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Dynamic Process Tracing Methods in the Study of Political Decision Making

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Summary and Keywords

Understanding how individuals make political decisions in a complex and ever-changing world requires recognition of the dynamic nature of the environment, as well as theoretical and methodological strategies to address these complications. As the scholarly understanding of the limits of human cognition expands, researchers can no longer rely on decision-making models that assume unlimited time, resources, and/or abilities of voters. Fortunately, dynamic process tracing models demonstrate the information processing component of decision-making, turning the focus away (slightly) from the decision outcome and toward the ways that people come to these decisions. These models derive from weaker, but more accurate, assumptions about the cognitive abilities of humans and provide critical insight into both the factors that voters consider when making decisions and the ways voters incorporate those factors into their decisions. In addition, thanks to the work of Lau and Redlawsk, these processes are directly observable with their Dynamic Process Tracing Environment (DPTE).

Researchers relying on dynamic process tracing models are now able to assess the influence of political and demographic factors on the pattern, content, and amount of information voters access and rely on when making political decisions. These models offer a more realistic view of voter abilities than rational choice models, as well as providing greater insight into the process of decision-making (rather than the outcome of the process) than much of the work deriving from the Michigan model of public opinion. Additionally, the DPTE offers advantages over earlier static information board studies.

Rather than seeing one's self in conflict with decades of public opinion research, however, scholars in the dynamic process tracing tradition would be wise to consider their work as complementary. A focus on political variables as outcomes misses a crucial cognitive step: the evaluation of environmental stimuli through the lenses of short- and long-term predispositions. As scholars seek to understand why voters possess certain attitudes, they should ask *how* those attitudes were formed in the first place. Dynamic

process tracing models allow for theorizing about and empirically testing components of the decision-making process previously left uninvestigated.

Keywords: process tracing, campaigns, correct voting, decision-making, DPTE, political decision making

Introduction

A primary struggle for political scientists involves uncovering the processes by which individuals make political decisions. Although scholars have spent decades finding the correlates for political attitudes and behaviors (see, for canonical examples, Campbell, Converse, Miller, & Stokes, 1960; Lewis-Beck, Jacoby, Norpoth, & Weisberg, 2008), they have spent less time focused on the cognitive processes associated with those decisions. Yet the political and social world is complex and constantly changing, and researchers interested in the decisions voters make must account for this dynamic environment.

In pursuit of this goal, a primary option for researchers is the use of dynamic process tracing (DPT) methods, and particularly the Dynamic Process Tracing Environment (DPTE) tool developed by Lau and Redlawsk (2006; Anderson, Redlawsk, & Lau, FORTHCOMING). DPT allows researchers to follow the information search and learning processes of voters in a controlled but changing environment. By pairing this information with data about the participants, as well as political outcome variables, researchers gain greater understanding of how voters make decisions in complex environments. Researchers using DPT have advanced our understanding of the decision-making processes that individuals undertake in politics. This article describes the primary research tool for utilizing DPT in political science, provides background on the logic and reasoning for DPT, and outlines the significant advances made by DPT researchers.

The Case for Dynamic Process Tracing

As scholars became interested in the processes by which political actors made decisions, the need arose for methods to measure and evaluate the decision-making process. DPT methods are one subset of these methods, referring specifically to those techniques that function with a flexible understanding about the amount and type of information that individuals use when making decisions, as well as allowing for multiple decision-making models that individuals may employ.

DPT methods are useful for this adaptability, but their most important function is in the recognition of the limited cognitive abilities of humans in most social situations. As Lau and Redlawsk (2006) point out, this runs directly counter to the expectations of rational choice theories of voting (Arrow, 1951; Downs, 1957), which generally expect voters to process large amounts of information before coming to a decision. Conceptions of voters as “cognitive misers” (Fiske & Taylor, 1984) are inherent in the assumptions of DPT, while rational choice (and to some extent, the Michigan Model of public opinion à la Campbell

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et al. [1960]) assumes voters are significantly more well informed than social psychology suggests they are capable of being.

Although DPT does not assume voters are highly informed, it also does not rest on the assumption that voters are completely ignorant of issues. Indeed, by focusing on the *process* of decision-making, rather than the outcome, DPT methods do not preclude the possibility that voters (or some voters) are exceptionally knowledgeable. Instead, DPT allows for a range of voter models, stretching from fully informed rational voters to limited processors deciding how to vote based on the smallest amount of information.

This flexibility recognizes extensive work in social psychology on the multiplicity of information processing. Since the 1980s, psychologists have recognized that information can be processed quickly and intuitively (called System 1, heuristic, or peripheral route processing) or with more care and consideration (called System 2, systematic, or central route processing) (Chaiken, 1980; Eagly & Chaiken, 1993; Kahneman, 2003; Petty & Cacioppo, 1986). Yet existing decision-making models overwhelmingly relied on voters to process large amounts of information, considering candidate job performance, issue stances, and economic evaluations, among many other factors. This assumption of System 2/systematic/central route processing clouded our understanding of the American voter.

DPT methods explicitly allow for the possibility that voters act under the System 1/heuristic/peripheral route framework. Additionally, DPT is flexible enough to account for different motivations behind decisions. Early theoretical models assumed voters wanted to come to the “best” decision, but scholars now know that different motivations influence the way people come to decisions. Although some people clearly do want to find the correct decision, others simply want to come to a decision quickly (Redlawsk & Lau, 2013). This distinction between accuracy-based and directionally based decisions, first outlined by Kunda (1990), underscores the necessity of examining the process of decision-making, rather than just the outcome.

Incumbent in many of the new models of voter behavior is the assumption that humans cannot process all of the information available to them. They fail to do so for motivational reasons (Jain & Maheswaran, 2000; Kunda, 1990) and/or cognitive limitations (Chaiken, 1980; Fiske & Taylor, 2008; Kahneman, 2003; Petty & Cacioppo, 1986), but the fact remains that there is more information available to individuals during the decision-making process than they can access and interpret. This is why DPT shines in examining these processes. In contrast to static process tracing methods, where the information is unchanging, DPT forces individuals to interact with information under constraints similar to those they face in the real world.

By recreating this environment through the use of DPT methods, researchers are able to examine how, when, and why individuals sometimes process information deeply and sometimes do so shallowly. Additionally, insight is gained into the political decision-making process when the amount and type of information that voters prioritize when making decisions can be traced. Unlike many models of public opinion and political behavior, DPT does not place assumptions on voters; instead, it assumes that voters act

as social psychology tells us they will act: in a variety of ways, depending on factors like their interest in the situation, existing knowledge and ability, and underlying motivations. Rather than specifying a model of voter behavior, DPT simply allows researchers to understand the multiple ways that voters interact with the political environment.

Behavioral Decision Theory

Whereas early voting models assumed rational behavior, these assumptions ran up against findings about the limited cognition that most individuals engage in. To account for these limitations, Simon (1978) coined the term “bounded rationality” to describe a more accurate portrait of human rationality. Rather than the classical, full-information, optimal decision-making of unrestrained rationality, Simon’s conception understands that humans, though generally desiring to make the “correct” choice, are limited in both the amount of knowledge they can possess and the ability to use that knowledge when making decisions (Simon, 1990).

Behavioral decision theory takes this as the starting point to explain the psychology that underlies the decisions made by individuals. In essence, behavioral decision theory operates under the assumption that individuals are limited processors and therefore must adopt adaptive strategies to come to a decision. Although a full accounting of the various strategies available to individuals is beyond the scope of this article, Lau and Redlawsk (2006) break down the strategies into two broad categories: those that simplify evaluations and those that simplify choices.

One of the most common strategies to simplify evaluations is the use of heuristics (Kahneman & Tversky, 1972; Tversky & Kahneman, 1973). Heuristics have often been posited as a missing link to explain the disconnect between the instability of individual political attitudes (Campbell et al., 1960; Converse, 1964), a general lack of political knowledge (Delli-Carpini & Keeter, 1996), and the stability of mass attitudes (Page & Shapiro, 1992). If voters lack consistent issue positions and knowledge, how can the public, in the aggregate, exhibit stability? Simple cognitive shortcuts (heuristics) help solve this problem by allowing voters to come to decisions with relatively little knowledge or information, but to do so with relative stability (although, for an example of the limits of heuristics, see Dancy and Sheagley [2013]).

In addition to simplifying evaluations, decision-makers can also ease the process by simplifying the choices they make. Again, Lau and Redlawsk (2006) break these decisions down into three categories. Decision-makers can decompose the decision, making a series of smaller, and presumably more manageable, decisions. They can also edit, or prune, their choices down to a more manageable number of options. Or they can rely on heuristics around the choice set (as opposed to the evaluation of a choice) to limit their options.

For scholars seeking a usable model of political decision-making, behavioral decision theory represents an attractive and empirically well-grounded option. Relying on a reduced choice set or a simplified evaluative process helps explain a number of anomalies

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in public opinion and political behavior research. Yet just as DPT methods help us understand the limits of human cognition, they provide a similar service to our testing of behavioral decision theory.

Realistic View of the Process

Early tests of the tenets of behavioral decision theory utilized static information boards but, in addition to the limitations noted earlier, static boards are simply lacking for a realistic representation of the political environment. If scholars are to take Bartels's (1996) concern that scholars rely on the expectations of behavioral decision theory without testing the mechanism, then they must adopt methods that allow for direct tests of how voters simplify the choices and evaluations in the political environment.

To do this, researchers must begin by approximating the dynamics of the political environment. As any observer of the contemporary media environment can tell you, news consumers are faced with a multitude of options, both partisan and non-partisan, appearing in a variety of digital, broadcast, and print forms. Although it may have been safe to assume some baseline level of political knowledge in the era of the Big Three news networks, scholars know now that increased choice leads some individuals to opt out of politics and others to opt in (or to utilize "soft" news sources) (Baum & Jamison, 2006; Prior, 2003, 2005, 2007).

Baum, Jamison, and Prior rely largely on observational evidence to construct measures of news exposure, but these methods do not allow for precise control of the media environment the way a dynamic, experimental system could. More importantly, however, observational methods that rely on self-reports of interest, media use, access, and knowledge can only capture the *outcomes* of the behavioral decision process. Again, researchers are left with Bartels's critique, that a reliance on behavioral decision theory to explain these outcomes often fails to actually test the underlying mechanisms.

DPT research not only better approximates the media environment, but it allows researchers to study the interaction between more traditional media sources and paid media, such as television advertisements or political mailers. By allowing for the introduction of campaign materials into the media environment on a controlled basis, DPT can settle debates such as whether campaign advertisements decrease (Valentino, Hutchings, & Williams, 2004) or increase (Housholder, Watson, & LoRusso, 2018) information-seeking behavior. Additionally, scholars who adopt the more quantitative DPTE (discussed at length in the section entitled "Description of the Dynamic Process Tracing Environment") as an instrument to trace decision-making avoid much of the complexity in more qualitative DPT approaches (Groenland, Kuylen, & Bloem, 1996). Ultimately, a dynamic information environment allows for a compromise between the observational methods of Housholder et al. and the relatively limited experimental methods of Valentino et al.

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Most importantly, however, is the ability of DPT methods to account for variation in the depth, balance, and sequence of information search (Lau & Redlawsk, 2006; Redlawsk & Lau, 2013). Depth of search, conceptualized as the amount of information sought, and often measured as a count of stories read or seen, tells us whether individuals are highly engaged with the decision process. Given an unlimited amount of time, respondents are likely to view a high number of sources. Yet in a dynamic environment, natural variation occurs on the amount of information sought. In the political world, individuals are more or less inclined to learn about political subjects. If scholars believe behavioral decision theory and the proposition that individuals rely on heuristics or other cognitive shortcuts to make decisions (Fiske & Taylor, 2008; Kahneman & Tversky, 1972; Tversky & Kahneman, 1973), they should expect variation in search depth. DPT methods allow us to predict this engagement as well as use the depth of search as an explanatory variable for assessing the decision-making processes and outcomes.

In addition to search depth, DPT methods allow for a test of balanced or unbalanced search. Search balance (or comparability, in the words of Lau and Redlawsk [2006]) is the level of variation in search across different alternatives. That is, a balanced search might see a voter seek out the partisan identity and issue positions of all candidates in the choice set, whereas an unbalanced search would see information sought about only one or a few potential candidates. To the extent that individuals are motivated reasoners (Kunda, 1990; Lodge & Taber, 2013; Taber & Lodge, 2006), under certain conditions individuals would be accuracy motivated and seek a relatively balanced set of information, and under alternative conditions, individuals would be directionally motivated and only seek information that supports their prior attitudes. Additionally, if voters not only rely on evaluative shortcuts but also choice set shortcuts, examining search balance lets researchers see the process of limiting or eliminating alternatives.

Finally, with DPT methods, researchers are able to examine the sequence of search. By tracking the order in which information is accessed, researchers are able to see what information is valued and, potentially, which information is most consequential for the decision-making process. A rich literature exists demonstrating a variety of order effects, including recency and primacy biases (or a tendency to favor early information and the most recently acquired information; see, e.g., Anderson and Hubert [1963] and Hogarth and Einhorn [1992]). Others, however, pushed back against these order effects, arguing that political evaluations are continually updated (online processing) as new information becomes available (Lodge, McGraw, & Stroh, 1989). Under the online processing model, voters are less susceptible to recency and primacy bias, but are instead reliant on information they view as particularly important (McGraw, Lodge, & Stroh, 1990). Regardless of the theoretical model being tested, DPT methods, by tracking search order, allow researchers to examine not only which pieces of information are viewed early and late in the search process but also the influence of different pieces or types of information (by pairing search order information with prior attitudes and political outcomes).

Taken together, depth, balance, and sequence of information search offer insight into the level of cognitive engagement an individual has with the decision process. An individual who seeks out many pieces of information about all of the candidates (high depth and balanced search) is expending a large amount of cognitive energy on the decision process. In contrast, the individual who seeks out only the bare necessity of information about their same-party candidate is expending significantly less energy while engaging in a shallow and unbalanced search. In addition, the sequence of information seeking can tell researchers when a participant reaches a decision point or what information is valuable enough to end or alter the search process. Thus, the theoretical and methodological advances from DPT are numerous. In particular, this type of thinking about the process of decision-making in a complex political environment helped produce a number of key insights for both public opinion and political behavior research by allowing researchers to understand the decision-making process.

Description of the Dynamic Process Tracing Environment

The DPTE (Anderson et al., FORTHCOMING) is a free program that is highly customizable and available to researchers online. The program is currently hosted by the University of Iowa (researchers can access the program online). Originally designed to study the changing nature of political campaigns, the program is adaptable for multiple situations, both political and nonpolitical (Chen & Bryan, 2017; Ditonto, Hamilton, & Redlawsk, 2013; Lau & Redlawsk, 2006; Redlawsk, 2002).

Although some decisions can be studied using so-called static information boards, where participants are given an unchanging set of information to help them make their decisions (see, e.g., Ferrari & Dovidio, 2001, or Payne, 1976), political campaigns, and the media environment in general, are constantly changing. That is, individuals do not have continual access to all information. Instead, some information is more commonly available, some is available intermittently, and other information is easily accessible at some times and nearly impossible to find at others. For example, Mintz, Geva, Redd, and Carnes (1997) recognized the possibility that new information entering the decision-making process could change the strategies used by decision-makers and compared dynamic and static choice sets when looking at foreign policy. Their procedure, however, was relatively simple in its introduction of new information. In contrast, the DPTE offers significantly greater control over the information environment.

In particular, the DPTE can present participants with a continually scrolling list of information headlines. The program allows users to design and present multiple pieces of information (called “stimuli”) to participants. At the beginning of the experiment, a headline appears at the top of the computer screen. At a researcher-specified interval, a new headline enters the screen, and the first headline moves down one position. In total, there are six information positions on the screen at any point. When the seventh headline

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enters the environment, the first headline to appear exits by scrolling off the bottom of the screen. This information is now unavailable to the participant for the time being.

As the headlines scroll, participants must click on the headlines that they want to access. When they access the headline, a new screen opens with more information related to that headline. While the participant reads this information, the headlines continue to scroll in the background. Thus, accessing information exerts an opportunity cost on other available information. This cost is dictated by the amount of information in the stimuli, the speed with which headlines appear, the frequency with which headlines reappear, and the total time allowed to interact with the environment, among other factors.

In addition to the items in the information flow (“flow items”), researchers can have information appear at certain times in the experiment (“timed items”). These are stimuli that open automatically and that participants must interact with before continuing in the environment. Researchers can choose to allow headlines to continue scrolling in the background or to stop the information flow and experiment timer while the timed item is open.

Because the platform is online, researchers are not limited to simple text stimuli. In addition to text, stimuli items can be images, videos, or a “ticker” that scrolls information across the screen while the information flow continues. Participants interact with all of these stimuli and, if the Social Experiment feature is enabled, they are able to comment, share, and like stimuli in a way similar to a social network. Like all aspects of the DPTE, this is fully customizable and can be a true social experiment (with participants actually sharing and interacting with each other) or a simulated social experiment (with researchers specifying and collecting shared information, but no actual contact occurring between independent participants).

Because the DPTE was designed as an experimental platform, participants can be randomly or nonrandomly assigned to different groups, which presents them with different environments. For example, researchers wishing to study the effect of a campaign advertisement on information search patterns can randomly assign participants to treatment and control conditions and compare search pre- and post-treatment. Researchers can also assign participants to groups based on prior responses to questions. This allows researchers to place respondents in particular groups or allow respondents to opt in to certain campaign environments, for example, a partisan primary for their preferred party (see Utych & Kam, 2014).

The most important feature of the DPTE information board, however, is the background data that are collected by the program unobtrusively. While the participant is simply interacting with the information board, the program collects the order and frequency that stimuli are presented, the order and frequency with which a participant opened a headline, and the duration of time that a participant spent with each piece of information. These data are vital to the process tracing component of the program. As researchers explore how voters make decisions, they care not only about *what* information voters access (which can be assessed with a static board) but also in *what order* they view

information, *how often* they view a piece of information, and *how long* they interact with it. Additionally, researchers care how search patterns change with certain types of information and how voters decide what information to prioritize when opportunity costs exist.

DPT methods, and in particular the DPTE, are vital tools for understanding the ways that individuals prioritize and process information. These methods offer valuable advances beyond static information boards and other methods of examining information search that allow for full information or unlimited time. In particular, DPT more closely approximates the decision-making environment that voters and political elites encounter on a daily basis by accounting for the limits of human cognition within the framework of behavior decision theory.

Contributions to Political Behavior and Public Opinion Research

Importantly, the introduction of DPT to the study of opinion formation and behavior did not lead to a wholesale rejection of existing theories. Instead, it allowed for an examination of the “black box” of decision-making. Whereas many scholars speculated about the processes of political decision-making (e.g., Lodge et al. [1989] or Marcus, Neuman, and Mackuen [2000]), studying opinion or behavior through the DPT framework allowed for direct testing of these theoretical assumptions.

DPT research can be subdivided in numerous ways, but here I work under three broad and intersecting themes. The first theme captures work that utilized the DPTE primarily as a tool to better approximate the political media and campaign environment. This work built on existing observational and experimental work on campaigns, often providing greater clarity to these relationships. The second theme concerns a direct benefit of the DPT approach, namely the ability to trace the information-seeking patterns that individuals engage in as they make political decisions in a complex environment. This work addressed questions about voter competence and decision strategies (among other important questions) and offered insight into how voters come to decisions. The final theme, focused on extending and refining theoretical models of voter behavior, builds out of these two themes. Without the realistic information environment or the ability to trace and understand decision patterns, researchers would be unable to refine theoretical models the way scholars have done.

DPTE as a Campaign Simulation

Assessing Different Contexts

A major advantage of the DPTE, reiterated frequently by Lau and Redlawsk (2006), is the program’s ability to more realistically represent how information appears in political campaigns. This is particularly true under a 24-hour news cycle, when seemingly important news events are quickly overshadowed by the next instance of “breaking

news.” Although the normative preference may be highly rational, fully informed voters, the reality of the situation is that voters must decide what information to read, and those decisions often mean they will not be able to pay attention to other pieces of information, either because the agenda of the news media has shifted or the time they can devote to politics has elapsed.

Under these conditions, DPTE can provide valuable insight into the dynamics of political campaigns. One important debate in the campaign literature focused on whether negative political advertisements altered the composition of the electorate, with some arguing that they decreased turnout (Ansolabehere & Iyengar, 1995; Ansolabehere, Iyengar, Simon, & Valentino, 1994) while others argued they could increase turnout (Finkel & Geer, 1998; Geer, 2006) and some posited that there were subtleties to the dynamics (Brooks & Geer, 2007). Although not fully explored, Russo (2017) utilized the DPTE to explore issue- and person-based negative campaigns and found that person-based campaigns led to decreased evaluations for in-party candidates. Similarly, Gasperoni and Mantovani (2015) leveraged the forced stimuli exposure of a DPTE experiment to assess the influence of pre-election polls in a comparative context, adding nuance to existing research on the influence of election polling (Blais, Gidengil, & Nevitte, 2006; Faas, Mackenrodt, & Schmitt-Beck, 2008; Vowles, 2002).

The DPTE software has also been used to answer questions about non-campaign-related questions. Chen and Bryan (2017), for instance, used the DPTE to simulate news about the Supreme Court nomination process, showing that citizens react differently to nominees, depending on how forthcoming or reticent they are in the hearings. Although primarily relying on the DPTE as a media environment simulator, this work adds to efforts by judicial politics scholars to understand the nature of public preferences toward Supreme Court nominees (Caldeira & Wright, 1998; Cameron, Cover, & Segal, 1990; Kelly, 2010). As researchers think about ways to extend the DPT framework, they should consider the variety of situations that can be approximated, rather than thinking purely about political campaigns and voting.

Assessing Individual Differences

This first set of studies concerned how scholars use DPT to test for the effects of contextual variation. But the ability to embed the DPTE within larger surveys means that researchers can also use it to understand individual-level characteristics and how these relate to contextual variables. One particularly fruitful area of research focuses on personality traits as moderators of reactions to the political environment. In the early 2000s, scholars began studying the effects of the so-called “Big Five” personality traits as well as more specific traits such as need for cognition and need for closure on political outcomes (see, e.g., Carney, Jost, Gosling, & Potter, 2008; Gerber, Huber, Doherty, & Dowling, 2011A, 2011B; Jost, Glaser, Kruglanski, & Sulloway, 2003; Mondak, 2010; Mondak & Halperin, 2008). Building on this work, scholars have used DPT techniques to study the effects of personality on voting strategies (O’Hara, Walter, & Christopher,

2009), as well as how it conditions receptiveness to political disagreement (Lyons, Sokhey, McClurg, & Seib, 2016) and campaign advertisements (Chen, 2015).

In addition to individual personality differences, DPT methods can also be used to test the effects of more traditional voter characteristics, such as age, gender, race, and political knowledge or sophistication (Lau & Redlawsk, 2006). Building on canonical works in political science (e.g., Campbell et al., 1960; Delli-Carpini & Keeter, 1996; Jennings & Niemi, 1981), this work examined how individual demographics interact with the campaign environment to affect things like depth and amount of information processing. Interestingly, although static information board approaches led to conclusions about the decision strategies and satisficing that older individuals engage in (Riggle & Johnson, 1996), using a DPT method allowed Lau and Redlawsk (2008) to conclude that decision strategies may not vary greatly by age. Instead, political cognition and correct voting markedly declined as individuals reached their mid-60s. These findings related to memory and cognition are simply unachievable under the static information approach. As before, the existing research simply scratches the surface of possibilities for understanding the effects of individual differences on voter decision-making.

Assessing Candidate Characteristics

The third piece of much of the voting literature focuses on the differential effects of candidate characteristics. For decades, scholars have focused on candidate appearance, hoping to understand why voters prefer more attractive or competent-appearing candidates, even when faced with competing information (Lawson, Lenz, Baker, & Myers, 2010; Lenz & Lawson, 2011; Mueller & Roberts, 2016; Rosenberg, Bohan, McCafferty, & Harris, 1986; Rosenberg, Kahn, & Tran, 1991; Spezio et al., 2008). However, appearance, and the appearance of competence, are intricately tied to other candidate characteristics such as gender (Alexander & Andersen, 1993; Bauer, 2015, 2017; Dolan & Lynch, 2016; Schneider & Bos, 2014) and race (Sigelman, Sigelman, Walkosz, & Nitz, 1995; Terkildsen, 1993).

What these studies lack, however, is a way to test for both the interaction of race, gender, and appearance with a changing media environment, as well as a measurement of information search and decision-making that might offer insights into why these attributions and candidate characteristics exert such a strong influence. Once again, DPT offers a way forward. Ditonto (2017, 2018) convincingly demonstrated that male and female candidates face different evaluations based on perceived competence and that perceptions of competence based on appearance are persistent even in the face of extensive information search. Again, the DPTE system allowed Ditonto to measure information access and assess how increases in access did or did not alter competence evaluations. This type of work is being extended to the judicial politics realm, with scholars showing that information access exerts differential influence on nominee evaluations based on the gender of the nominee (Chen & Bryan, N.D.). This approach has been especially fruitful as it relates to gender (Ditonto, Hamilton, & Redlawsk, 2013) and

can easily be applied to questions around race or other candidate identities (Ditonto, 2013).

In addition to characteristics like race and gender, DPT also allows researchers to understand the conditions under which certain candidate characteristics matter. Redlawsk and Lau (2006) look at candidate likeability and compare it to how close the candidate is to the voter on issues. What they find is that certain voters (less educated, less politically knowledgeable, men) are more likely to value likeability over issue closeness, as are voters who rely on pictures and personality information when learning about candidates (as opposed to issue and ideological information).

Taken as a whole, these studies represent research that utilized the DPTE primarily as a tool to further our understanding of political campaigns (of note, the DPTE can also be used as a methodological tool for scale validation; see Lau, Kleinberg, and Ditonto [2018]). This work began to unlock the true potential of DPT. However, with a few exceptions, most of the work covered in this section utilized dependent variables that are well known in political science, such as vote choice or candidate evaluations. Researchers using the DPTE have significantly more data available to them than other researchers, and the “Tracing the Decision Process” section details some of the advances that are only available within this framework.

Tracing the Decision Process

Evaluating the American Voter

One advantage of DPT methods is that researchers have the opportunity to understand decision quality, as well as the processes by which decisions are made. Normative questions about the relative competence of the American voter have fascinated scholars for decades. Beginning with the early work of Converse (1964) and continuing through to the 21st century (Kinder, 2006), scholars expressed doubts about the ability of the American voter to make informed decisions based on broad ideological principles. Other work, however, pushed back against some of these claims, to argue that the American voter may not be as troubled as initially believed (Chen & Goren, 2016; Goren, 2004, 2013).

In a similar vein, DPT work demonstrates the capabilities of the American voter to make correct, if not fully informed, decisions. Using a mix of experimental DPTE-derived data and American National Election Studies (ANES) data, Lau and Redlawsk (1997) show that, on average, roughly 75% of the people make the “correct” voting decision with relatively limited information. They expand on this work in their book, where they use the rates of correct voting as a starting point for an investigation of how voters manage to reach these correct decisions, considering their relative lack of ideological knowledge (Lau & Redlawsk, 2006). Furthermore, the DPTE was critical in the validation of correct voting measures that do not rely on the experimental framework (Lau, Andersen, & Redlawsk, 2008).

How Do Voters Get It Right?

As noted, DPT is useful not just for establishing the fact that a majority of American voters manage to vote correctly in presidential elections but also for understanding how voters manage to do this. One possibility was that the “correct” voters were simply employing the normatively preferable rational choice model, seeking large amounts of information and making reasoned, fully informed choices. What is clear from the data, however, is that, although a segment of the population does this (around 35%), it isn’t nearly enough to explain the high rates of correct voting (Lau & Redlawsk, 2006). In fact, a similar percentage of voters relied on shallow and unbalanced searches before coming to their decision. So, what explains the gap?

A common but previously untested view from psychology says that cognitive shortcuts, or heuristics, allow voters to make decisions that are good enough to satisfy them (Chaiken, 1980; Kahneman, Slovic, & Tversky, 1982; Nisbett & Ross, 1980). If DPT were used to confirm this expectation, that alone would stand out as a positive development. Yet the findings paint a nuanced picture of the advantages and disadvantages of cognitive heuristics. Lau and Redlawsk (2001) began the discussion by demonstrating that nearly all voters used heuristics, especially under complex choice scenarios. But the benefits of heuristic use are not evenly distributed in the population. Individuals with high levels of sophistication improved their decision-making with heuristics and produced a higher rate of correct voting, whereas heuristic use among those at the low end of sophistication actually decreased correct voting. Studies using DPTE have found similar results in multiparty contexts outside the United States (Hrbkova 2017; O’Brien & Harris, 2014). Further complicating theories of heuristic use, Sheagley (2017) showed that when partisanship and policy conflict with each other, voters do not simply rely on their party heuristics. Instead, this sparks partisan ambivalence (à la Hillygus & Shields, 2008; Lavine, Johnston, & Steenbergen, 2012) and leads to less reliance on party heuristics.

One question that remains is how researchers know what information voters rely on when making decisions. On this account, DPT provides information that prior methods could not. By tracing the types and amount of information seen by participants as they go through a study, researchers gain insight into what information people care about, how much they feel is necessary to come to a decision, and what information they value (because the environment is timed and dynamic, forcing participants to prioritize information access). Redlawsk’s (2004) early work set the stage for the discussion by showing the complexity of voter decision-making. Depending on campaign context (number of candidates) and voter characteristics (education and age), voters engaged in varying levels of compensatory or non-compensatory searches. The takeaway point is that voters and campaigns are not homogeneous. Context matters to how voters seek out and use information.

Scholars used this framework to expand our knowledge about voter behavior. Utych and Kam (2014) showed that candidate characteristics, namely whether or not the candidate is perceived as viable, influenced the amount of information voters seek. Ditonto et al. (2013) tested a different candidate characteristic (gender) and found that amount and

type of information search varies based on the gender of the candidate. Similarly, Levitan and Wronski (2014) (using both the DPTE and observational evidence) found that social networks affected information search patterns. Specifically, individuals who are members of heterogeneous social groups look for more political information and carefully consider the information they find. Finally, it's possible that both individual and campaign factors interact to influence information search. Chen (2015) demonstrated that personality traits, campaign communications, and candidate congruence can all interact (depending on the personality trait) to increase or decrease information search.

Researchers are not, however, simply limited to examining the information environment as a dependent variable. Some of the most innovative work treats information as an independent variable and specifically uses the functions of the DPTE to experimentally manipulate availability of information. There is good reason to expect that the information environment influence behavior (Prior, 2005, 2007) and heuristic use (Peterson, 2017), and the DPTE gives researchers leverage to examine these environmental differences. Testing Prior's work, Lau, Andersen, Ditonto, Kleinberg, and Redlawsk (2017) found that increased media choice, coupled with negative political advertisements, led to higher levels of affective partisan polarization.

Taken together, DPT methods and the DPTE system have significantly advanced our understanding of the American voter by providing a framework to study decision-making processes. Far from being uninformed partisans or full information rational actors, voters rely on a variety of decision schemas to decide how to vote and act. This contingency, based on candidate, campaign, and individual differences, allows DPT research to contribute beyond our understanding of voters and helps refine and update theoretical models of voter decision-making.

Advancing Theoretical Models

Updating the Online Model

One of the most influential models of voter decision-making (the online model) was developed by Milton Lodge and colleagues. Put simply, the online model says that voters keep a "running tally" of the affective value of the information they experience during the course of a campaign (Lodge et al., 1989; Lodge, Steenbergen, & Brau, 1995; McGraw et al., 1990). In contrast to "memory models" that presume voters must remember or recall specific events from a campaign to evaluate candidates (Enelow & Hinich, 1981, 1982; Price & Zaller, 1993), the online model says that as voters gain a new piece of information about a candidate, they experience an affective reaction to the information and then add it as a positive or negative experience related to the candidate. They are then free to forget the content of the information, only retaining the running tally.

For a frivolous example, a voter who learns a local city council candidate graduated from the same high school she did might react positively and add a mental mark on the positive side for this candidate. Conversely, finding out the candidate graduated from the voter's rival high school might be affectively tagged in the negative and result in a mark

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against the candidate. Come time to make a decision, the voter does not need to remember the details of why she feels positively about a candidate; she simply must know that, on balance, she is most positive about the candidate she is voting for.

One of the key assumptions of the online model was that memory played a relatively minor role in the decision-making process. This assumption was untested, however, until Redlawsk (2001) used DPTE to complicate the model. In contrast to the assumptions, Redlawsk found that memory plays an important role in the process. Taking advantage of the more complicated (and more realistic) DPTE election simulation, he notes that, when faced with candidate choice (between multiple candidates) as opposed to candidate evaluation (assessing affective reactions to a single individual), voters do, in fact, rely on memory at times. In particular, when comparing candidate positions, memory is necessary to know where each candidate stands. After the positions are evaluated and a “winner” is picked, then the online tally can take over. But memory is necessary for the comparative evaluation. This lines up well with updates to the online model that suggest a larger role for affectively tinged memory (Steenbergen & Lodge, 2003) and the existence of a dual-process model (Kim, Taber, & Lodge, 2010).

Motivated Reasoning in the Online Model

Although the original online model presented a simple and psychologically sound model of decision-making, the next three decades saw an important update to the model, which was at least partially dependent on insights gained from DPT research. This update accounts for the role of motivated reasoning (Kunda, 1990) in the online tally (Lodge & Taber, 2013). Put simply, this work suggests that the online tally is updated primarily through directionally based motivations (wanting to preserve prior attitudes) rather than accuracy-based motivations (wanting to come to the correct decision).

Redlawsk (2006) used the DPTE system to delineate the conditions under which memory is required, showing that attitude-incongruent information leads to a “stop-and-think process” that forces voters to remember why they formed the evaluations that they did. Paradoxically, the motivated reasoning process means that this incongruent information is often met with increased scrutiny and counterarguing. Thus, incongruent information can actually lead to a positive tally for the originally favored candidate, even though the initial information was negative (Redlawsk, 2002).

This is not to say, however, that the entire online updating experience is controlled by motivated processing. To begin with, some type of information must be used to form the first impression of a candidate. Redlawsk & Pierce (2018) found that, to some extent, randomness dictates those first impressions. If the first piece of information encountered about a candidate is negative, voters hold on to this impression, creating a deficit for the candidate. Additionally, when voters had a positive first impression of a candidate, they sought out more information than those with a negative or neutral reaction. Candidates need not be fatalistic about the randomness of first impressions, however. Redlawsk, Civettini, and Emmerson (2010) showed that, at a certain “tipping point,” enough

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incongruent information can trigger a strong affective reaction, override the motivated reasoning process, and lead to accuracy-based updating.

Updating the Theory of Affective Intelligence

This work points to a second contribution that DPT made to theoretical decision-making models. Around the same time that the online model was being refined, Marcus et al. (2000) were developing their theory of affective intelligence, which posits a role for emotions and affect in driving decision-making. The core assumption of the theory is that, in many cases, new information is met with limited affect or positive affect (enthusiasm, e.g.). This allows us to use a specific emotional processing system, the dispositional system, and rely on habits with little risk of making an incorrect decision. On the other hand, negative affect (anxiety, e.g.) triggers a separate system, the surveillance system, which leads to greater attention and, presumably, more conscious processing.

DPT, however, offers some important caveats. Affective intelligence theory makes certain assumptions about information processing, but DPT methods allow for direct tests of these assumptions. Redlawsk, Civettini, and Lau (2007) showed that, as expected, activation of the surveillance system (through anxiety) leads to more effortful information processing, but only for candidates that the voter prefers. Civettini and Redlawsk (2009) offered an additional corrective, suggesting that different affective processes may account for system activation, information encoding, and memory of the information. That is, anxiety about information may lead to activation of the surveillance system, but upon careful examination of the new information, a voter may actually feel positive affect about the content of the information.

Both affective intelligence theory and the online processing model demonstrate the importance of DPT to advancing decision-making theories in politics. Without a careful examination of the ways voters behave, scholars would be left with a set of assumptions that, upon close empirical analysis, need to be revised or limited. The ability to measure depth of information processing in a complex, competitive campaign environment represents a key advantage of DPT.

Dynamic Decision-Making as a Holistic Process

Although the full range of contributions made by DPT to political science is beyond the scope of this article, it is helpful to note the most important advances. To begin, the foundations of DPT rest in behavioral decision theory, which takes a more realistic and holistic approach to the psychology of decision-making. This foundation led to major advances in our understanding of politics. These can be summarized by the three major themes discussed above: providing a more realistic view of the campaign process, empirically tracing the decision-making process, and advancing or refining theoretical models of voter decision-making.

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Theoretical models offer important insights into the individual-level process of voting, but by nature of being theoretical, they often leave large portions of the process unexamined or untested. Prior to the advancement of DPT, scholars were left with few (realistic) options for studying the ways that voters access and encode information. They also knew little about how prior information influenced subsequent information search and processing. Fortunately, DPT lays out a theoretical framework for understanding the ever-changing information environment, and the DPTE provides the empirical tool necessary to measure that environment.

The scope of this research, however, is not complete or defined. New research should continue to use the flexibility of the DPTE platform to simulate different decision contexts, and researchers should not be content with traditional outcome variables such as vote choice or candidate evaluation. These are important variables, but the value of a DPT approach is that researchers can also understand the amount and type of information and the patterns within the information search. Similarly to much of the work in public opinion and behavior, scholars working with DPT should consider contextual-, candidate-, and individual-level factors that might alter the information search process. The existing set of research is impressive, but not nearly comprehensive.

As researchers continue to build our understanding of voter decision-making, they must consider the dynamics of the process. Voters do not make decisions and evaluations in a vacuum. Instead, they do so with a constantly changing set of information available to them. Additionally, as they learn new information, this alters their interaction with information that comes later. Finally, voters do not act as rational Bayesian updaters, but instead seem more reliant on motivations and affect (with some exceptions). As the newest research in the DPT framework demonstrates, using the experimental components of the DPTE, coupled with observational evidence, provides the strongest tests of our decision-making models. Moving forward, our theoretical and empirical models must continue to account for the dynamic nature of the decision-making process. DPT offers a psychologically sound and empirically verified way to do this.

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