 2002).

¹⁹ This is the variable “cont_prp.”

$$\text{Tone} = [P + (.25 \times C)] - [N + (.43 \times C)]$$

Where P, N, and C are the number of positive, negative, and contrast airings, respectively. Thus, as the value of this measure increases, the tone of the campaign becomes more positive. I construct this tone measure separately for the Democratic and Republican candidates and the party committees (DNC, RNC, etc.).²⁰

Methodology and Model Specification

The data are structured as a time-series cross-sectional (TSCS) dataset. The appropriate time-series unit depends on the “periodicity” of candidates’ and parties’ response to each other and to public opinion. Candidates could continually monitor each other’s advertising and respond quickly. For example, after the 2006 midterm election, the *New York Times* reported that Senator Charles Schumer, head of the Democratic Senatorial Campaign Committee, “established what he called a 24-hour rule: If Republicans ran an advertisement attacking a Democratic candidate, a response had to be on the air within 24 hours.” This is possible if the campaign has already purchased advertising time on stations in the relevant media markets and if the response necessitates little research and production time. If this is an accurate characterization of campaign decision-making, then the appropriate time-series unit is the day.

However, candidate interaction may not occur so quickly. A variety of factors may lead campaign interaction to occur on a weekly rather than daily basis. One is resource limitations, as most campaigns cannot afford to poll so frequently as to get reliable daily samples. A second is the logistics of producing television advertisements and buying advertising time. A third is the

²⁰ The CMAG data do contain variables capturing whether the ad featured footage of an opponent’s ad and whether the ad contained a rebuttal. In 2000, 14 percent of ad airings in House and Senate races met one or both of these criteria. In 2002, 16 percent of ads did so. However, interaction need not entail a specific rebuttal. An attack can be met with a counter-attack on a different subject—e.g., Candidate Smith says “My opponent is soft on crime” and Candidate Jones says “My opponent wants to cut Medicare benefits.” This is why I prefer to measure overall tone.

campaign team's belief that it is not always necessary to respond to an attack today with a counter-attack tomorrow, especially if there are other, less costly ways of responding—e.g., via faxes to news organizations, videos posted to a campaign website, and so on. During the 2000 campaign, the Bush team typically made decisions about ad content on a weekly basis, reviewing the tracking polls over the weekend and making any adjustments to advertising strategy by Monday (personal communication with Daron Shaw). Thus, I also employ the week as the time-series unit. For analyses that include the Bush campaign tracking polls, I rely exclusively on weekly data, for these were the polling data examined by the Bush campaign team and, presumably, the Gore team as well.

In the 2000 presidential campaign, the cross-sectional (or panel) unit is the media market. I rely on the media market in light of indicators the Bush team was sensitive to the dynamics within markets and adjusted their advertising content accordingly (personal communication with Daron Shaw). In the analysis of the daily advertising data, I include only markets with at least 21 days of advertising. For Bush and Gore advertising, I include only ads that aired after August 20, when both candidates began polling and airing ads in earnest.²¹ There are 37 media markets with advertising data and 17 markets with both advertising and polling data.²² For DNC and RNC advertising, I include only ads that aired after June 11, when both parties began advertising. There are 45 media markets with advertising data and, as before, 17 markets with both advertising and polling data. (See Appendix Table A-1 for further information about the samples.)

In the 2000-2002 congressional campaigns, the panel unit is the race. To maintain comparability with the 2000 presidential campaign, I include only races with at least 3 weeks of

²¹ This excludes a brief spate of Bush advertising between July 20-30.

²² I eliminate markets which had only small numbers of respondents in the tracking polls. The remaining markets had at least an average sample size of 50 in each week (see Table A-1), and in most cases much more. One of these markets, St. Louis, spans two battleground states, Missouri and Illinois. Thus, I average together the vote intentions of respondents in both states to generate an estimate for this market, assuming that Bush and Gore would be equally concerned about their poll numbers in each state when formulating strategy.

advertising and only airings that occurred on or after August 20.²³ In 2000 and 2002, 80 and 94 House and Senate races, respectively, featured advertising from opposing candidates, and 36 and 46 races, respectively, featured advertising from opposing party committees.

To test for the presence of interaction, I estimate a series of panel vector auto-regression models. This model is similar in spirit to a standard vector auto-regression, or VAR (see Freeman, Williams, and Lin 1989). VAR models are useful when theory does not impose strong assumptions about the direction of causality. These models are well-suited to the current analysis, where the central hypothesis is that there is an ongoing interaction between opposing candidates, and between each candidate and public opinion. The panel component arises because, unlike in a traditional VAR model, there are multiple cross-sectional units: markets in the 2000 presidential election, and races in the 2000-2002 House and Senate elections. Much as in a traditional time-series cross-sectional analysis—e.g., where country-years are the unit of analysis—one must account for heterogeneity that may arise across cross-sectional units. The panel VAR model accomplishes this within the VAR framework. Appendix A provides more details about the model.²⁴ For the purposes of illustration, the equations estimated for the 2000 presidential campaign are:

$$r_{it} = \beta_1 d_{i,t-1} + \beta_2 p_{i,t-1} + \alpha_i + u_{i,t}^r \quad (1)$$

$$d_{it} = \beta_1 r_{i,t-1} + \beta_2 p_{i,t-1} + \alpha_i + u_{i,t}^d \quad (2)$$

$$p_{it} = \beta_1 r_{i,t-1} + \beta_2 d_{i,t-1} + \alpha_i + u_{i,t}^p \quad (3)$$

²³ In 2000, only 8 percent of the ads aired before this date (in 2002, 5%).

²⁴ These models were estimated in Stata 9.0 using code that was graciously provided by Lea Zicchino (see Love and Zicchino 2006).

where r_{it} is the tone of the Republican candidate or party, d_{it} is the tone of the Democratic candidate or party, p_{it} is Gore's standing in the polls, α_i is the fixed effect of each cross-sectional unit, and $u_{i,t}$ is an error term. The panel VAR model transforms the data via a differencing procedure so as to remove the α_i and then, via a generalized method of moments estimator, obtain estimates of β_1 and β_2 . In the weekly data, the independent variables are lagged one week; in the daily data, I similarly include one week's worth of lags. This strategy assumes that decisions in campaigns reflect recent events much more than distant events. Candidates are thus reacting to what their opponents did in the past week, not to their opponent's actions in the more distant past. Given that candidates will likely believe that waiting to respond to an opponent's attacks is risky—and, similarly, that waiting to address lagging poll numbers is also risky—this assumption seems warranted. I discuss the results of alternative lag specifications below.

In what follows, I present a series of impulse-response functions, which are a standard way to present the substantive effects of variables in VAR models.²⁵ Impulse-response functions represent the effect of a one-standard-deviation “shock” in an independent variable on the dependent variable. In other words, these functions show, for example, the effect on Gore's advertising tone, *ceteris paribus*, of a sudden “shock” of negativity in Bush's advertising tone. For each function, I also present a 95 percent confidence interval.²⁶

Do Candidates and Parties “Hit Back”?

²⁵ The coefficients and standard errors from these models are available from the author upon request. As Brandt and Williams (2007: 64–65) note, the coefficients mean nothing in and of themselves, and thus are typically not presented. The impulse-response functions are orthogonalized via the Cholesky decomposition. This accounts for the fact that variance-covariance matrix of the disturbances is non-diagonal, making it impossible to separate the effects of a “shock” in any one regressor. By purging the disturbances of correlation, the substantive significance of each regressor can be presented, holding “constant” the effects of the other regressors. The confidence intervals are generated by a Monte Carlo simulation (see Love and Zicchino 2006).

²⁶ In the results presented below, the variables are ordered as follows: Republican candidate or party, Democratic candidate or party, and polling data (when available). All of the results are robust to alternative orderings of the variables. See Brandt and Williams (2007: 40) on the potential effects of ordering.

The 2000 Presidential Campaign

Figures 1 and 2 present the impulse response functions for the 2000 presidential campaign. Figure 1 derives from models of the daily data, and Figure 2 from models of the weekly data, which include the tracking polls as well. There are separate models for Bush and Gore and for the Republican and Democratic National Committees (RNC and DNC).

[insert Figure 1 about here]

In Figure 1, the first two plots present the responses of Bush and Gore's tone to their own shocks. These demonstrate, unsurprisingly, that each candidate's tone is strongly dependent on its own lagged values. A shock in tone produces an immediate effect that decays fairly rapidly over the subsequent week. More interesting, of course, are the effects of one candidate's tone on the other. The second row of Figure 1 suggests that Bush and Gore evinced a pattern of strategic interaction, though in a complex fashion. Positive shifts in Gore's tone had a positive and statistically significant effect on Bush's tone. Conversely, then, an increase in the negativity of Gore's tone was associated with a similar increase in Bush's tone. The effect of this shift in Gore's tone was evident in the first three days, then subsided, and then emerged again at week's end. A tentative interpretation is that changes in Gore's strategy may have led, on average, to both an immediate and a more delayed response. To be sure, the effect of shifts in Gore's tone was not as large as the response of Bush's tone to its own shocks, but it demonstrates that Bush's strategy was attentive to Gore's, engendering an attack-and-counterattack pattern. However, the apparent effect of Bush's tone on Gore's tone was precisely the opposite: if Bush shifted towards a more positive tone, Gore's tone actually became more negative. Figure 1 shows that a positive shock in Bush's tone was associated with an immediate and fairly durable downward shift in Gore's tone. This pattern suggests that Gore's attacks on Bush were not necessarily a direct response to attacks from Bush.

The lower half of Figure 1 presents similar impulse response functions for the Republican and Democratic National Committees. The responses of RNC and DNC tone to their own shocks are positive and statistically significant, though they declined markedly over time. The last row of plots depicts interaction between the opposing party committees. In both cases, shifts in one party's tone were associated with a similar shift in the other's tone. Although the magnitude and duration of these shifts varied—the response of the DNC's tone is larger and persists a little bit longer—the overall pattern suggests a sort of tit-for-tat pattern among the party committees.

To confirm these results, I estimated separate VAR models for each market and then, using Granger causality tests, determined whether there was a significant relationship between the opposing candidates' or party committees' tone—defined as a p-value less than .05 for the F-statistic in the Granger test. For Bush and Gore, the vast majority of markets (85%) manifested evidence of interaction. In 42 percent of markets, the interaction was “symmetrical”: each candidate's tone affected the other's. In 27 percent of markets, Gore's tone affected Bush's but not vice versa. In 15 percent of markets, Bush's tone affected Gore's but not vice versa. Similar results held for the party committees. Most importantly, interaction was apparent in 69 percent of markets. Thus, both the panel VAR models presented in Figure 1 and a series of unpooled, market-specific VAR models suggest interaction.

Figure 2 displays the impulse response functions for the models of the weekly data. Here, the focus is on the 17 markets for which both advertising and polling data were available. The plots depict the effect of one candidate's or party's tone on the other, the effect of the polls on tone, and the effect of tone on the polls. (I do not present the responses of each variable to its own shocks.) The plots that capture any interaction between the candidates display relationships quite similar to those in Figure 1. A shock in Gore's tone was associated with a similar shift in Bush's tone, beginning in the subsequent week and dissipating after about 4 weeks. The magnitude of this one-

standard deviation shock is equivalent to approximately one-fourth of a standard deviation in Bush's tone. A shock in Bush's tone was again associated with an opposite shift in Gore's tone in the subsequent week, a shift equivalent to almost one-half of a standard deviation in Gore's tone. These results suggest patterns similar to those in the results from the daily data.

[insert Figure 2 about here]

Did the polls manifest any significant relationship with the candidates' advertising tone? On the whole, there is little evidence that shifts in the polls affected either Bush's or Gore's tone, and vice versa. Figure 2 shows that shifts in Gore's poll standing have effects that are quite small in magnitude and statistically indistinguishable from 0. Thus, while it may be true that candidates facing a chronic disadvantage at the polls tend to attack more often, these data provide no evidence that *shifts* in the polls lead to different tactics.²⁷ Moreover, the candidates' poll standing changed only modestly in response to changes in advertising tone. There was no significant relationship between Bush's tone and the polls. However, Gore's poll standing appeared to increase when Gore's advertising became more positive, albeit slightly—about a 1-point shift in the subsequent week, dwindling rapidly thereafter. Thus, although political consultants often claim that negative ads “work,” in the 2000 presidential campaigns, shifts in the candidate's tone had little consequence and, if anything, positive ads increased a candidate's vote share.

Panel B of Figure 2 presents results from models of the party committees' advertising tone. As in the daily models, it appears that both the RNC and the DNC based decisions about advertising tone on what the other party has done. A shift in tone by one party is associated with a similar shift from the other.²⁸ Moreover, these shifts are quite durable—evident even 6 weeks later. This pattern of relationships suggests an “arms race”: when one party aired more negative ads, the

²⁷ Of course, given the nature of presidential elections—and the 2000 election in particular—any observed shifts in the polls are likely to be quite small. In elections with more dramatic swings in candidate fortunes, it is more plausible that candidate strategy would respond accordingly.

²⁸ The parties' responses are each equivalent to approximately a one-third standard deviation shift in tone.

other party followed suit, with the consequences persisting in time. Given that the party committees are in general more disposed to air negative advertisements than candidates are, it is perhaps not surprising that such a dynamic exists. Finally, there was little evidence of any relationship between party strategy and poll standings. Shifts in the tracking polls did not produce notable shifts in party strategy. Party advertising tone affected the horse race only slightly: a positive shock to the DNC's tone was associated with a small and temporary 1-point increase in Gore's poll numbers. The arms race gave neither party's candidate an advantage among likely voters.²⁹

The 2000-2002 House and Senate Campaigns

Lacking polling data for House and Senate elections, I focus only on the interaction between candidates. Figure 3 presents the impulse-response functions, omitting the responses of each tone measure to its own shocks.³⁰

[insert Figure 3 about here]

The top panel in Figure 3 presents models for the candidates, with the daily models on the left and the weekly models on the right. Each tells a similar story about the pattern of interaction. In 2000, shifts in the Democratic candidate's tone were associated with shifts in the Republican opponent's tone. In particular, the behavior of the Republican candidates suggests that, on average, they countered Democratic attacks with attacks of their own. However, the effect of the

²⁹ Models with additional lags—e.g., more than seven days in the daily data, or more than 1 week in the weekly data—tell a similar story, although adding additional lags does sacrifice observations, thereby reducing sample size. In general, shifts in Gore's tone produce a similar reaction from Bush, while shifts in Bush's tone produce an opposite reaction from Gore. Shifts in the polls have small and statistically insignificant effects on both candidates' tone. The effects of tone on the polls are also modest at best. In the models of the party committees, there is always evidence of an interaction between the party committees and little evidence that either party's tone affects the polls. In the weekly data, models with additional lags suggest that a positive shock in Gore's poll numbers is associated with a positive shift in both the RNC and DNC's tone, though this relationship is smaller in magnitude than the relationship between the parties' tone.

³⁰ I omit these responses to save space. The response of each measure of tone to its own shocks is large and positive and decays gradually over the subsequent weeks or days to essentially zero. These responses look similar to the analogous response functions in Figure 1.

Republican's tone on the Democrat's tone was, if anything, the opposite: a positive shock in the Republican's tone was associated with a negative shift in the Democrat's tone. The daily data suggest a negative shift that increased in magnitude over the subsequent week. The weekly data confirmed this negative shift, but the trend was not statistically significant.³¹

In 2002, by contrast, candidates appeared to respond to each other in a comparable fashion. Positive shocks to one candidate's ads led to positive shifts in the opponent's ads. The reaction of Democrats to Republicans was evident in both the daily and weekly data, while the reaction of Republicans to Democrats emerged only in the weekly data. In the weekly data, a positive shift in the Democrat's tone was associated with a positive shift in the Republican's in the subsequent week, which decayed thereafter. The response of Democrats to Republicans occurred sooner but decayed more quickly. The substantive magnitude of these two effects is equal to approximately one-sixth of a standard deviation in the outcome variable—an effect that is smaller than the response of tone to its own shocks, but not negligible.

Panel B of Figure 3 presents results for the party committees. Across these two elections, the Democratic committees responded in like fashion to the Republican committees. These effects were more notable in 2002 than in 2000, when there was a small effect only in the daily data. The response of the GOP committees was different. In the daily data in both 2000 and 2002, shocks to the Democratic committees' tone were associated with an opposite shift in the GOP committees' tone—a finding mirroring Gore's apparent response to shifts in Bush's tone in the 2000 election. However, the weekly data suggested no association of any magnitude. Unlike the apparent arms

³¹ This asymmetry in the pattern of interaction does not arise because Republicans aired more negative ads in general, as Lau and Pomper (2004) found in their data. In fact, a comparison of the behavior of opposing candidates suggests that, in incumbent-challenger races, Republicans and Democrats air roughly equal proportions of negative/contrast ads, while in open seat races, Democrats air slightly more of these ads.

race between the parties in the 2000 presidential race, in the 2000 House and Senate races there was no evidence of this dynamic.³²

As above, I also estimated a separate VAR model for each race and then conducted Granger causality tests for the effects of each candidate's tone on his or her opponent's tone. I considered interaction present when the p-value from the Granger causality tests was less than .05. Based on this criterion, 70 percent of the races displayed evidence of interaction. In 30 percent of races, the interaction was "symmetrical," with each candidate's tone affecting the other's, and in 40 percent it was "asymmetrical," with one candidate's tone affecting the other. This confirms the general finding of the pooled analyses. However, there was no evidence of systematic variation in interaction. One might expect more evidence of interaction in tightly contested races, but interaction was not more common in competitive races than non-competitive ones, with competitive races categorized as those with a 55-45 margin or less. Similarly, interaction was not more common in open-seat races than in those with an incumbent running. Asymmetrical interaction was not related to incumbent-challenger status: in races where only one candidate appeared to respond to the other, this candidate was no more likely to be an incumbent than a challenger. Moreover, this candidate was no more likely to have spent more money during the campaign than to have spent less money. Thus, the traditional factors that affect congressional elections—competitiveness, incumbency, and spending—did not seem related to interaction.³³ But the basic finding—that most congressional races manifested interaction—was clear.

Discussion and Conclusion

³² Adding additional lags to these models does not change the basic findings. There continues to be little evidence of interaction in the 2000 campaigns, and evidence of asymmetric interaction in the 2002 campaigns.

³³ See Carsey et al. (2006) for similar findings from gubernatorial races.

Scholarly attention to political campaigns has elicited new insights about both candidate strategy and campaign effects on voters and election outcomes. However, few studies have considered the possibility of interaction, both between opposing candidates and parties and between these actors and voters. Nevertheless, there are good reasons to expect interaction. No rational candidate will ignore shifts in public opinion; thus, we might expect candidates to adjust their strategy, particularly when opinion shifts in an unfavorable direction. Furthermore, candidates may have both expressive and instrumental motivations to respond to their opponent. With regard to negative campaigning, I have argued that candidates will be reluctant to ignore attacks. If they believe an attack could be effective—and evidence suggests this is a common assumption—then they would prefer to respond rather than risk being “Swift-Boated” or labeled a Dukakis.

Given these theoretical motivations, this paper provides some of the first evidence of interaction. Specifically, changes in the tone of a candidate’s or party’s televised campaign advertisements depend in part on changes in the tone of the opponent’s ads. To be sure, this evidence comes from races that featured televised advertising, which means that they are on average more competitive than the typical race. Thus, the implication of these findings is not that all campaigns feature interaction; obviously, in races that are uncontested or that are contested only by token opposition, there is scarcely any real opportunity for interaction. But in campaigns that have two committed candidates, these results suggest that interaction often takes place. Campaign strategy depends not only on factors that pre-date the campaign, but also on the decisions and actions of the opposing side during the campaign itself. Strategies therefore adjust dynamically as the campaign unfolds and candidates and parties formulate their messages in response to those of their opponents.

The evidence for interaction between campaign strategy and public opinion is much sparser. In the 2000 presidential campaign, poll numbers did not appear to drive decisions about campaign

tone, and shifts in tone had at most small consequences for the candidates' standing in the polls. However, these results stem from just one race, and, moreover, a presidential race, in which the impact of campaign decisions is known to be more muted. Other races could show larger effects of strategy on opinion. Another reason for these null results is that opinion was only weakly related to general measures of tone. Shifts in opinion may depend on other features of campaign messages, such as their issue content, that operate separately from or in interaction with tone.

Though this analysis establishes the existence and prevalence of interaction, several puzzles, questions, and tasks remain. First, why is interaction asymmetrical at times, with only one candidate responding to the other? The theoretical motivation of this paper did not anticipate that finding. Nor did it anticipate that shifts in tone by one candidate might be associated with opposite shifts by the opponent. This pattern was most apparent in Gore's apparent response to Bush in the 2000 presidential campaign. Given the incentives candidates have to "hit back," why might this pattern result? Perhaps candidates sometimes believe that "going positive" is an appropriate reaction to the opponent's attacks; they can then claim to have taken the high road while their opponent slung mud.

Second, is interaction provoked by particular kinds of themes or messages in advertising? For example, candidates may feel more compelled to respond to attacks that impugn their character, as opposed to their issue positions. They may also respond more readily to attacks on issues central to their campaign platform. More detailed measures of advertising content, including both their tone and their substantive claims, could improve our understanding of not just whether but how candidates interact. Examining issue content will also speak directly to the prevalence and nature of dialogue in campaigns.

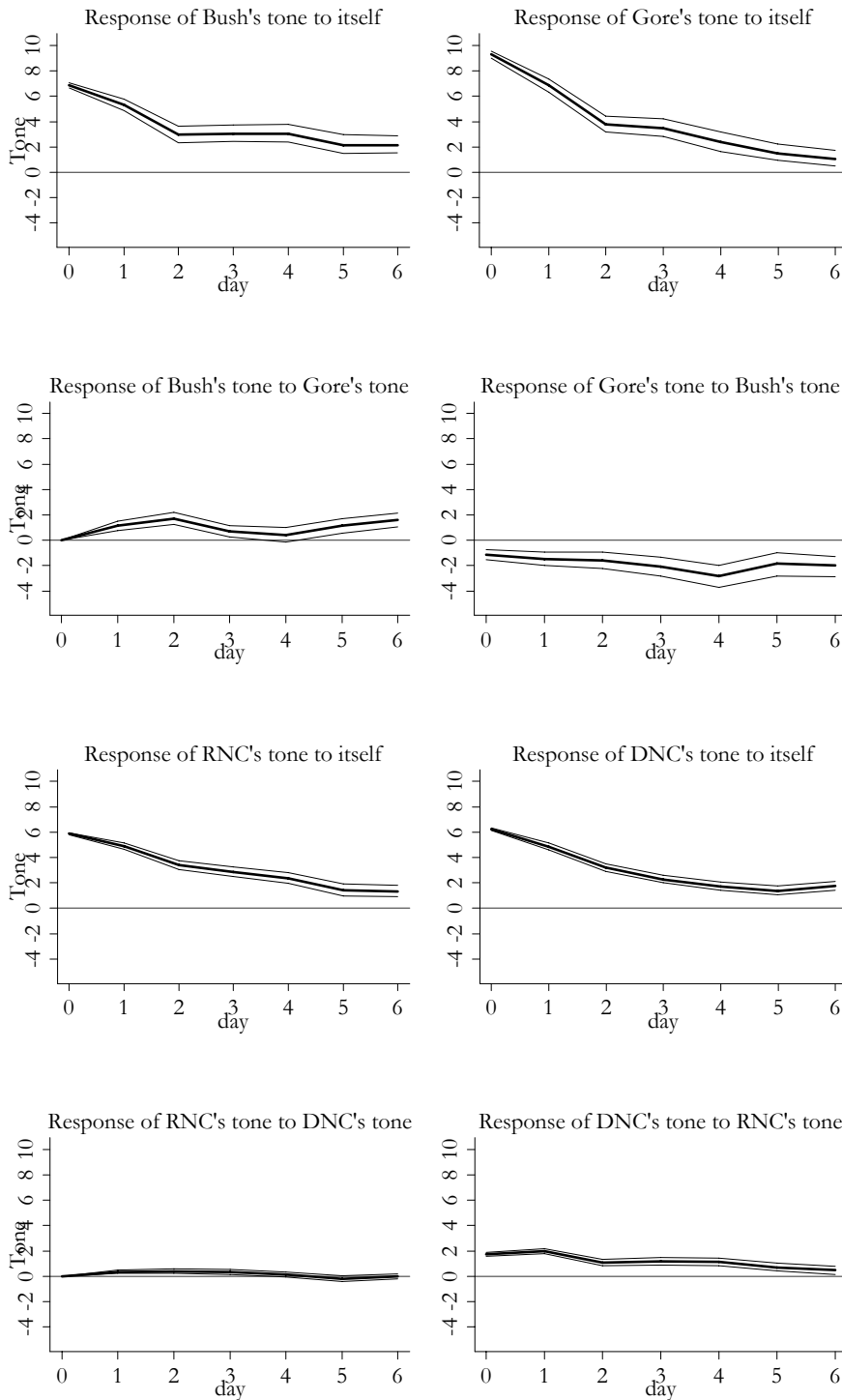
Third, does interaction depend on how the media react to the claims of a candidate? Candidates want their message to attract favorable attention from the "free media," i.e., from commentators and news programs, which amplifies their message. A ready example is the claims of

the Swift Boat Veterans for Truth, which gained national media attention after modest advertising in a handful of battleground states. Candidates may be selective about how they respond to their opponent, launching a counter-attack only once the opponent's claims have attracted the media's attention.

Fourth, do candidates react not only to their opponents but also to the party committees or to independent interest groups? Candidates may feel compelled to respond to party and interest group ads, particularly because party and issue advertising is so often negative. Candidates may also adjust their advertising strategy to their own party's ads as well as those of favorable interest groups. For example, if the candidate's party is attacking the opponent, the candidate may not need to.

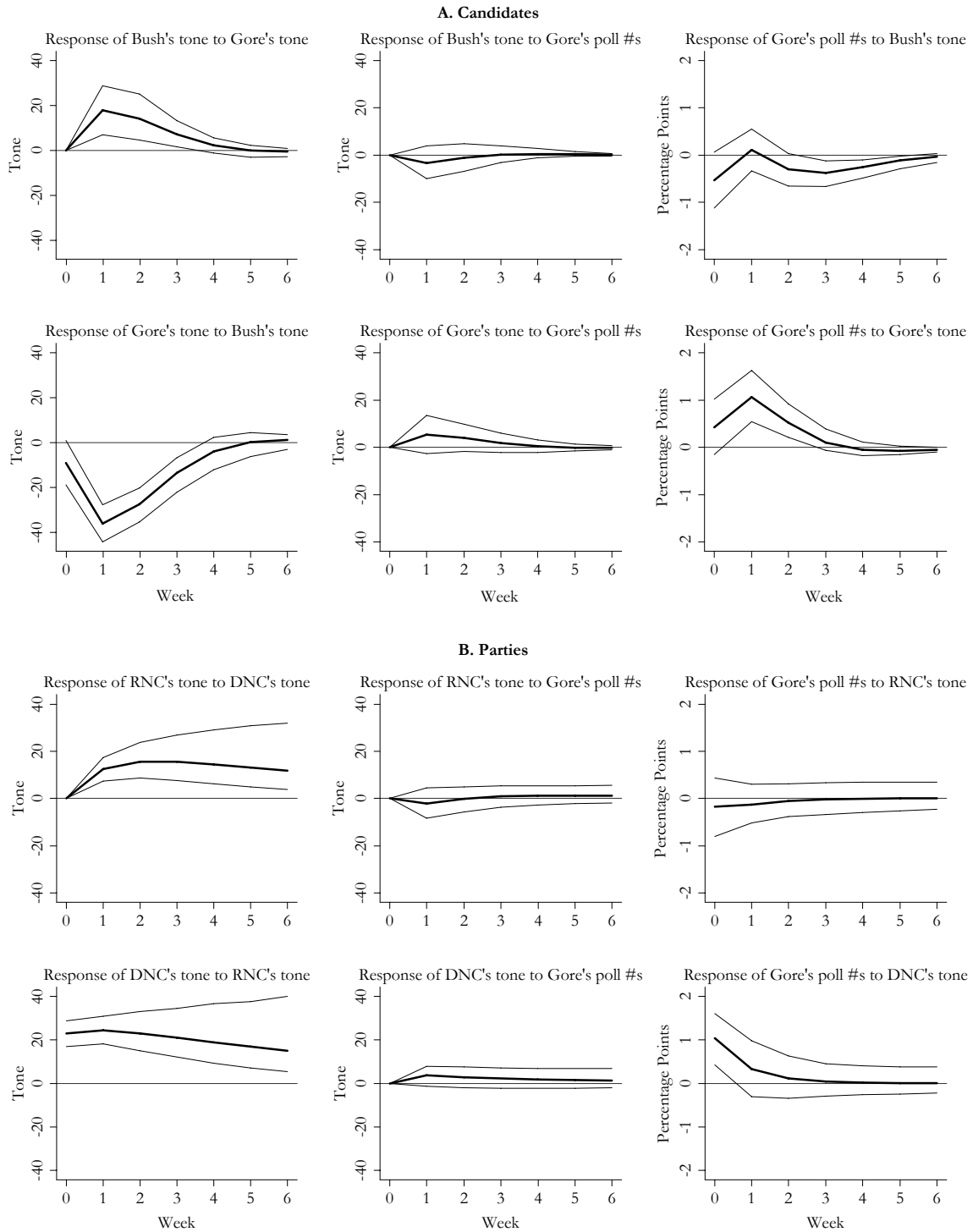
Finally, to understand the interaction between strategy and public opinion, there is a pressing need for additional survey data, particularly data that measure opinions over the course of a campaign (see Shaw 2006: 174-175). To the extent that strategies are tailored to particular states or media markets, surveys should also be designed to capture opinion congruently. Scholars have made important strides at the presidential level (e.g., Johnston, Hagen, and Jamieson 2004), but comparable data for lower levels of office is much sparser. Better data and an attention to interactive dynamics will help illuminate how and why campaign strategy evolves, and whether ultimately it matters on Election Day.

Figure 1. Impulse-Response Functions for 2000 Presidential Race, Daily Data



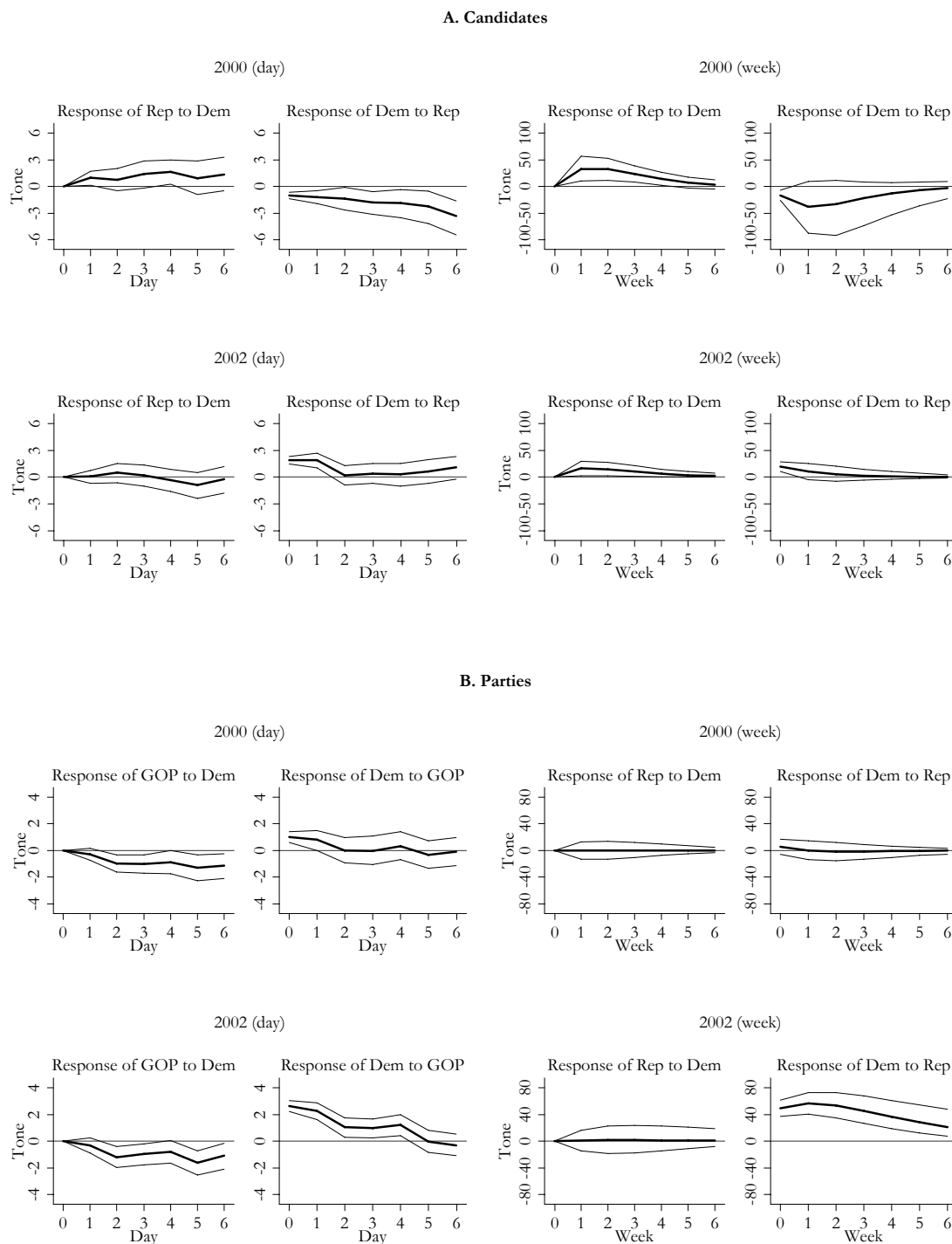
The darker lines represent the effects on the dependent variable of a standard deviation “shock” in the independent variables. The lighter lines are 95% confidence intervals, as calculated via a Monte Carlo simulation with 1,000 repetitions.

Figure 2. Impulse-Response Functions for 2000 Presidential Race, Weekly Data



The darker lines represent the effects on the dependent variable of a standard deviation “shock” in the independent variables. The lighter lines are 95% confidence intervals, as calculated via a Monte Carlo simulation with 1,000 repetitions.

Figure 3. Impulse-Response Functions for Candidates in 2000-2002 House and Senate Races



The darker lines represent the effects on the dependent variable of a standard deviation “shock” in the independent variables. The lighter lines are 95% confidence intervals, as calculated via a Monte Carlo simulation with 1,000 repetitions.

Table A-1. Information about Sample Size

	Number of markets/races	Number of days or weeks			Sample size (N×T)
		min	max	median	
2000 Presidential					
candidates (daily)	37	30	78	78	2708
candidates (weekly)	17	7	11	10	186
parties (daily)	45	27	143	133	5196
parties (weekly)	17	7	11	10	186
2000 Congressional					
candidates (daily)	80	21	79	52	5029
candidates (weekly)	80	3	11	8	722
parties (daily)	36	22	79	51	2491
parties (weekly)	36	5	11	11	354
2002 Congressional					
candidates (daily)	94	22	78	48	5486
candidates (weekly)	94	3	11	8	807
parties (daily)	46	21	76	49	2960
parties (weekly)	46	3	11	8	430

Note: For the presidential data organized by week, the number of markets is limited to those included in the 2000 presidential tracking polls. These markets, with sample sizes from the tracking polls in parentheses, are: Albuquerque-Santa Fe (2550); Charleston-Huntington (766); Chicago (2000); Des Moines-Ames (565); Detroit (2045); Flint-Saginaw-Bay City (467); Grand Rapids-Kalamazoo-Battle Creek (819); Green Bay-Appleton (859); Jacksonville-Brunswick (299); Kansas City (1331); Miami-Ft. Lauderdale (922); Milwaukee (1959); New Orleans (915); Orlando-Daytona Beach-Melbourne (779); St. Louis (2323); Tampa-St. Petersburg-Sarasota (1304); West Palm Beach-Ft. Pierce (404).

Appendix A. Estimation of Panel Vector Autoregression

While standard vector auto-regressions involve time-series data, typically with relatively long time-series, panel VAR (PVAR) models involve time-series data collected across cross-sectional units. With time-series cross-sectional data, the length of the time-series (T) is typically less than the number of cross-sectional units (N). Estimating PVAR models thus involves accounting for the possibility of heterogeneity across cross-sectional units.

Using Wawro's (2002) notation, a general version of the model in this paper can be written thusly:

$$y_{it} = \gamma y_{i,t-1} + \beta x_{i,t-1} + \alpha_i + u_{it} \quad (1)$$

where y_{it} is the tone of Candidate A's advertising at time t in market i , x_{it} is the tone of Candidate B's advertising at time t in market i , α_i is a unit-specific effect, and u_{it} is a disturbance term. The model employed here derives from methods for estimating dynamic panel data models (see Arellano and Bover 1995; Holtz-Eakin, Newey, and Rosen 1988; Love and Zicchino 2006; Wawro 2002). In these models, there are both lagged endogenous variables ($y_{i,t-1}$) and, because of the cross-sectional nature of the data, unobserved effects specific to the panel unit (α_i). Standard ways of accounting for these unit-specific effects—such as the least-squares dummy variables (LSDV) approach—do not eliminate the correlation between the lagged endogenous variable and the disturbance term.

The essence of the model employed here is two-fold. First, the individual-specific effects are removed by differencing the variables in the model. Specifically, the differencing strategy is forward mean-differencing or the Helmert procedure (Arellano and Bover 1995). This subtracts the mean of all future observations for each cross-sectional unit in the sample.³⁴ Second, once the data are differenced in this fashion, one can estimate the effects of the endogenous variables without bias by

³⁴ Following Love and Zicchino (2006), I subtract out the mean across time for each cross-sectional unit before differencing.

employing an instrumental variables approach. In this case, the instrumental variables are all values of the endogenous variables from period $t-2$ and before (see Holtz-Eakin, Newey, and Rosen 1988: 1378; Wawro 2002: 33). The model is identified as long as the number of time periods (T) is greater than or equal to 3 plus the lag length (m) in the PVAR equation, or $T \geq m+3$ (Holtz-Eakin, Newey, and Rosen 1988: 1375). The parameters of this model are estimated using a generalized method of moments estimator.

An important diagnostic for this model is the Sargan or Hansen test (see Wawro 2002: 38-39). This test evaluates whether the moment conditions used in estimating the model (over and above those needed to identify the model's parameters) are valid. The test statistic is distributed as chi-squared; when it is significant, one should "reconsider the specification of the model, possibly reducing the number of instruments employed or including more lags to eliminate serial correlation" (Wawro 2002: 39). The models presented in the text are just-identified, meaning that the Sargan test statistic cannot be estimated. I have experimented with alternative specifications, adding additional instruments (i.e., from further back in the time-series) and then comparing the Sargan test statistics across models. In the models of both presidential and congressional advertising, adding additional instruments worsens the fit. This is true in the daily and weekly data, and for models of both candidate- or party-sponsored advertising. More specifically, in most cases the value of the Sargan statistic increased with each additional instrument, though the shapes of the impulse-response functions, and thus the substantive findings, were similar to those in Figures 1-3. Thus, the just-identified models presented here seem most appropriate.

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