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Do Gender Cues from Images Supersede Partisan Cues Conveyed via Text? Eye Movements Reveal Political Stereotyping in Multimodal Information Environments

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ABSTRACT

An important feature of the information environment is its multimodal nature. In politics, people encounter representations of political candidates that combine images and text. Among the most prominent pieces of information people encounter are a candidate's gender, obtained from images of the candidate's face, and the candidate's partisan identification, often represented as text. This feature of the environment is important given previous work showing that individuals infer gender categories from faces rapidly and effortlessly. In this study (N = 113), we use eye movements to determine how individuals assign stereotypical policy positions to candidates in an environment in which photos of candidates' faces are paired with labels of their partisan IDs. We find that politically-knowledgeable individuals are more likely to use partisan- than gender-based stereotypes. In contrast, political novices did not prioritize one type of stereotype over the other. Our findings have implications for understanding how individuals make political evaluations in multimodal settings and show the advantages of measuring eye movements when studying stereotyping in multimodal environments.

Much of the information that people encounter in their everyday lives is presented through multiple modes of communication. In the domain of politics, for example, images and text are frequently combined in newspaper articles, social media websites, and electronic voter guides when conveying information about politicians (Boomgaarden et al., 2016; Bucy & Grabe, 2007). An important feature of this multimodal information environment is that different types of information can be presented together in different modalities.

For instance, over 30 countries across the globe now present photos of political candidates' faces – which can convey social information such as gender, age, and race – alongside text such as their partisan identification on their ballots (e.g., Greece, Portugal, Ireland, and South Africa; Lev-On & Waismel-Manor, 2016; Reynolds & Steenbergen, 2006). Similarly, prominent online voter guides in the United States present photos of candidates' faces along with labels of their partisan ID.[1]

This specific feature of the information environment is important given work showing that individuals infer gender categories from faces rapidly and with very little effort (Dobs

et al., 2019; Ito & Urland, 2003). Indeed, gender – along with age and race – is among the first categories people extract from faces (the "big three" social categories; Brewer, 1988; Ito & Urland, 2003; Quinn et al., 2002). As we discuss in a later section, extracting partisan ID information from text, in contrast, may occur more slowly and require more deliberate effort. Once social categories have been activated, they can lead to stereotyping (Macrae & Bodenhausen, 2000). Thus, people's tendency to immediately and effortlessly categorize others based on gender when looking at their faces may influence voters' evaluations.

In particular, voters may be more likely to use gender information from images of faces than partisan ID information from text when they attribute stereotypical policy positions to candidates. U.S. voters have been shown to associate specific policy stereotypes with social groups and attribute these stereotypes to political candidates based on the candidates' gender and partisan identities (Huddy & Terkildsen, 1993; Rahn, 1993; for a review, see Bauer, 2019). For example, candidates categorized as females and Democrats are stereotyped to be more likely to support legalization of abortion whereas males and Republicans are expected to oppose it.

The goal of our study is to examine the extent to which voters assign stereotypical policy positions to candidates in an information environment in which a photo of a candidate's face is paired with a textual label of their partisan ID. This specific condition is of particular interest because the preponderance of studies in the gender and political stereotyping literature specifically examine instances in which *both* the candidate's gender and partisan ID information are conveyed via text (e.g., Bauer, 2018; Hayes, 2011; Huddy & Capelos, 2002; King & Matland, 2003; Schneider & Bos, 2016; for exceptions, see Andersen & Ditonto, 2020; Bauer, 2015a; Bauer & Carpinella, 2018).[2] For example, some studies convey gender information via the candidates' names (e.g., Huddy & Capelos, 2002; Bauer, 2018) or gender-specific personal pronouns (e.g., King & Matland, 2003). Although valuable, this work may underestimate the extent to which gender stereotypes influence political judgments given that, in these studies, people extract gender-category information from text instead of images of faces.

In this environment in which photos of candidates' faces convey gender identity and text conveys partisan identity, our study specifically examines which individuals will likely use partisan over gender information when attributing stereotypical policy positions to candidates. This is important because voters' inferences about candidates' policy positions can influence their candidate evaluations (Rahn, 1993). Our central hypothesis is that people who possess a large body of knowledge about politics – political sophisticates – will be more likely to use partisan information than gender information. As we describe in detail below, this prediction is based on the theory that sophisticates are repeatedly exposed to a media environment that associates certain policy positions with partisan identities at a greater rate than gender identities.

We test this hypothesis in a unique way by tracking people's eye movements as they assign stereotypical policy positions to political candidates. Critical to the design of the study, we examine instances in which individuals evaluate candidates whose gender and partisan identities can signal conflicting stereotypes (i.e., female Republican, male Democrat). When attributing stereotypical policy positions to candidates (e.g., supports legalization of abortion), this instance allows us to examine whether political sophisticates will be more likely to use gender information (e.g., female Republicans judged to be more likely to support legalization of abortion than male Democrats) or partisan information

(e.g., male Democrats judged to be more likely to support legalization of abortion than female Republicans).

In the study, we first showed participants a policy statement (e.g., This candidate supports public funding of abortion). Then, we showed them a visual display containing four candidates (2 female Republicans, 2 male Democrats). Each candidate was represented by a photo of his or her face and a partisan label below each photo. The key idea of our research design is that participants will look longer at certain candidates (both their photos and labels) if they associate them with specific policy positions. This idea is based on previous work in cognitive psychology showing that eye movements can measure associations between concepts (e.g., a social group and a trait) in long-term memory (Yee & Sedivy, 2006). For example, if individuals are more likely to associate female Republicans than male Democrats with supporting the legalization of abortion (suggesting that they prioritize gender information), then they will look longer at female Republican candidates than male Democrat candidates. On the other hand, if individuals are more likely to associate male Democrats than female Republicans with supporting the legalization of abortion (suggesting that they prioritize partisan information), then they will look longer at male Democrat candidates than female Republican candidates. Given our central hypothesis, we expect that as political sophistication increases, individuals will prioritize partisan over gender information (e.g., sophisticated individuals will look longer at male Democrats than female Republicans when determining which candidates are associated with the position "supports public funding of abortion").

Our study advances the political communication and gender and politics literatures in several ways. First, despite the ubiquity of multimodal communication in politics, very little work in the field of political communication has examined how individuals integrate distinct types of information presented simultaneously via different modalities (for exceptions, see Andersen & Ditonto, 2020; Bauer, 2015a; Bauer & Carpinella, 2018; Boomgaarden et al., 2016; Bucy & Grabe, 2007; Druckman, 2003; Nagel et al., 2012; Patterson et al., 1992; Powell et al., 2015, 2018a, 2018b); only a small number of these studies (Andersen & Ditonto, 2020; Bauer & Carpinella, 2018; Bauer, 2015a) have examined political stereotyping. Given that the current electoral environment in the United States and around the world is saturated with visual information (e.g., on television, in social media), studying the multimodal communication of political information is important to understanding contemporary political behaviors.

Second, there is an ongoing and important debate in the gender and politics literature pertaining to whether voters employ partisan stereotypes more than gender stereotypes during candidate evaluation (Hayes, 2011; Hayes & Lawless, 2016; Sanbonmatsu & Dolan, 2009). Much of this work finds that individuals prioritize partisan information over gender information when stereotyping candidates (for a review, see Bauer, 2019). However, most of these studies examine a unimodal setting in which both the candidate's gender and partisan ID information are conveyed via text (for exceptions, see Andersen & Ditonto, 2020; Bauer & Carpinella, 2018; Bauer, 2015a). As a consequence, much of this work does not examine stereotyping in an alternative, yet prevalent context in which gender information is often automatically obtained – from images of faces – and where it may exert its strongest effects on people's judgments. In addition, the current work does not consider political sophistication as an important individual difference which could

influence whether individuals use partisan stereotypes over gender stereotypes (for exceptions, see Coronel & Federmeier, 2016; Sanbonmatsu, 2003).[3]

Finally, the majority of studies in the gender and political stereotyping literature use self-report measures of stereotyping (for an exception, see Winter, 2010). Scholars who have conducted these studies recognize the possibility that social desirability pressures could have influenced participants' responses (Sanbonmatsu, 2003)[4] and some have called for the use of other measures that are less susceptible to social desirability biases (Krupnikov et al., 2016). Our study highlights the viability of eye movements as an alternative measure of political stereotyping. Eye movements are not dependent on the accuracy of self-report assessments (for a review, see Coronel, Poulsen et al., 2020; Hannula et al., 2010; McKnight & Coronel, 2017) and can be obtained without requiring behavioral reactions (Coronel, Poulsen, et al., 2020; Coronel, Ott, et al., 2020) that can interrupt the natural flow of cognition (characteristic of response time-based methods such as the Implicit Association Test or Lexical Decision Task).

Political Stereotyping in Multimodal Information Environments

Investigating political stereotyping in a multimodal information environment in which gender information is conveyed via images of faces and partisan information via text is important given that there are reasons to believe that individuals may use gender stereotypes more than partisan stereotypes in this environment. In particular, there is evidence that gender information is extracted from faces rapidly and with very little effort and that this capacity develops early, as young as three months old (Quinn et al., 2002; Wild et al., 2000). In addition, converging evidence from studies on adults using electrophysiological methods with a high level of temporal resolution (i.e., event-related potentials, magnetoencephalography) shows that individuals begin to identify gender information from images of faces between 100 and 200 milliseconds after the onset of a face stimulus (these results are obtained regardless of whether the participants were explicitly asked to attend to gender; Dobs et al., 2019; Ito & Urland, 2003). This tendency for individuals to quickly and effortlessly extract gender categories from faces may be due to people's extensive experience in discriminating gender from faces (Gauthier & Tarr, 1997). Another explanation is that this capacity may have evolved due to the biological significance of identifying another person's gender (i.e., identifying mating partners; Cosmides et al., 2003).

This tendency for individuals to rapidly and easily extract gender categories from faces suggests that – in an environment in which gender information is conveyed via faces and partisan information via text – individuals may categorize candidates primarily by their gender rather than partisan identity. Specifically, categorizing candidates via their partisan identification may not occur effortlessly and instead require deliberate cognitive effort. This is because, compared to gender, partisan categorization is (1) not a well-practiced ability for most people and (2) not a biologically-salient category.[5] Thus, depending on individuals' level of motivation and given the effort required to use partisan ID information, partisan categorization may not even occur. Categorization is important because once category information about a person has been obtained, it can automatically activate stereotypes (Macrae & Bodenhausen, 2000). Therefore, if categorization by gender is more likely to occur than categorization by partisan ID in an environment in which gender

information is conveyed via faces and partisan information via text, then individuals may use gender stereotypes more so than partisan stereotypes.

However, there are still reasons to believe that individuals might prioritize partisan ID over gender information. In the political domain, individuals who view partisan information as more relevant than gender can exert control and prioritize certain categories over others (in this case, partisan identity over gender) and inhibit non-prioritized stereotypes. This view is based on a body of work in the social cognition literature suggesting that individuals can engage in deliberative processes to prioritize certain social categories along with their associated stereotypes and actively inhibit others (Kang & Bodenhausen, 2015; Kang et al., 2014; Macrae et al., 1995).

Critically, however, we expect that political sophistication will influence whether individuals will prioritize partisan ID information over gender information. Politically sophisticated individuals are ones who possess a large body of knowledge and interest about politics (Delli Carpini & Keeter, 1996; Luskin, 1987), whereas political novices lack the wide-ranging base of political knowledge of their sophisticated counterparts. Voters often rely on party stereotypes to make judgments about candidates' issue positions and competencies (Hamill, Lodge, and Blake 1985; Rahn, 1993) and this should be more pronounced among sophisticates than novices for two reasons. First, this tendency to view the political world through a partisan lens is encouraged by news coverage that focuses on differences and conflict between Republicans and Democrats instead of gender. Second, given their interest in politics, sophisticates are more likely to be in-tune and pay attention to political information in the media environment (Delli Carpini & Keeter, 1996).

Indeed, emerging evidence suggests that the content of political campaigns are increasingly divided along partisan and not gendered lines (for a review, see Hayes & Lawless, 2016). For example, studies suggest that female candidates in the U.S. campaign on issues that are similar to their male counterparts instead of focusing on "women's issues" (Dolan, 2005). This outcome is thought to be due to political polarization (Hayes & Lawless, 2016). As Republicans and Democrats have taken more extreme conservative and liberal positions (McCarty et al., 2006), members of the same party (whether male or female) have resorted to emphasizing the same set of partisan issues during their campaigns (Hayes & Lawless, 2016).

Further evidence suggests that this similarity in how male and female candidates discuss issues in their campaigns are also reflected in journalistic coverage of candidates and policy issues. In particular, researchers have argued that elite polarization diminishes the role that a candidate's sex plays in influencing journalistic coverage of candidates (Hayes & Lawless, 2016). Given the more recent phenomenon of Democrats and Republicans taking more extreme positions on issues, news coverage of candidates tends to center on partisan (as opposed to gender) conflict.

Sophisticates, given their interest in politics, are more likely to exposed political information in the media environment (Delli Carpini & Keeter, 1996) – an environment that promotes viewing political issues through a partisan rather than gendered lens. Thus, even in multimodal information environments in which partisan information conveyed via text is placed alongside gender information conveyed via images of faces, we specify the following hypothesis:

H1: Individuals with higher levels of political sophistication will be more likely to use partisan stereotypes than gender stereotypes when attributing policy positions to candidates.

Assessing Political Stereotyping via Eye Movements

The monitoring of eye movements is a promising approach that can allow communication scholars the ability to measure stereotyping processes on-line (i.e., as they occur) without relying on the accuracy or reliability of self-report measures. In addition, there is recognition in the gender and politics literature that traditional self-report measures of stereotyping may be susceptible to social desirability biases (Krupnikov et al., 2016). Eye movement measures represent an alternative approach to traditional methods (e.g., overt self-reports) for assessing political stereotyping.

Of particular interest is previous work in cognitive psychology showing that eye movements can be used to measure the associations between concepts in long-term memory (Yee & Sedivy, 2006). This is an important feature of eye movements given that stereotypes have been theorized to consist of semantic/conceptual associations between a particular group and specific traits (Devine, 1989). The ability of eye movements to measure associations between concepts has been documented in several studies (Huettig & Altmann, 2007; Yee & Sedivy, 2006). In these studies, participants are usually shown photos of four objects in a visual display. Two of the objects are semantically related to each other (e.g., a cat and a mouse). Specifically, one of these objects is termed the "target" (e.g., cat) while the other the "semantic lure" (e.g., mouse). The remaining two objects are not semantically related to any objects in the visual display. They are often referred to as "controls" (e.g., a bed and a pump). These studies have shown that when participants hear the target word (e.g., "cat"), they direct most of their gaze at the target image. However, they also direct their gaze to the semantic lure (in the example used here, the mouse) more so than the controls (bed and pump). These data suggest that eye movements can reflect the activation of semantically related concepts (e.g., cat and mouse) in long-term memory.

Building on this work from cognitive psychology, a previous and pertinent study directly examined the ability of eye movements to measure a person's tendency to assign stereotypical policy positions to political candidates (Coronel & Federmeier, 2016). In this study, individuals were shown policy descriptions that either conveyed a position stereotypically associated with females (e.g., This candidate supports public funding of abortions) or males (e.g., This candidate supports increasing the number of military bases around the globe). The participants were then shown four photos of unfamiliar individuals – two males and two females presented simultaneously – which the participants were led to believe were political candidates running for elected office. The study found that when the four-candidate visual display was preceded by the policy position stereotypically associated with females (e.g., This candidate supports public funding of abortions), participants were more likely to direct their gaze at the photos of females more so than the photos of males. In addition, when the four-candidate display was preceded by the policy position stereotypically associated with males (e.g., This candidate supports increasing the number of military bases around the globe), individuals were more likely to direct their gaze at the photos of males more so than the photos of females.[6] These data suggest that eye movements can reflect people's semantic associations between gender categories and certain policy positions. These results could be driven by a form of semantic priming that is similar to the concept of "priming" in the political communication literature. That is, priming are instances in which an event (e.g., reading "supports

public funding of abortions") increases the accessibility of related constructs in people's memories (e.g., female candidates) (Miller & Krosnick, 2000).

However, this previous study only used photos of male/female candidates and participants were not provided any information about the candidates' partisan identifications. This is because the study was interested in examining the use of eye movements as a measure of political stereotyping, and the primary focus was examining the extent to which self-report and eye movements yielded similar results across different levels of political sophistication.[7] As a consequence, this study could not examine political stereotyping when partisan ID information is present. Finally, given evidence that eye movements can be used to measure the association of semantically-related concepts in long-term memory and that eye movements can reveal individuals' knowledge that they are unable or unwilling to self-report (for a review, see Coronel & Federmeier, 2016; Coronel & Sweitzer, 2018; Hannula et al., 2010), we suggest that eye movements constitute a promising approach to measuring political stereotyping.

Methods

Participants

We recruited a total of 120 participants from a large university in the United States and the surrounding community. All participants were compensated with 15 USD for taking part in the study. We excluded seven participants who started to drift off to sleep during the study or who were wearing glasses or contact lenses that interfered with the calibration of our eye-tracking instruments. We analyzed data from the remaining 113 participants (53% female; Age M = 24 years, SD = 7.7 years, range = 18–74 years; see Supplementary Information).

Political Sophistication Measure

To measure political sophistication, we used a political knowledge questionnaire. Political knowledge is the single best predictor of political sophistication and its constituent parts (Delli Carpini & Keeter, 1996; Luskin, 1987), including cognitive capacities, interest, and attentiveness toward politics, and understanding of relevant political issues and events (Neuman, 1986). The questionnaire consisted of 20 multiple-choice questions ("don't know" was not an option; see Mondak, 2000), which tested the participant's knowledge about general and specific civic-based facts (i.e., names of political figures currently holding office, basic workings and rules of certain government institutions; political knowledge score, M = 10.5, SD = 3.1, range = 2–18); these items were inspired by the questionnaires developed by Delli Carpini and Keeter (1996) (see Supplementary Information).

Materials

The stimuli consisted of 24 policy positions (see Table 1). The statements were pretested using a different set of participants (*n* = 95) to ensure that they were strongly associated with either the Democratic or Republican Party.[8] Twelve of the policy statements were

Table 1. Policy positions used in the study.

Female Stereotypes (Democrat Stances)	Gender Neutral (Democrat Stances)
This candidate supports increasing government funding for early childhood and higher education.	This candidate supports affirmative action.
This candidate supports government-funded birth control programs.	This candidate supports giving illegal aliens a path to citizenship.
This candidate supports allowing gay couples to adopt children.	This candidate supports giving reparations to descendants of slaves.
This candidate supports increasing welfare funds for families with children.	This candidate supports increasing visas for skilled workers.
This candidate supports public funding of abortions.	This candidate supports physician-assisted suicide.
This candidate supports universal health care.	This candidate supports removing "God" from the pledge of allegiance.
Male Stereotypes (Republican Stances)	**Gender Neutral (Republican Stances)**
This candidate supports a military strike against Iran.	This candidate supports an amendment banning flag burning.
This candidate supports allowing electronic surveillance without a warrant.	This candidate supports building a fence along the Mexican border.
This candidate supports banning homosexuals from joining the military.	This candidate supports giving federal funds to faith-based organizations.
This candidate supports increasing the number of military bases around the globe.	This candidate supports hanging the Ten Commandments in public school classrooms.
This candidate supports military recruitment on college campuses.	This candidate supports making English as the official language of the US.
This candidate supports the use of torture in the interest of national security.	This candidate supports mandatory prayer in public schools.

associated with the Democratic Party (89% of pretest participants rated the issues as belonging to the Democratic Party) while the remaining twelve were associated with the Republican Party (86% of participants rated the issues as belonging to the Republican Party).

In addition, half of the statements for each party affiliation were gender-stereotypical policy positions in that they were either stereotypically associated with female or male candidates (6 policy issues for each; see Table 1; Huddy & Terkildsen, 1993; Sanbonmatsu, 2002). Stereotypical policy positions associated with females consisted of Democratic positions in policy domains such as abortion (supports public funding of abortions), education (supports increasing government funding for early childhood and higher education), and children-related issues (supports increasing welfare funds for families with children). Stereotypical policy positions associated with males consisted of Republican positions in domains associated with the military (supports increasing the number of military bases around the globe), foreign policy (supports a military strike against Iran), and defense (supports the use of torture in the interest of national security). The remaining 12 stances were "gender-neutral issues" that consisted of stances in other domains (e.g., religion, immigration) that were not strongly associated with a specific gender. The gender-neutral issues served as distractors that aided in concealing the purpose of the study from participants.

Another group of pretest participants (n = 96) rated the issues to determine if they were strongly associated with either male or female candidates.[9] Among the 12 Republican issues, 6 of the gender stereotypical policy positions were more likely to be attributed to males (73% of pretest participants associated the issues with males) than the other 6 gender-neutral issues (53% pretest participants indicated that *both* male and female

candidates were equally likely to endorse the issue). Among the 12 Democratic issues, 6 of the gender stereotypical policy positions were more likely to be attributed to females (72% of pretest participants associated the issues with females) than the other 6 gender-neutral issues (48% of pretest participants indicated that *both* male and female candidates were equally likely to endorse the issue).

Candidates were represented by 96 unique color photographs of middle-aged white females and males (48 females and 48 males) taken from publicly available websites.[10] We used white individuals given that elected officials in the United States are predominantly white (79% of Democratic politicians, 97% of Republican politicians [Lardieri, 2017]). The photos were obtained from websites of law firms and corporations given that lawyers and businesspersons are two of the most common previous occupations of individuals in the U.S. Congress (Murse, 2019). We standardized the photos for background color (i.e., black background), size, and they were cropped such that the photos only contained the individual's face. Further, pretest participants rated the photos on perceived age, attractiveness, facial expression, and whether they looked masculine or feminine (see Supplementary Information; Carpinella et al., 2016).
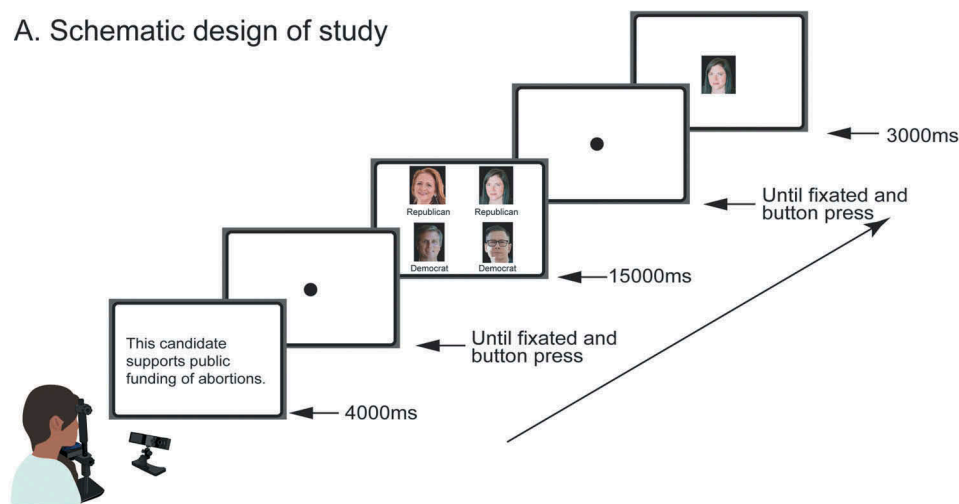
Procedure

Participants were tested in a room where they were seated 100 cm away from a 24-inch Asus VG248QE LCD monitor (resolution 1920 × 1080), with a refresh rate of 60 Hz. Before the experiment began, the desktop-mounted SR Research EyeLink 1000 eye tracker (1000 Hz) was fitted and calibrated for each subject with a 9-point calibration system. A chin rest was used to reduce head movements. A rigid mount was used to keep the chin and forehead from moving, and participants were instructed to remain still throughout each phase of the experiment (see Figure 1a).[11] Recordings were taken from the right eye, except for four instances in which the participant's glasses necessitated left eye recording.

Participants were told that they would be learning about political candidates and the issue positions they endorsed. During this task, we monitored participants' eye movements (see Figure 1a). They were instructed to pay attention to the issues paired with the candidates as they would be asked to "vote" for them later. Prior to the start of the actual experiment, they were shown a single practice trial in which they viewed a single issue position, the 4-candidate display, and a photo of the single candidate associated with the issue position. The practice trial ensured that they knew the structure of how information was going to be presented to them (lessening the possibility of confusion).

Each actual trial began with an issue position presented in the middle of the screen for four seconds (see Figure 1a). Afterward, participants saw a dot (drift-check target) in the middle of the screen. By fixating on the dot while simultaneously pressing the relevant button on the left side of a hand-held controller, participants could advance to the next screen. This ensured that all participants were looking at the middle of the screen before advancing to the critical part of the trial.

Participants then saw photos of four unique candidates displayed in a two-by-two array for 15 seconds (see Figure 1a). Each trial contained unique photos of two males and two females, along with a political party affiliation below each photo represented as text (each visual display always contained two Democrats and two Republicans). The locations of the male/female and Democratic/Republican candidates on the screen were counterbalanced

A. Schematic design of study

B. Trials in which gender and partisan cues conflict (critical trials)

4-candidate display preceded by
Republican / Male Stereotypical Policy Position

4-candidate display preceded by
Democrat / Female Stereotypical Policy Position

This candidate supports a
military strike against Iran.

This candidate supports
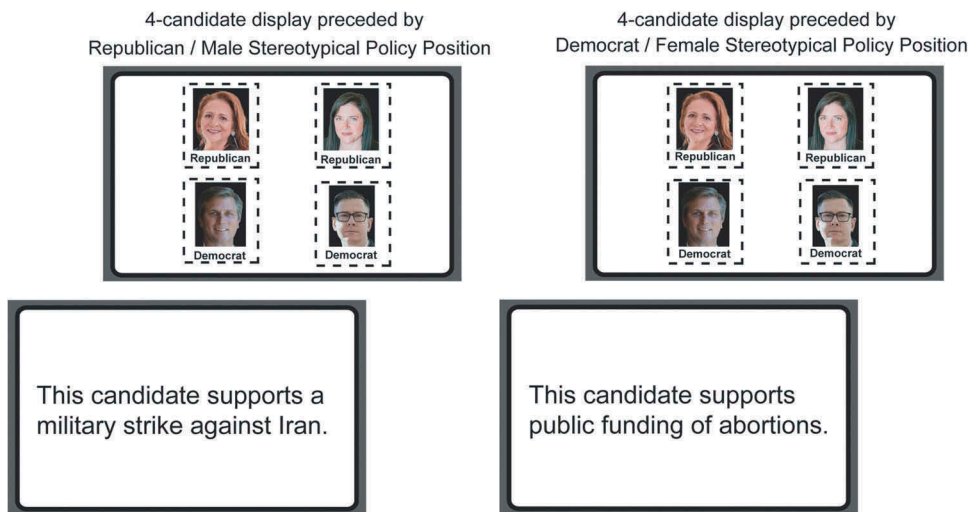public funding of abortions.

Figure 1. (a) Represents a schematic design of the study. (b) Shows examples of trials in which gender cues and partisan ID conflict (two female Republican candidates, two male Democrat candidates). These are the critical trials. The dashed rectangles show the areas of interest that encompass both the faces and text labels.

within and between participants. Participants were told that these four candidates competed against another at some point in their career. Afterward, participants saw another dot. They then saw one candidate photo, out of the initial four, for three seconds. They were told that this candidate was the one associated with the policy issue. Thus, from the participants' perspective, the issue and the single candidate photo constitute the relevant parts of the trial. This helped conceal the true purpose of the study as given that, as we

explain later, we were most interested in participants' eye movements when the four candidates were simultaneously displayed on the screen.

For both gender-stereotypical and gender-neutral policy positions, half of these issues were either followed by (1) instances in which the gender and party information in the four-candidate visual display converged (i.e., the two females were labeled "Democrats," the two males were labeled "Republicans") or, critically, (2) instances in which the gender and party information conflicted (i.e., the two females were labeled "Republicans," the two males were labeled "Democrats"; see Figure 1b). Given our interest in the conditions under which individuals prioritize partisan information over gender information, this second instance represents our critical trials. After the eye movement task, participants answered a series of demographic questions (age, gender, education-level of parents, partisan affiliation). They also answered the 20-item political knowledge questionnaire.

Analytic Strategy

Of primary interest in this study are instances in which partisan information and gender information can signal conflicting stereotypes (i.e., participants were shown two female Republicans and two male Democrats in the four-candidate visual display; see Figure 1b) and in which the four-candidate visual display was preceded by a gender-stereotypical/party-stereotypical policy position (these are issue positions that were strongly associated with *both* a specific party and gender; e.g., "This candidate supports a military strike against Iran," "This candidate supports public funding of abortions"). Our critical trials put partisan and gender information in direct competition and allowed us to examine which individuals were more likely to make use of partisan information than gender information.

Our areas of interest include both the photos and the text labels (placed below each photo) associated with each of the candidates (see dashed rectangles in Figure 1b). The key idea of our research design is that participants will look longer at certain candidates (both photos and labels) if they associate them with specific policy positions.

If individuals were more likely to use partisan stereotypes than gender stereotypes, then we expected two distinct patterns in the data. First, in trials in which the four-candidate display was preceded by stereotypical male/Republican policy positions (This candidate supports a military strike against Iran), we expected individuals to direct a greater amount of gaze at the female Republicans than the male Democrats (see Figure 2a). Second, in trials in which the four-candidate display was preceded by stereotypical female/Democrat policy positions (This candidate supports public funding of abortions), we expected individuals to change the distribution of their gaze – directing a greater amount of gaze at the male Democrats than the female Republicans (see Figure 2b).

On the other hand, if individuals were more likely to use gender than partisan stereotypes, then we expected different patterns in the data than the ones mentioned above. First, in trials in which the four-candidate display was preceded by stereotypical male/Republican policy positions, we expected individuals to direct a greater amount of their gaze at the male Democrats than the female Republicans (see Figure 2c). Second, in trials in which the four-candidate display was preceded by stereotypical female/Democrat policy positions, we expected individuals to direct a greater amount of their gaze at the female Republicans than the male Democrats (see Figure 2d).

Note that an equal amount of gaze directed to both female Republicans and male Democrats (50% each) would suggest that partisan and gender influence did not elicit
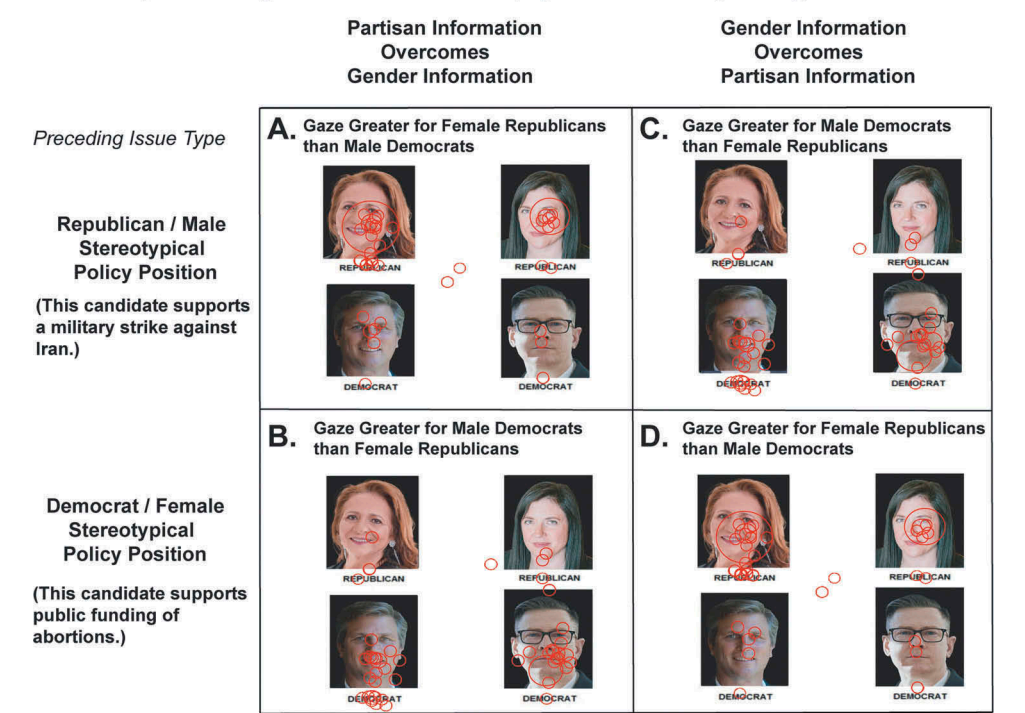
Figure 2. Expected patterns in gaze based on preceding issue type to the four-candidate display in conflict trials if either (1) partisan information overcomes gender information or (2) gender information overcomes partisan information. Red circles represent fixations (brief periods in which the eyes are not moving). Larger circles represent longer fixation durations.

a stronger influence over the other. Thus, by examining whether participants directed a greater amount of gaze (above 50%) at either the female Republicans or male Democrats based on whether the four-candidate display was preceded by a stereotypical male/Republican or female/Democrat policy position, our research design allowed us to determine whether individuals were more likely to use partisan than gender stereotypes. Finally, since our central hypothesis is that individuals with higher levels of political sophistication will be more likely to use partisan stereotypes than gender stereotypes when attributing stereotypical policy positions to candidates, we expect: 1) Individuals with higher political knowledge scores will direct a greater amount of gaze at the female Republicans than the male Democrats when the four-candidate display is preceded by stereotypical male/Republican policy positions and 2) Individuals with higher political knowledge scores will direct a greater amount of gaze at the male Democrats than the female Republicans in trials in which the four-candidate display is preceded by stereotypical female/Democrat policy positions.

Results

We manually defined areas of interest that combined both the photo and party label for each of the four candidates prior to data collection (see Figure 1b). We used participants'

total number of fixation counts (brief periods in which the eyes are not moving; see Figure 2 for an illustration of fixations) directed to the interest areas and the duration of these fixations as dependent variables (results for analyses of fixation durations are in the Supplementary Information).[12] We estimated a logistic regression model with robust standard errors clustered on participants.[13] Each individual fixation was modeled as a binary variable with "1" indicating that the fixation was located in the interest areas encompassing the female Republican candidates and "0" indicating that the fixation was located in the interest areas encompassing the male Democrat candidates.[14]

To test our hypothesis, we used our participants' political knowledge scores (0 to 20 with higher levels indicating more correct answers), issue type (stereotypical male/Republican policy position = 1, stereotypical female/Democrat policy position = 0), and the interaction between political knowledge score and issue type as independent variables. We also used participant's sex, age, and socioeconomic status, partisan affiliation, normative ratings of the candidates' attractiveness and ages, and partisanship as well strength of partisanship interacted with issue type (Bauer, 2018) as covariates. Note that we obtained substantively similar results whether we use a sparse or comprehensive model specification (see Table S1 in Supplementary Information).[15]

We obtained a positive and significant interaction between political knowledge score and issue type (B = 0.038, SE = 0.015, p =.01; see Table S1 in Supplementary Information). To interpret this interaction, we created predicted probability plots (see Figure 3a). As expected, for trials in which the four-candidate display was preceded by stereotypical male/Republican policy positions (e.g., supports military strike against Iran), individuals with higher political knowledge scores were more likely to fixate on the female Republican candidates than the male Democrat candidates (Figure 3a). Specifically, as a political knowledge score rose from its lowest (score of 2) to highest value (score of 18) in our sample, the predicted probability of fixating on the female Republicans increased from 48% [95% CI: 44% to 53%] to 59% [95% CI: 54% to 64%]. Furthermore, the 95% confidence interval intersects 50% for those in the lowest end of the political knowledge score (suggesting that they were equally likely to direct gaze on female Republicans and male Democrats) while those high in political knowledge score were above 50%. Taken together, the data suggest that individuals high in political sophistication were relying primarily on partisan stereotypes rather than gender stereotypes.

In contrast, for trials in which the four-candidate display was preceded by stereotypical female/Democrat policy positions (e.g., supports public funding of abortions), individuals with higher political knowledge scores, as expected, were more likely to direct their fixations to the male Democrats than the female Republican candidates (Figure 3a). In particular, as political knowledge score rose from its lowest (score of 2) to highest value (score of 18), the predicted probability of fixating on the male Democrats increased from 52% [95% CI:48% to 57%] to 56% [95% CI: 53% to 60%]. In addition, the 95% confidence interval intersects 50% for those in the lowest end of the political knowledge score (suggesting that they were equally likely to direct gaze at female Republicans and male Democrats) while those high in political knowledge score were above 50%. This pattern is consistent with the notion that individuals high in political sophistication were relying primarily on partisan rather than gender stereotypes.

Together, these results are consistent with our hypothesis that individuals with higher levels of political sophistication will be more likely to use partisan stereotypes than gender

A. Fixations to Faces and Labels for Trials in which Gender Cues and Partisan Cues Conflict
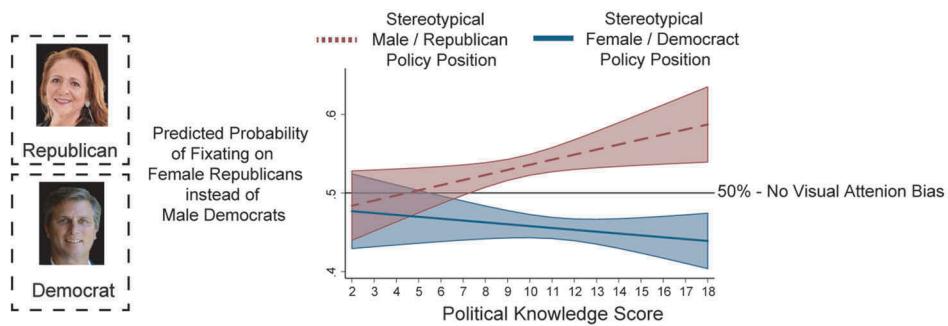
B. Fixations to Faces for Trials in which Gender Cues and Partisan Cues Conflict
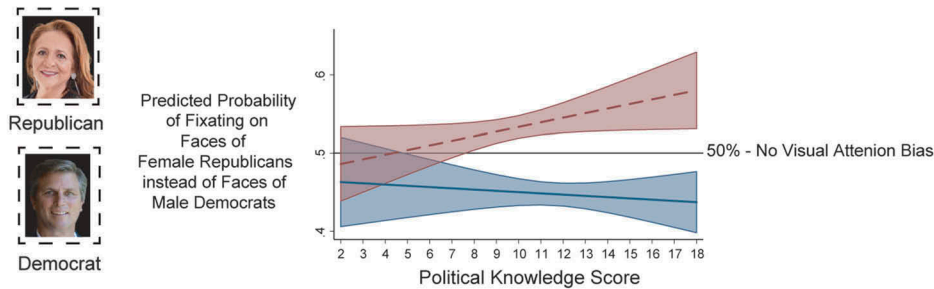
C. Fixations to Labels for Trials in which Gender Cues and Partisan Cues Conflict
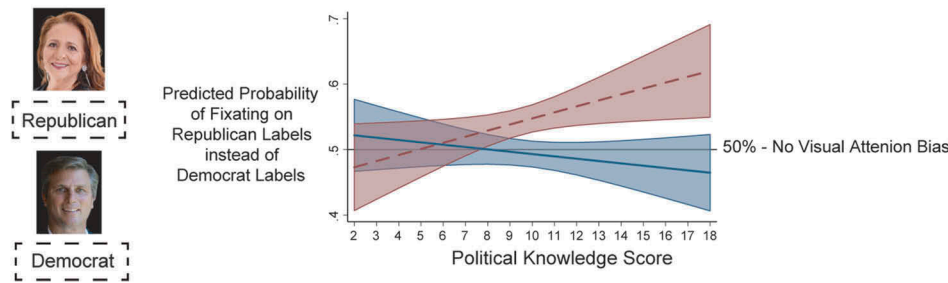

Figure 3. Estimated predicted probability of fixation to interest areas encompassing either (a) both the photos and partisan labels of the candidates, (b) only the faces, and (c) only the labels. Higher values indicate greater likelihood of fixations to female Republicans while lower values indicate greater likelihood of fixations to male Democrats. Shaded regions are 95% confidence intervals. Across all three figures, individuals with higher political knowledge scores are more likely to direct fixations to the female Republican candidates if the four-candidate display is preceded by a male/Republican stereotypical policy position. In addition, individuals with higher political knowledge scores are more likely to direct fixations to the male Democrat candidates if the four-candidate display is preceded by a female/Democrat stereotypical policy position.

stereotypes when attributing policy positions to candidates.[16] We conducted additional analyses to determine the extent to which our primary result can be observed if we separated out the interest areas into the candidates' faces and labels. First, we examined the amount of visual attention to faces of female Republicans compared to faces of male

Democrats, which yielded the same results (see Figure 3b; See Supplementary Information for details). As can be seen in the predicted probability plot (Figure 3b), in trials in which the four-candidate display was preceded by stereotypical male/Republican policy positions, individuals with higher levels of political knowledge were more likely to direct their fixations at the female Republicans' faces than the male Democrats' faces. In trials in which the four-candidate display was preceded by stereotypical female/Democrat policy positions, individuals with higher levels of political knowledge were more likely to direct their fixations at the male Democrats' faces than the female Republicans' faces.

Second, we examined the amount of visual attention to the Republican party labels compared to the Democratic party labels, which also yielded substantively results (Figure 3c): Taken together, then, our results suggest that individuals with higher levels of political knowledge were more likely to prioritize partisan information over gender information when attributing stereotypical positions to candidates.

Discussion

Our study has several substantive and methodological contributions to both the political communication and gender and politics literatures. First, this study contributes to the few studies that have examined how political evaluations unfold in a multimodal information environment (Boomgaarden et al., 2016; Bucy & Grabe, 2007; Druckman, 2003; Nagel et al., 2012; Powell et al., 2015, 2018a, 2018b) and the even fewer studies examining political stereotyping in multimodal settings (Andersen & Ditonto, 2020; Bauer & Carpinella, 2018; Bauer, 2015a). Second, there is still an active debate in the gender and politics literature about whether, and under what conditions, gender and partisan stereotypes influence political behaviors (e.g., voting, candidate evaluations, information search; Ditonto, 2019; Ditonto et al., 2014; Bauer, 2015a, 2019; Sanbonmatsu & Dolan, 2009). The present study's theoretical contribution is to show that individuals with higher levels of political knowledge are more likely to engage in partisan rather than gender political stereotyping (in a specific context in which partisan information is represented as text and gender information as images of faces). This contribution can be viewed as part of this broader literature examining the conditions under which partisan stereotypes will exert greater influence than gender stereotypes.

Finally, our study's novel methodological contribution shows how eye tracking technology can be used to measure the stereotype activation processes theorized by the literature to underlie the effects of partisan and gender stereotypes on voting decisions. As recognized by gender and politics scholars, the preponderance of studies that examine the influence of partisan and gender stereotypes on voting decisions either (1) don't directly measure the theorized stereotyping processes (Bauer, 2013) or (2) often use self-reports that the literature recognizes are vulnerable to social desirability biases (Krupnikov et al., 2016). The prevalence of self-report measures of stereotypes could underestimate the effects of gender stereotypes on political evaluations (Krupnikov et al., 2016). Our study lays the groundwork for how these concerns may be addressed through eye tracking technology.

More generally, eye movement monitoring is a powerful approach in allowing political communication scholars the ability to (1) determine what information is attended to or ignored in multimodal environments and (2) unobtrusively measure cognitive processes

(e.g., attention) that occur prior to people's political decisions. Indeed, the political media environment is rich with many stimuli that serve as possible inputs for visual and cognitive processing. Because the visual system has a limited capacity (for a review, see Driver, 2001), selection must occur to prioritize important stimuli for further processing while less important stimuli are ignored. To accomplish this task, individuals move their eyes to place information in the environment within foveal vision (which corresponds to the center of people's gaze) where visual acuity is the highest (Rayner, 1998). These fixations to specific areas in the visual field allow individuals to select stimuli for further visual processing. Furthermore, people are typically unaware of when they make eye movements and the location of their fixations while looking at visual stimuli (Mahon et al., 2018). This limits their ability to self-report this information. Thus, eye movement monitoring technology can provide researchers with unique information on what features or regions in a person's visual field are the focus of attention and what is ignored (for examples in the context of political communication, see Coronel, Ott et al., 2020; Coronel, Poulsen et al., 2020; Coronel & Sweitzer, 2018; Kruikemeier et al., 2018).

The types of political candidates most relevant to our results are those whose partisan and gender identities signal conflicting stereotypes (e.g., Republican females). If a candidate has a policy position which is stereotypically related to their gender identity but the opposite position is implied by their partisan identity, then the candidate may need to exert greater effort to publicize that issue stance. This is because, left up to the minds of voters, sophisticates might be more likely to incorrectly infer their policy position. For example, current U.S. Senator Susan Collins is a pro-choice Republican. If voters prioritize partisan stereotypes over gender stereotypes, then such a pro-choice female Republican would need to emphasize their pro-choice stance in their campaigns in order to counteract partisan stereotypes (i.e., Republicans oppose abortion). Similarly, such candidates could also strategically emphasize party and downplay gender if they want particular audiences (e.g., Republican voters) to assume that they are pro-life.

Of note, participants in our sample who were on the lower end of the political knowledge scores were equally likely to direct their fixations at the female Republicans and male Democrats (95% confidence interval intersects 50%; Figure 3a). This raises two possibilities: 1) political novices lacked either partisan or gender stereotypes or 2) novices possess knowledge of partisan and gender stereotypes but neither partisan nor gender information exerted greater influence on stereotyping. If the results generalize to a larger population, one view suggests that novices would be unable to effectively use partisan identification as a heuristic.

Political scientists have argued that stereotypes can function as cognitive heuristics which can help citizens make political decisions (Lau & Redlawsk, 2001; Rahn, 1993). For example, in low-information elections, voters may only have access to cues like partisanship and gender to inform their political decisions (Banducci et al., 2008). Low-information elections are particularly important as the vast majority of elections in the U.S. are not high-profile elections (Streb & Frederick, 2009). Indeed, work in gender and politics has begun to examine gender stereotyping of candidates in low-information elections at the local level (Bauer, 2020). In addition, partisan information tends be a more accurate predictor of politicians' issue positions or policy priorities (Ansolabehere et al., 2001; de Benedictis-Kessner & Warshaw, 2016) than gender information (Atkinson & Windett, 2019; Dolan, 2005). With this in mind, if neither gender nor

party information are prioritized by novices when evaluating political candidates, they will not be able to make as reliable of inferences about candidate's issue positions compared to if they prioritized partisan information.

However, most individuals in our sample have received or are currently receiving a college education (see Supplementary Information). Most are likely to be on the higher end of the spectrum in terms of their level of political sophistication. Consequently, political novices in our sample may be better educated than novices from a representative sample. If the novices were more similar to ones from the general population, it is possible that they may be more likely to use gender than partisan stereotypes. This is because novices with lower levels of education may be less likely exposed to partisan policy stereotypes in the media environment. As a consequence, with little knowledge of politics, novices may be more likely to use trait-stereotypes (e.g., females are caring and nurturing) to infer policy positions (supporting expansion of health care).

As with all studies, caution is warranted in terms of interpreting our results and generalizing our findings. Political campaigns feature an information environment in which voters receive several pieces of information which can be presented in a variety of modalities simultaneously. For example, while viewing a video of a candidate's campaign speech, other modes such as body language and voice can convey gender information (Everitt et al., 2016; Klofstad, 2016). In this study, participants received gender information from viewing a static photo of a candidate's face. However, there are environments in which voters are simultaneously exposed to other modalities that convey gender information such as the candidate's voice and nonverbal behaviors. Receiving gender information from multiple modes may lead individuals to prioritize gender information over partisan information conveyed via a textual label. In addition, recent research has investigated the ways in which additional visual information (e.g., images of members of the military) can be presented alongside candidate information (e.g., on a candidate website) to further emphasize gender cues and activate gender stereotypes (Bauer & Carpinella, 2018). Furthermore, future work should examine candidate portrayals and other political information in modes beyond still images and text (e.g., full motion video with sound; Bucy & Stewart, 2018). Examining the joint and potentially compounding effects of these distinct modes are important for future research to explore.

Although our study was conducted in the U.S. context, there are reasons to believe that our findings may generalize to other countries. For example, security and defense are more likely to be associated with male than female candidates in Belgium (Devroe & Wauters, 2018), Scandinavia (Matland, 1994), Finland (Lefkofridi et al., 2019), and Kazakhstan (Herrick & Sapieva, 1998), while healthcare is more likely to be associated with female than male candidates in Belgium (Devroe & Wauters, 2018) and Turkey (Matland & Tezcür, 2011), child care in Scandinavia (Matland, 1994), and social policy in Finland (Lefkofridi et al., 2019). Importantly, these are some of the same associations held by US voters about issue positions of male and female candidates and were stimuli in our study. In some cases, these gender-based policy stereotypes may conflict with partisan policy stereotypes – similar to the U.S. context in which policy stereotypes associated with females conflict with Republican-based policy stereotypes. If the information environments in these countries are structured such that policy positions are associated more strongly with partisan than gender identities, then we might expect political sophisticates to be more likely to use partisan than gender stereotypes. Generally, however, there is little

work to-date examining the interplay between gender and partisan stereotypes in countries outside of the United States (for an exception, see Matland & Tezcür, 2011). Future work in this domain can expand our understanding of the joint role of gender and party in voter decision-making in countries other than the United States. In multimodal settings, our study can provide the theoretical and methodological foundations that future work can build upon.

In summary, in multimodal settings in which partisan information is conveyed via text and gender information is presented through images of faces, political sophisticates use partisan stereotypes more so than gender stereotypes despite the gender-categorization advantage inherent in faces. Our unique eye movement approach is relevant for future studies of multimodal environments. As the presentation of information in multiple modes becomes more frequent, as in social media and online news environments where multimodal presentation of information is commonplace (Naaman, 2012; Tran, 2015) and in contexts that are consequential to political outcomes (e.g., on ballots), the study of how people make use of political information in multimodal settings will increasingly become an important topic to explore.

Notes

1. For an example, see Ballotpedia (https://ballotpedia.org/).
2. Beyond the gender and politics literature, there is work examining how rapid trait judgments extracted solely from faces of politicians (e.g., competence, trustworthiness) can influence voting decisions (for a review, see Olivola & Todorov, 2010).
3. See also Bauer (2015b) for the closely related concept of individual differences in attention to the news.
4. This is particularly salient in studies that explicitly label a candidate as a "man" or "woman" in their research designs (Sanbonmatsu & Dolan, 2009). Although such manipulations increase the saliency of gender categories in the minds of participants, they may also increase demand characteristics or social desirability biases if participants infer that researchers are explicitly studying gender biases.
5. Unlike gender, cognitive systems did not develop over the course of evolutionary history to categorize individuals based on partisan identification.
6. These results were strongest for stereotypes that participants intentionally endorsed (i.e., self-reported that they endorsed a specific stereotype).
7. Coronel & Federmeier (2016) study demonstrates that eye tracking and self-reports only converge for political sophisticates, not for novices.
8. These participants were recruited from Amazon's Mechanical Turk and were living in the United States. Participants were asked to indicate whether a given issue was more likely to be endorsed by the Democratic or Republican Party. We then calculated the average ratings for each of the issues.
9. These participants were recruited from Amazon's Mechanical Turk and were living in the U.S. Participants were asked to indicate whether a given issue was more likely to be endorsed by male or female candidates. Specifically, they were given the following options: male candidates, female candidates, both candidates equally likely.
10. Researchers can contact the authors for access to the photos.
11. The photos in the figures depicted here were not the actual photos used in the study. The photos in the figures were from unsplash.com. We thank Emma Hite for helping create the figures.
12. Fixation counts and duration of fixations are both highly correlated and often yield similar results in eye movement studies (for a review, see Hannula et al., 2010).

13. Modeling proportion as a binary response and using logistic regression to analyze the data is appropriate if it can be conceptualized as a set of target events over the total number of trials, as is the case in this study (Chen et al., 2017; Jaeger, 2008). Another desirable property of using logistic regression is that it allows us to estimate predicted probabilities (as seen in Figure 3). For our particular design, predicted probabilities provide an intuitive way of interpreting the results.

14. For example, suppose a participant for a four-candidate display directed 8 fixations to the female Republicans and 2 fixations to the male Democrats. Each of the 8 fixations that were directed at the female Republicans would be coded as "1 s" and each of the 2 fixations directed at the male Democrats would be coded as "0 s." We clustered the standard errors on participants to account for that fact that, within a given participant, fixations are not independent observations.

15. We operationalized our participants' socioeconomic status by using the highest level of education obtained by their mother and father (self-reported by participant; the two levels were averaged).

16. Although female Republicans are less frequent among political candidates and violation of expectations has been shown to influence gaze (Gong & Bucy, 2016), it cannot explain the results we obtained. If violation of expectation is driving our effects, then individuals should consistently direct greater gaze to the female Republicans (regardless of the type of the preceding issue).

Disclosure Statement

No potential conflict of interest was reported by the authors.

Data Availability Statement

The data described in this article are openly available in the Open Science Framework at https://osf.io/dqkf3/.

Open Scholarship

This article has earned the Center for Open Science badges for Open Data and Open Materials. The data and materials are openly accessible at https://osf.io/dqkf3/.

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