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A Cognitive Neuroscience Perspective on Political Knowledge, Misinformation, and Memory for “Facts”

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Memory is a fundamental concept in the fields of public opinion and political communication research. For example, the seminal studies in political science that examined what voters knew (or didn't know) about political candidates were based on assessments of memory for information that was disseminated over the course of an election campaign (Berelson, Lazarsfeld, & McPhee, 1954). Since the establishment of media research as a field of study, survey-based attempts to estimate media use have relied heavily on how well respondents can remember utilizing a specific news source (for criticisms of this approach, see Prior, 2009a, 2009b). Moreover, experimental work in media information processing has demonstrated that attention to certain features of news, such as negative compelling images, may retroactively inhibit memory for the preceding content (Newhagen & Reeves, 1992), distorting the accuracy of recollections about news stories that viewers have just seen. Taken together, insights about the nature of memory are critical to understanding how citizens make sense of the political world.

The central role of memory in explanations of political phenomena, then, begs the question of the extent to which public opinion and political communication scholars possess an accurate understanding of the nature and organization of human memory. This chapter argues that researchers in our field have much to gain by incorporating concepts and methods from studies of the cognitive neuroscience of memory.¹ In the following sections, we demonstrate how adopting a cognitive neuroscience perspective on memory can advance theoretical and empirical work in public opinion and political communication research. We proceed by discussing two important domains in which utilizing a cognitive neuroscience perspective can pay enormous dividends: (1) political learning and knowledge; and (2) processing misinformation.

This chapter is organized as follows. First, we discuss how public opinion and communication scholars have conceptualized memory. Different conceptualizations of memory have distinct implications for scholarly assessments of how effectively voters are able to understand their political world. Then, we describe a prominent view of memory from cognitive neuroscience: the notion of multiple memory systems. Adopting the theoretical view of multiple memory systems has profound implications for how scholars conceptualize the manner in which political learning from the media environment occurs. Second, we turn to the domain of

political misinformation. In particular, how neuroscience studies of false memories can contribute to a more nuanced understanding of why political misinformation persists and is difficult to eradicate. The chapter ends by briefly observing the implications of a cognitive neuroscience perspective on memory on assessments of how well equipped we assume citizens are to take on the challenges of democratic life.

MEMORY IN PUBLIC OPINION AND POLITICAL COMMUNICATION RESEARCH

Much of the foundational work in public opinion did not articulate an explicit conceptualization of memory. Early media effects research similarly ignored information processing issues, casting the “human processor as an impenetrable ‘black box’ with unknowable processes taking place between message reception and the traditional outcomes of learning, attitudes, or behaviors” (Geiger & Newhagen, 1993, p. 42). However, one could make inferences regarding how scholars implicitly thought about memory based on their central research questions and the methods they used in answering them. In particular, public opinion research in its formative years was focused on estimating what citizens knew about politics and the kinds of information they gleaned from media (Berelson et al., 1954; Campbell, Converse, Miller, & Stokes, 1960; Converse, 1964). Early research was heavily reliant on the survey method and respondent self-reports to determine what voters remembered about candidates, parties, policies, and other political constructs. An implicit assumption of this body of work is that voters fail tests of political knowledge because they possess no memory of an event or fact to which they were previously exposed (e.g., information disseminated from a political campaign).² From this perspective, the ability to verbally describe a past political event or fact served as an indicator for memory for political information.

This survey-based approach had a large influence on scholars’ assessments of the ability of voters to function as informed citizens. Critically, this influential work led to the conclusion that citizens possessed little political knowledge because they performed poorly on survey questions (Berelson et al., 1954; Campbell et al., 1960; Converse, 1964; Lazarsfeld, Berelson, & Gaudet, 1944)—a problem that had as much to do with the way questions were presented as it did with how much voters actually knew about candidates and issues (see Prior, 2014). Many theorists viewed such findings as troubling (Delli-Carpini & Keeter, 1997; Lupia & McCubbins, 1998), given that they challenged participatory models of democracy that cast an informed electorate as a prerequisite for a well-functioning democracy (see Dewey, 1927).

Furthermore, prominent theories of political learning assumed that political information could only exert an influence on attitudes and behavior if voters were able to explicitly remember it in a narrow, test-like format. The seminal Columbia and Michigan studies assumed that people’s ability to think in ideological terms and engage in policy-based voting required that they successfully retrieve and apply information about parties, issues, and nuances of political ideology (Berelson et al., 1954; Campbell et al., 1960; Converse, 1964). In addition, the formation of political attitudes about issues was conceptualized as involving a process of retrieving considerations associated with each issue, including recollection about official party positions, arguments made by political figures, and so on (Zaller, 1992; Zaller & Feldman, 1992). In these “fixed memory” studies of political knowledge and sophistication, scholars ultimately concluded that the mass of voters were largely unable to think in ideological terms, at least as operationally defined in survey instruments, and were incapable of making policy-based judgments.

In the late 1980s, however, a group of public opinion scholars challenged the conclusions of the static model of memory by introducing a new conceptualization. Borrowing from the information processing approach in social psychology, Lodge and colleagues distinguished between “memory-based” and “on-line” processing of political information (Lodge et al., 1989, 1995). In this model, memory-based representations were conceptualized as political information that citizens could consciously remember or recite verbally when tested, a view of memory similar to one adopted by early work in public opinion research. In contrast, Lodge and colleagues introduced the concept of an on-line affective tally, an overall summary evaluation based on affect that is derived, but independent from, memory-based political information. Through a series of experimental studies, they showed that rather than storing specific information about candidates and retrieving relevant bits at the time of decision-making (i.e., memory-based processing), people instead acted like on-line processors; that is, they could not report the specifics, but these details still affected their summary judgments via an affective tally.

For example, in a typical political campaign, voters are exposed to various types of information associated with the candidates running for office. Voters may encode (in classic “memory-based” models, the process of storing information in memory is often referred to as “encoding”) and then later use this information to decide whether they like or dislike a particular candidate. Scholars have traditionally viewed this candidate evaluation process as driven primarily by deeply ingrained specific facts about the candidate that can be consciously remembered. That is, scholars have assumed that in order for voters to render reasonable like or dislike judgments about candidates, they must first be able to recall specific information associated with candidates (e.g., the candidates’ issue positions; Enelow & Hinich, 1984; Kelley & Mirer, 1974). This recalled information is then compared with political preferences and drives affective judgments about the candidate. An important implication of this memory-based model is that meaningful political evaluations and voting decisions depend entirely on the successful recall of issue information.

On-line processing specifies a different means of representing and storing information. According to the on-line model of candidate evaluation, voters extract affective information from exposure to candidate issue positions and public statements (Lodge et al., 1989, 1995), as when negative emotion is elicited from a candidate whose issue positions, values, or even communication style diverge from the voter’s political preferences. This negatively stamped affective information is then incorporated into an accumulated affective tally for that candidate. Critically, the updated tally endures *irrespective* of whether information about candidates and the specific issue positions they advocate are also stored in memory. When the voter is later queried about that particular candidate, she only has to reactivate the affective tally to render an evaluation. As a consequence, voters can render reliable judgments even if they cannot remember any specific issue stands or policy positions. Because the average voter will likely not remember much specific, policy-related information previously learned during a campaign, as documented by public opinion survey data (e.g., Delli-Carpini & Keeter, 1997) on-line processing represents an efficient method of voter alignment with preferred candidates.

The on-line processing model has had substantial impact on public opinion and political communication research. First, the model has revised how scholars conceptualize the storage of political knowledge in memory. According to this model, political knowledge does not just specify representations of information that voters must retrieve from long-term memory and express verbally but can also take the form of general, affective representations. Second, these studies reached a substantially different conclusion about voter capacities to engage in informed citizenship than the earlier literature. Voters, they argued, can be responsive to campaign information even though they are unable to remember the specific considerations that went into

their political evaluations. In the next section, we discuss the extent to which the on-line model of political learning and evaluation comports with modern views of memory from cognitive neuroscience.

A COGNITIVE NEUROSCIENCE PERSPECTIVE ON MEMORY

Modern research on the cognitive neuroscience of memory began in 1957 when two neuropsychologists described a patient who became known by his initials, H.M. (Scoville & Milner, 1957). H.M. underwent brain surgery and had the medial portion of his temporal lobe removed (these included brain regions such as the hippocampus, amygdala, and the parahippocampal gyrus) in order to treat his epilepsy—a medical procedure considered severe and inhumane today. Though the surgery decreased the occurrence of his epileptic seizures, it also severely impaired his capacity to form new long-term memories, a condition referred to as “anterograde amnesia.” Indeed, when exposed to new people, places, or events, H.M. and other amnesic patients cannot explicitly state that they have learned new information.

Importantly, however, later studies showed that although amnesic patients were incapable of identifying new information to which they had just been exposed, their behavior showed evidence of prior exposure (Cohen & Eichenbaum, 1993; Eichenbaum & Cohen, 2001). The evidence for this type of learning has been shown in a variety of domains and contexts. For example, amnesic patients have the capacity to learn new motor skills (Milner, Corkin, & Teuber, 1968), show enhanced performance in perceptually identifying objects or words to which they were previously exposed (Warrington & Weiskrantz, 1968), and are cautious toward individuals with whom they previously have had negative interactions (Claparède, 1911; Feinstein, Duff, & Tranel, 2010; Tranel & Damasio, 1993).

Similar to the on-line processing model, this work has shown that the capacity to have one’s performance shaped by learning experiences is distinct from the capacity to consciously remember the learning experiences themselves. Many memory researchers attributed this dissociation to the operation of distinct forms of memory that are mediated by different brain systems. In particular, researchers theorized that the memory system responsible for implementing the encoding, storage, and retrieval of facts and events was dependent on the medial temporal lobe structures (e.g., the hippocampus) that are damaged in amnesic patients. Thus, studies of amnesic patients provide one of the key insights of modern memory research: memory is not a monolithic process but consists of distinct and separate capacities, each mediated by different brain networks. The notion that memory is expressed in many ways by multiple brain networks is often referred to as *multiple memory systems* (Squire, 1992).

In the decades following research on patient H.M., the multiple systems view of memory has been strongly supported by findings from a variety of cognitive neuroscience approaches. Indeed, reviews of the literature reporting multiple, converging results from both humans and animals has provided robust evidence for the existence of multiple memory systems (e.g., Eichenbaum & Cohen, 2001). In particular, memory researchers have made a key distinction between two broad classes of memory: declarative and nondeclarative (Cohen & Squire, 1980; Cohen & Eichenbaum, 1993; Squire, 2004). Declarative memory refers to knowledge of facts and events that can be accessed and expressed consciously. It can support all manner of arbitrary relations and has a high degree of flexibility. That is, such memories can be manipulated and used in a wide range of novel contexts. In contrast, nondeclarative memory refers to a broad collection of unconscious learning capacities that are expressed through performance (Squire, 2004). They neither require nor necessarily permit conscious access for expression.

Nondeclarative memory includes capacities such as procedural learning, emotional memory, conditioning, and priming. Unlike declarative memory, expression of nondeclarative memory most often influences automatic, procedural, and habitual behavior.

Within the framework of multiple memory systems, the concepts of “memory-based” and “on-line” processing can be viewed, respectively, as forms of declarative and nondeclarative memory processes. Indeed, recent research has provided evidence for the claim that political evaluations comport with a multiple memory systems model of political learning (Coronel et al., 2012). This study examined the extent to which amnesic patients could vote for candidates whose issue positions come closest to their own political views, despite not remembering any of the candidates’ issue positions. The study exposed amnesic patients and neurologically intact comparison participants (i.e., matched on age, education, and sex) to fictitious political candidates who endorsed issues that either converged or diverged with participants’ political preferences. The researchers then assessed whether amnesic patients had the capacity to identify candidates whose issue positions came closest to their own views. The study found that the amnesic patients did vote for candidates whose issues positions matched their own despite not consciously remembering their associated issue stands.

These findings support the claim in the on-line processing literature that voters can be responsive to campaign information even though they are unable to consciously remember the information that influenced their political evaluations. The distinction made by public opinion and political communication scholars between “memory” and “on-line” based processing also seems to map onto the distinction between declarative and nondeclarative memory made by cognitive neuroscientists. However, despite the seemingly potent capacity of nondeclarative memory to reliably support advantageous political decisions, findings from cognitive neuroscience may lead to less than optimistic conclusions about the capacity of nondeclarative memory systems, such as the affective tally, to aid voters in navigating the political world.

Multiple Memory Systems and Political Performance

The memory-based and on-line processing models have been highly influential in the public opinion and political communication literatures. Evidence suggests that Lodge and colleagues’ on-line processing framework can be viewed as a nondeclarative, emotional learning account of political evaluations. This work has been presented as a rebuttal to critical depictions of the democratic citizen. However, prior work on on-line processing neglects a critical feature from multiple memory systems research. In particular, evidence from memory research suggests that we should *not expect* nondeclarative memory to aid people’s ability to effectively navigate the political world as much as declarative memory. The learning experience via nondeclarative memory is not consciously accessible and, as a consequence, nondeclarative memory is unlikely to be as robust as declarative memory in its use across multiple, political learning and decision-making contexts. Nondeclarative memory may aid political decision-making but is likely to do so only under a narrow set of conditions. Given that information contained in nondeclarative memory is largely inaccessible to conscious awareness, it is less amenable to scrutiny in political decision-making.

For instance, the claim that the on-line tally can compensate for lack of declarative memory for political facts in the context of political decision-making is based almost entirely on results from studies in which participants are exposed only to issue-oriented political information that is accurately tied to a specific candidate. The real-world information landscape, however, is quite “noisy” and increasingly requires voters to distinguish between accurate and inaccurate political information. This problem is compounded by the growing use of digital and social

media for election campaigns and governance. Devolving traditional editorial decisions about what qualifies as newsworthy to anyone with a social media account means that the individual must now navigate an expanding universe of content choices and delivery platforms, deciding what is important, believable, and true and what is not (Bucy & Newhagen, 2019).

The rise of “fake news” calls the assertion that the affective tally can support advantageous political decisions into question because such noisy messaging can also convey affective information. Suppose a voter encounters an article claiming that Hillary Clinton poisoned an FBI agent who leaked her emails. Although the voter recognizes the news as “fake,” exposure to it could still generate a negative emotional response toward Clinton, particularly if the message is delivered in a menacing or skeptical tone that reinforces the negativity. If the voter remembers the declarative source of these affective associations (i.e., a non-credible source), then she may simply discount these negative feelings since it’s clear that they have an unreliable pedigree. However, if the voter does not remember the source of such affective associations, then she may treat the negative affective information derived from “fake news” the same way as affective information derived from a credible source. In other words, the voter may incorporate this emotional information into her affective tally.

Taken together, a cognitive neuroscience view of memory leads us to a more skeptical perspective on the extent to which nondeclarative processes such as the affective tally can, without the aid of declarative memory, effectively aid voters in performing some important functions in their role as citizens (evaluating candidates, aligning candidates with their policy positions based on accurate political information, making voting decisions, and so on). Although our arguments are admittedly speculative, future work employing a multiple memory systems perspective can test such predictions regarding the capacity of nondeclarative memories to aid political decision-making in real-world information environments. Finally, work on the cognitive neuroscience of memory is continually evolving. Emerging theoretical views have begun to move away from the consciousness/unconscious distinction that has been previously used to characterize declarative and nondeclarative memories (Hannula & Greene, 2012; Hasson, Chen, & Honey, 2015; Henke, 2010; Ranganath & Ritchey, 2012). These new ways of characterizing memory systems (i.e., differences in processing modes, support for relational memories) will likely have implications for future work in political communication and public opinion.

A FALSE MEMORY PERSPECTIVE ON POLITICAL MISINFORMATION

Work on false memory over the past two decades suggests that much of the American public is probably misinformed about key issues (Kuklinski, Quirk, Jerit, Schwieder, & Rich, 2000; Pasek, Sood, & Krosnick, 2015). That is, many citizens confidently hold beliefs that are demonstrably false. These false beliefs range from inaccurate views about scientific facts to who benefits from social policies, to health-related misnomers, to propaganda about political candidates (Kuklinski et al., 2000; Pasek et al., 2015). Political communication scholars theorize that the popularity of convenient media sources that disseminate fake news and questionable reports, such as blogs, apps, and social media platforms, has played a major role in misinforming members of the mass public (Bessi et al., 2015; Mocanu, Rossi, Zhang, Karsai, & Quattrocchi, 2015). Indeed, this concern gained international prominence in 2016 during the U.S. presidential election and the U.K. Brexit referendum campaign with the proliferation of fabricated news stories across legions of misleading websites and social media accounts (Lapowsky, 2018).

Here, we focus on another important source of misinformation: instances in which individuals are exposed to accurate information from a source (e.g., news websites), but biases inherent in memory cause them to misremember information. In particular, we focus on instances in which individuals can form false memories about politics. A “false memory” refers to the vivid recollection of an event that did not occur (for a review, see Gallo, 2014). The mechanisms that lead to the generation of false memories are not commonly considered in the political communication literature as potential sources of misinformation but are likely part of the dynamic that deters citizens from factual understandings of important events.

In a now-classic study, Gilliam and Iyengar (2000) presented participants with a local television news story about a violent crime. In one of the conditions, the story did not show or even mention the word “suspect.” After exposure to the story, participants were asked if the story showed a suspect. Strikingly, 44% of participants inaccurately recalled seeing a black “suspect” in the story that did not show or mention a suspect. There are at least two possible explanations for why these errors occurred. First, participants may have relied on stereotypic or schema-based judgments about groups to make a strategic guess about the presumed race of the suspect in the news story. This is largely the explanation provided by the authors of the study. Under this strategic guessing account, participants had no memory of the suspect in the news story. Instead, they used their knowledge of stereotypes—that African Americans are often associated with crime in news stories (Dixon & Linz, 2000)—to infer that the suspect was likely an African American.

These errors, however, can also stem from a different source: false memories. In this scenario, an individual’s stereotypic beliefs about African Americans may be sufficiently developed that exposure to information stereotypically associated with African Americans (e.g., crime) can lead to the implicit generation of other, related concepts (e.g., a black person). According to this account, information is stored in the form of schemas consisting of an organized network of semantically related concepts. For certain voters, for example, the concept of “African American” may be linked with “crime.” When a concept is encountered, its associated representation in memory becomes active and that activation spreads to surrounding concepts within the network (Collins & Loftus, 1975). Incidental activation of a related, non-encountered concept could form a long-lasting memory representation. A false memory occurs when an individual retrieves this memory representation and misattributes its source, mistakenly thinking that they encountered information that was, instead, internally activated (Johnson, Hashtroudi, & Lindsay, 1993; Johnson & Raye, 1981; Roediger & McDermott, 1995).

Thus, the critical difference between the strategic guessing and false memory account of false beliefs is that there is presumably a memory trace of a black suspect in the latter whereas there is no memory trace in the former. That is, a false memory account would predict that people possess an actual memory of the black suspect. In contrast, the strategic guessing account would predict that people do not possess an actual memory of the black suspect. Strategic guessing and false memory are two qualitatively distinct processes and distinguishing them is critical. Indeed, a large body of work suggests that individuals treat false memories the same as true memories in that they report similar levels of confidence in real and falsely remembered events (see Gallo, 2014). Thus, political misinformation is potentially harder to correct if it is the outcome of a false memory process than if it is the result of strategic guessing. In the next section, we discuss how cognitive neuroscience techniques, specifically, event-related potentials, can be used to investigate false memories in the context of political misinformation.

Using Event-Related Potentials to Investigate False Memories

Event-related potentials (ERPs) are well suited to investigating false memories as they can provide information specifically linked to different types of memory processes. ERPs are measures of electrical brain activity recorded from the scalp that are time-locked to a stimulus event (photo, phrase, individual word, etc.) and, therefore, index the information processing operations engaged as a result of exposure to the stimulus (for a general introduction to ERPs, see Amodio, Bartholow, & Ito, 2014). Within the more global ERP signal are components that can be described on the basis of polarity (positive or negative), amplitude (measured in microvolts), latency (time in milliseconds from stimulus onset to peak amplitude), topography (distribution of amplitude across the scalp), and functional sensitivity (i.e., the types of perceptual, motor, cognitive, and affective factors to which they respond). Based on functional sensitivity, as well as an understanding of the underlying neural generators (when known), these components have come to be associated with cognitive processes of interest to communication research, namely, attention and memory.

There are two ERP components that reflect different aspects of memory processing: N400 and the LPC.³ The N400 has been linked to the nondeclarative aspects of memory processing (for a review, see Kutas & Federmeier, 2011). For example, N400 memory effects are preserved in amnesic patients with compromised declarative memory systems (Olichney et al., 2000). In contrast, the LPC has been associated with declarative memory-related processes (Friedman & Johnson, 2000). Indeed, the LPC disappears in patients with anterograde amnesia, suggesting that the generation of the LPC requires an intact declarative memory system (Düzel, Vargha-Khadem, Heinze, & Mishkin, 2001).

A study in the domain of candidate evaluation has examined how one could use the N400 and LPC to disentangle strategic guessing from false memory-based processes (Coronel, Federmeier, & Gonsalves, 2014). The study examined people's tendency to misattribute issue positions that are consistent with a candidate's party affiliation, even when the candidate has never explicitly stated or endorsed such issue positions. For example, during the 2008 presidential election, half of Americans surveyed believed that it was Barack Obama and not John McCain who was in favor of embryonic stem cell research, when in fact, both candidates supported this position. These errors can stem from strategic guessing or false memories. Under the strategic guessing account, voters might reason that since McCain is a Republican and most Republicans are against stem cell research, then McCain must also be against stem cell research. Under this explanation, voters might assume that because their knowledge is incomplete, they should guess where candidates stand on some issues. In contrast, a false memory account suggests that voters' stereotypes or schemas of major party candidates can be so strong that voters create false memories about the issues that candidates support or oppose. Because false memories are indistinguishable from real memories in consciousness, voters believe candidates support issues they actually oppose, or vice versa.

In the study, participants learned about fictitious political candidates and their issue positions. In a subsequent test phase, brain activity in the form of ERPs were recorded. During this memory test phase, participants were shown issue positions that they were previously exposed to ("old") or positions they were not shown during the study phase ("new"). Individuals were asked to classify the items as old or new. The memory test generated four types of trials: hits (old issue positions correctly classified as "old"), misses (old issue positions incorrectly classified as "new"), correct rejections (new issue positions correctly classified as "new"), and false alarms (new issue positions incorrectly classified as old). The study generated the classic old/new effect, the finding that hits generate distinct ERPs (N400 and LPC) from correct rejections.

Given the functional interpretations of the N400 and LPC as indexing memory processes, this difference in ERPs between hits and correct rejections is theorized to arise from individuals possessing a memory signal for hits but possessing no memory for correct rejections.

The critical items are the false alarms—issue positions that were not shown in the study phase but that were incorrectly identified as shown. The strategic guessing account predicts that ERP responses to false alarms should resemble ERP responses to correct rejections since no memory signal should exist for these items. With the absence of a memory signal, false alarms are likely the product of strategic guessing. In contrast, the false memory account predicts that ERP responses to false alarms should be similar to ERP responses to hits. This would suggest that there are memory signals for false alarms that are indistinguishable from true memories (hits) (for studies examining the neural networks associated with false recognition, see Dennis, Bowman, & Vandekar, 2012; Garoff-Eaton, Slotnick, & Schacter, 2006). The study found that ERP responses to false alarms were indistinguishable from hits (Coronel et al., 2014). In other words, falsely attributed issue positions exhibited similar brain patterns to *true* memories of issue positions. In addition, participants reported high levels of confidence when making false alarm choices.

The relationship between false memories and high confidence levels in recognition has implications for the behavioral consequences of misinformation. Indeed, previous work in different domains shows that confidence can influence behaviors. For instance, individuals who are uncertain about the validity of their beliefs are more likely to seek out additional information to reduce their feelings of uncertainty (Locander & Hermann, 1979). Under strategic guessing, voters are likely aware that their knowledge is incomplete and recognize that they are making educated guesses. With more information, voters likely would update their views, replacing incorrect guesses with facts.

In contrast, because false memories are indistinguishable from real memories, voters can possess stronger confidence in their beliefs. Unlike educated guesses, false memories are potentially harder to correct even in light of new information given that voters believe this information to be valid or the events in question to have really occurred. Although we are not claiming that all types of misinformation can be explained by false memory-based processes, false memories generated by schemas or stereotypes may explain why some patently false beliefs are held in high confidence and why they are hard to correct.

CONCLUSION

The capacity of voters to retrieve political information about candidates, parties, and policies from memory has been a central criterion for assessing the competence and performance of democratic citizens since the earliest empirical research in public opinion. Indeed, over the last half century, memory and memory-based processes have played a key role in theories of political behavior and decision-making, sometimes as an implicit or assumed process rather than a fully articulated construct. Historically, public opinion and political communication scholars have conceptualized voters' memories for political information in different ways. As discussed, early attempts by public opinion and political communication scholars to conceptualize memory generated multiple and sometimes conflicting conclusions regarding the competence and political performance of citizens. Thus, insights into the organization and function of memory is critical to understanding the nature of citizen decision-making in democratic governance.

Although nondeclarative memory, via on-line processing, has been used as a refutation to critical portrayals of voters, memory research suggests that we should have a skeptical view of

such a claim. In particular, nondeclarative memory is characterized by its lack of conscious access and scrutiny. Thus, nondeclarative memory should not be as robust as declarative memory in its use in political decision-making across different information contexts.

The work in cognitive neuroscience on false memory suggests that some types of political information may be the product of false memories rather than strategic guessing. This perspective on misinformation is important, given the evidence that people treat false memories the same as true memories and false memories tend to elicit high levels of confidence (while generating a memory signal that is indistinguishable from a true memory). An important implication of the false memory account of information processing is that some types of misinformation may be harder to correct than previously thought.

In summary, the use of concepts and frameworks from cognitive neuroscience should be useful in advancing theoretical and empirical work in public opinion and political communication research. The role of memory in assessing citizen competence and performance is an example of how knowledge about the brain can revise concepts central to communication. Indeed, different conceptualizations and characterizations about memory can lead to vastly different assessments of citizens' political performance in democratic governance. More broadly, a cognitive neuroscience approach to questions about citizen competence has the potential to change how political communication scholars think about the underlying mechanisms of citizenship—including memory, attention, emotion, and cognition—in a way that increases our understanding of how citizens make sense of the political world.

NOTES

1. The arguments and ideas from this entry were also developed in the first author's doctoral dissertation (Coronel, 2012).
2. It was unclear from these early studies whether the inability to correctly answer survey questions was due to memory failures (people were exposed to relevant political information but just forgot them) or failures in exposure (people were never exposed to relevant political information).
3. The N400 is so named because it describes a negative deflection that peaks around 400 milliseconds after stimulus onset. The LPC (late positive component or late positive complex) is a positive deflection that peaks 500 and 800 milliseconds post-stimulus onset.

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