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# Temporal Elements in Career Selection Decisions: An Archival Study Investigating Career Decisions in Medicine

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Time is a ubiquitous but often omitted variable in career selection decisions. This study investigates the impact of temporal elements on career selection decisions, thus advancing our understanding of both career decision making and the impact of timing on decision making. We investigate the influence of timing and duration of experience with career options on career selection decisions in an archival study using medical residents' rotation schedules. We also investigate factors that mitigate the influence of timing on career selection decisions by examining the interaction of timing with the duration of experience and the diversity of options that an individual experiences. Conditional logit results indicate that decisions often based on career and individual attributes are significantly influenced by the timing and duration of options even when controlling for option attributes. Additionally, significant interactions between timing and diversity of experience and timing and duration of experience revealed boundary conditions for timing. Individuals were more likely to select later-appearing career options when they appeared for a greater duration or when they experienced a greater diversity of options in their schedule. Results illustrate that schedules over which individuals have no control can influence consequential decisions.

*Key words:* career selection decisions; timing; decision making; primacy; information sequencing

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## Introduction

Selecting a career is arguably one of the most important decisions we make. It is a high-stakes decision with long-term consequences that affects future opportunities, income, and lifestyle. Researchers have investigated a myriad of factors influencing career selection decisions, ranging from individual characteristics, career options, and a match between the two (Chapman et al. 2005, Dorsey et al. 2003, Holland 1997). High-stakes decisions are often made with limited control of the surrounding temporal elements, such as timing and duration of access to relevant information. Career selection decisions are no exception; however, temporal elements are not considered in this research. Yet these exogenous temporal elements may affect our decisions. Timing research finds that often overlooked temporal variables (i.e., sequencing or temporal shifts) are important in our understanding of behavior in organizations (Albert 1995, Ashforth 2012). Similarly, early

decision-making research suggested that the structure of information provided by the environment is an important factor in how decisions are made (Simon 1956). Although decision-making research on primacy examines this intersection of information timing and structure, the focus is on one facet of time (i.e., early information), often in an experimental setting (Curley et al. 1988, Pennington and Hastie 1986). As such, it is unclear whether information timing will influence high-stakes decisions when examined in conjunction with other temporal or structural elements in the environment or when individuals can actively seek information. To gain a more complete understanding of career selection decisions, we investigate the roles of both information timing and structure on these decisions.

Although there are many different temporal elements, the two we focus on here are timing and duration of experience. We select these facets for two reasons: first, the order and amount of information available to

decision makers may not be under their control, and second, although this influence on information acquisition may be inadvertent, these two components play an important role in decision making (Hogarth and Einhorn 1992, Le Mens and Denrell 2011). As such, each may play an important yet independent role on career selection decisions. Furthermore, to better understand the limits of primacy, we also investigate factors that may mitigate its effect. Specifically, we examine the role of timing on career selection decisions in conjunction with duration of experience with career options and the diversity of options an individual experiences, both of which determine the structure of information provided in the environment.

To address the above limitations, we conducted an archival study examining rotation schedules of medical residents to determine whether the timing and duration of subspecialty experience, based on a schedule over which the residents have no control, influence their career selection decisions. We also examine whether the duration of subspecialty experience and diversity of options mitigate the effect of timing on career selection decisions. Thus, actual decisions of significant consequence are examined in a naturalistic setting where all alternatives are known and information on them is publicly available. Research in this domain suggests that occupational attributes (i.e., salary, lifestyle, job duties), individual attributes, and a fit between the two are the most critical factors in these decisions (Bazerman et al. 1994, Chapman et al. 2005, Dorsey et al. 2003, Holland 1997). Yet the temporal structure of information provided by the environment is based on a schedule over which the decision maker has no control. Will subspecialty timing, duration of experience, or schedule diversity influence subspecialty decisions when occupational attributes are taken into account? We integrate the careers, decision-making, and timing literatures to investigate this question.

Although the research context in this study is medicine, and it will be used throughout this paper as an illustrative example, the role of temporal elements on decision making is generalizable to a wide array of contexts and decisions. Firms often use job rotation programs to orient new employees prior to final career placements (Campion et al. 1994). New hires facing these sequential and fixed socialization tactics may face similar temporal elements regarding schedules over which they have limited control (Van Maanen and Schein 1979). MBA students selecting concentrations face similar constraints. Required core curricula at many MBA programs determine the order and length of courses in different disciplines and offer limited, if any, elective options. Thus, a school's required core schedule may influence the concentration and subsequent career decisions of MBA students. Moreover, when students enter the job market, the timing of job interviews and

offers is not under their control, and as such, their sequence may influence job selection decisions. Last, beyond the realm of concentrations and job selection, research on this topic has clear implications for choice decisions in general. Regardless of the context, choices rarely appear simultaneously; as such, the impact of timing on decision making may be far reaching.

Our study makes three important contributions. First, we contribute to the careers literature by theorizing and empirically illustrating how the structure of information provided by the environment influences career selection decisions even when controlling for occupational attributes. Thus, we provide an illustrative example of how factors not conventionally examined in this context may influence these decisions. Second, we provide a novel perspective to primacy research by examining the influence of early information in conjunction with other temporal and structural factors, thus demonstrating boundary conditions for primacy. Specifically, we theorize and empirically illustrate that duration and diversity of experience mitigate the influence of primacy in decision making, thus providing new insights on the multiple effects of time on decision making. Last, we provide field evidence for the generalizability of the influence of timing to consequential decisions, a lacuna in the primacy literature. The following sections review our theoretical framework and hypotheses.

## The Roles of Timing, Duration, and Diversity of Experience on Career Selection

### The Role of Timing on Career Selection Decisions

Career selection is a highly consequential decision requiring extensive and deliberate contemplation. Decision-making research in vocational choice suggests that a dominant goal when selecting a career is decision accuracy (Sauermann 2005). Decision accuracy focuses on maximizing decision maker value or utility and is best achieved using a weighted additive strategy requiring intensive information processing (Bettman et al. 1998). This strategy entails evaluating attributes for all options, weighting their values based on one's preferences, summing values for each option, and selecting the highest value option. Factors such as salary, lifestyle, and skill fit are just a few characteristics weighing heavily in this decision (Dorsey et al. 2003, Holland 1997, Newton and Grayson 2003). In contrast to conventional factors, the order of experience with career options based on a schedule over which residents have no control would appear to have little if any influence on career selection, particularly when more decision-relevant information is available. In fact, decision-making research suggests that the order of alternatives is irrelevant when using a weighted average, or most other vocational choice strategies (Bettman et al. 1998, Sauermann 2005). However, we draw from the

literature on decision biases and career transitions to illustrate that timing can influence decisions of even this magnitude.

Career and life transitions research suggest an early window of time where individuals are highly susceptible to external information. Selecting a career clearly denotes a transition period, as individuals decide how or where to apply their skills and expertise. Uncertainty is amplified when individuals adjust to new roles and external demands, and they attempt to align their self-image with these demands (Ibarra 1999, Pratt et al. 2006, Stewart et al. 1986). Consequently, individuals in transition have a heightened awareness of their external environment and a reduced sense of self, resulting in a more receptive and dependent emotional stance susceptible to external influence (Pratt et al. 2006, Stewart et al. 1986). Upon adapting to new circumstances, individuals return to a more assertive or autonomous emotional stance less dependent on external factors (Stewart et al. 1986).

Similarly, a central premise in the socialization literature is that individuals are particularly susceptible to influence during the initial organizational entry phase, stemming from uncertainty regarding one's role in the firm (Ashforth and Saks 1996). Whereas socialization research focuses on organizational assimilation after a career decision is made, we posit that tactics facilitating assimilation may also influence career decisions in a context where training and socialization occur concurrently. For example, research in this domain finds institutionalized tactics particularly effective at reducing uncertainty (i.e., role conflict and ambiguity), thus facilitating newcomer attachment (i.e., job satisfaction, organizational commitment, and identity) and increasing perceptions of fit with the firm (Allen and Meyer 1990, Ashforth and Saks 1996, Cable and Parsons 2011). Institutionalized tactics of particular interest in this context include the sequential (versus random), providing a fixed sequence of activities; fixed (versus variable), providing a timetable for these activities; and serial (versus disjunctive), providing an opportunity for newcomers to work with experienced organizational members (Van Maanen and Schein 1979). Because perceptions of fit are often cited as the driver for career selection decisions (Cable and Judge 1996, Chapman et al. 2005, Holland 1997), the influence of these institutionalized socialization tactics may be present prior to organizational entry. The research findings above suggest an early window of opportunity exists where individuals are more susceptible to external information. Thus, timing of experience with options may affect career selection decisions.

Time, although not a conventional variable of interest in career selection decisions, is an important factor in decision bias research. Primacy research finds judgments are disproportionately influenced by information presented early rather than late in a sequence (Curley

et al. 1988). As such, we define timing of information as the earliest exposure to decision-relevant information. Evidence for primacy is found in domains ranging from jury deliberations, medical diagnosis, consumer brand preference, and military engagement actions (Adelman and Bresnick 1992, Curley et al. 1988, Pennington and Hastie 1986, Scarpi 2004). The influence of timing is attributed to a tendency to focus on early information while discounting that which appears later (Curley et al. 1988). Later information fails to get noticed or encoded because of its lack of novelty or reduced attention to subsequent information (Anderson 1971, Curley et al. 1988, Kahneman et al. 1997, Kashima and Kerekes 1994, Scarpi 2004). According to the belief-updating model, later information is assimilated and updated based on earlier information (Hogarth and Einhorn 1992, Jones and Goethals 1972). Thus, early information serves as a judgmental anchor upon which beliefs are updated through sequential anchoring and adjustment, often resulting in insufficient adjustment (Tversky and Kahneman 1974). Although research in this area provides strong evidence for the influence of early information, nearly all studies are experimental; subjects receive minimal information and make decisions of limited consequence. Actual decisions in organizations were not observed.

Related research on preference formation finds that preferences form early and spontaneously, and they are difficult to suppress (Jarvis and Petty 1996, Russo et al. 1998). Decision making is viewed as a sequential discrimination process where new information is subjectively distorted to support preliminary preferences even before selecting an option (i.e., predecisional distortion; see Russo et al. 2000). Desire to maintain consistency between a tentative preference and new information is cited as the motive behind predecisional distortion. Research expanding this work to the choice context finds that information sequencing can indeed influence consumer choice and that this order effect is attributed to a change in the interpretation and evaluation of information (Russo et al. 2006). However, as in primacy studies, this research is experimental and focuses on hypothetical decisions, and choice is limited to two or at most three alternatives (Carlson et al. 2006; Russo et al. 2000, 2006).

In sum, primacy and preference formation research suggest early information plays a role in selection decisions, but both have yet to be tested in the field. Moreover, both focus on the influence of information provided to individuals, not that which can be actively sampled through experience. Passively receiving option information is quite different from actively engaging in an option. The abundance and depth of information available and access to tacit information from direct experience are apt to have more pronounced effects on decision making than artificially provided information. Based on

the research above, individuals are most receptive to external information early in the career selection phase. Moreover, since preferences tend to form early, career options experienced early are apt to be particularly influential. Thus we predict the following.

**HYPOTHESIS 1 (H1).** *The timing of experience will influence career selection decisions such that individuals are more likely to select options experienced earlier than those experienced later, even when controlling for relevant attributes of the options.*

### The Role of Duration of Experience on Career Selection Decisions

In this section we explore how the duration of experience can influence decision making. We define *duration of experience* as the amount of time individuals are exposed to an option in the choice set. The duration of experience with career options based on a rotation schedule over which residents have no discretion would appear to have little if any influence when selecting a career, particularly when more decision-relevant information is available. However, in this section we draw from person–environment (P–E) fit, decision-making, and socialization research to propose that greater experience with options affects career decisions because it provides an opportunity to assess fit and reduce uncertainty.

Early research by Simon (1956) suggests that understanding the structure of information provided by the environment is just as important to understanding how decisions are made as the heuristics employed by individuals. Although much of decision-making research has focused on heuristics and resulting biases, recent research on the rational learning model draws on the former structural features of information (Le Mens and Denrell 2011). This body of research suggests that there are systematic differences in access to information, resulting in information asymmetry and subsequent uncertainty across options. Greater knowledge, interaction, or experience with options provides greater access to incidental information. Thus, this work suggests that a tendency to favor options for which more information is accessible is consistent with rational behavior (Le Mens and Denrell 2011).

This argument is consistent with findings in early attitudinal research indicating that mere repeated exposure to a stimuli results in positive attitudes toward the stimuli (Zajonc 1968). Applied to the interpersonal context, this body of research finds that more frequent interaction with another individual promotes attraction, even when interacting with attitudinally dissimilar others or under noxious conditions (Brockner and Swap 1976, Reis et al. 2011, Saegert et al. 1973). In the group domain, this research provides the foundation for the contact hypothesis, which finds that exposure to a group results in favorable views of that group regardless of the nature of

the interaction, and that this increases based on duration of exposure (Dasgupta and Rivera 2008, Pettigrew and Troop 2006). Most importantly, given the origins of this research in the intergroup conflict domain, its main contribution is that even preexisting negative stereotypes can be shattered and attitudes rendered positive with greater exposure.

We expand this body of research to career choice and suggest that incidental information gained through greater experience with options provides greater opportunity to learn about an occupation, assess fit, and reduce uncertainty. Thus, greater occupational experience facilitates career choice by mitigating key obstacles associated with career indecision and a lack of knowledge about occupations, personal skills, and fit between the two (Osipow 1999). In fact, assessment of skill fit with the environment as a driver of career selection decisions is a foundational assumption of P–E fit research (Cable and Judge 1996, Holland 1997). P–E fit refers to a match between attributes of the person and characteristics of the vocation (Holland 1997). As such, P–E fit requires that one has knowledge about her own skills, needs, and values as well as requirements of the career. Information may be abundant on the former but limited on the later. The above-mentioned rational learning model findings suggest that greater experience with an option provides more incidental information such as requisite skill set and occupational duties, in addition to the opportunity to develop these skills. Moreover, findings in the fit research indicate that individuals' perceptions of fit increase as more time is spent with members of the firm both before and after organizational entry (Chatman 1991). This is consistent with the socialization findings that indicate greater perceptions of fit when newcomers are subject to serial socialization tactics where experienced members serve as role models (Van Maanen and Schein 1979). In effect, greater experience with an option provides a greater opportunity to develop and perceive fit.

In addition to assisting in P–E fit assessment, greater experience with an option also reduces uncertainty. People often dread uncertainty and have a natural desire to reduce it (Curley et al. 1988, Dawes 1988). Unfortunately, uncertainty is pervasive in all aspects of decision making (Bazerman 1994), particularly career decisions, and is often an obstacle to effective decision making (Lipshitz and Strauss 1997). Informational sources of uncertainty range from inadequate understanding, incomplete information, conflicting information, and undifferentiated alternatives (Lipshitz and Strauss 1997). Decision makers cope with uncertainty by attempting to reduce it. Uncertainty reduction tactics include collecting more information, extrapolating from available information, controlling variability, and deferring decisions until more is known (Lipshitz and Strauss 1997, Thompson 1967). Increased experience with options

enables individuals to reduce uncertainty stemming from inadequate understanding, incomplete information, or conflicting information regarding options. More experience with options results in awareness of both their positive and negative aspects, therefore enhancing individuals' ability to differentiate among options. Whether positive or negative, one is fully aware or "certain" of the consequences of selecting an option. In addition, greater information exposure may provide individuals with opportunities to revise their judgments based on others' opinions (Soll and Larrick 2009). Last, greater information is also found to increase perceived credibility of the information and confidence in one's judgment based on the information (Bacon 1979, Tsai et al. 2008, Unkelbach 2007).

Based on the above findings, we posit that experience with an option provides an opportunity to assess competency, determine fit, and reduce uncertainty, thereby influencing selection decisions. Thus we hypothesize the following.

**HYPOTHESIS 2 (H2).** *The duration of experience will influence career selection decisions such that individuals are more likely to select options they have greater experience with than those they have minimal or no experience with, even when controlling for relevant attributes of the options.*

### **Factors Moderating the Influence of Timing on Career Selection Decisions**

The hypotheses above predict the independent influences of timing and duration of experience on career selection decisions. We further theorize that these two variables will interact to influence these decisions. When testing for primacy, variables such as duration or diversity of information are often controlled to avoid potential confounds. Although we can be certain that information timing, not other random factors, influences decisions, natural variations of these factors do exist in the field. Therefore, understanding the role of timing in conjunction with other factors is important because it provides a better understanding of the structure of information provided by the environment. Examining factors that moderate the role of early information on decision making provides insight into the boundary conditions of timing on decision making. In this section we examine the roles of duration and diversity of experience as moderators.

*The Role of Duration of Experience as a Moderator.* Although we expect the likelihood of selecting a career option to increase when individuals experience options early and often and decrease when individuals experience options late and for a shorter duration, of greater interest are the conditions when individuals experience options late but for a longer duration or early but for only a short duration. Will the experience be discounted because it appears later or seriously considered because

more information regarding the option is available? Similarly, will an option be discounted because of limited direct experience, or will it be preferred because it appeared earlier?

Decision-making research finds that preferences form early and spontaneously, and they result in a biased attribute evaluation for preferred options (Russo et al. 2000). Primacy research finds early information serves as a judgmental anchor upon which beliefs are updated through sequential anchoring and adjustment (Hogarth and Einhorn 1992). It is also well established that adjustments from an initial anchor are often insufficient (Tversky and Kahneman 1974). Thus, early experiences may have a greater capacity to influence us than those appearing later. Duration of experience may either amplify or mitigate this effect. Greater duration of experience results in more abundant information that is viewed as more credible, and it provides us with an opportunity to assess competency, determine fit, and reduce uncertainty regarding options on multiple dimensions (Bacon 1979, Lipshitz and Strauss 1997, Tsai et al. 2008, Unkelbach 2007). Thus, if an option is experienced early and for a greater duration, the initial anchor will remain intact and perhaps even strengthen. Alternatively, options experienced early and for a shorter duration may still establish an initial anchor; however, this anchor may be less durable and more susceptible to future adjustments. In contrast, options appearing later and for a greater duration may mitigate the effect of timing by providing more credible and compelling information that is able to shift the initial anchor. Supporting evidence for this perspective can be found in consumer behavior research demonstrating that early preferences for alternatives can be mitigated when decision makers are asked to evaluate options as a whole, instead of separately evaluating option attributes (Carlson et al. 2006). We speculate that evaluation focused on attributes of an option may provide minimal additional information, resulting in minor adjustments from the preexisting anchor, whereas evaluations focused on differentiating among options may provide abundant information capable of adjusting the anchor. Greater duration of experience with alternatives provides more abundant information and is apt to adjust a preexisting anchor even when it appears later. Thus we predict the following.

**HYPOTHESIS 3 (H3).** *Duration of experience moderates the relationship between timing of experience and career selection decisions such that the duration of experience reduces the effect of timing on career selection decisions.*

*The Role of Diversity of Experience as a Moderator.* The amount of information increases as the duration of experience increases, but this does not necessarily indicate that one is exposed to different information. Thus,

we now examine the influence of information timing when accounting for information diversity. Earlier we stated that one of the mechanisms behind primacy is a memory encoding problem. Specifically, early information is encoded fully because of its novelty, whereas late information fails to get noticed or encoded because of its lack of novelty (Kahneman et al. 1997, Scarpi 2004). This perspective often serves as a theoretical foundation for marketing research examining the competitive advantage of brands entering the market first (Niedrich and Swain 2008, Scarpi 2004). First brands are viewed as more novel and interesting, whereas those that follow are viewed as redundant. Furthermore, consumers absorb more information and are able to recall more attributes about the first brand compared with the brands that follow (Niedrich and Swain 2008). Minimal encoding of later information may be due to a lack of distinguishing features or attributes across products in a similar line. Experimental research on sequential decision making attributes order effects to the direction of comparison and information valence. Impressions are formed by comparing the second option to the first; unique positive information for the second option shifts the comparison and subsequent preference to the second option, whereas preferences remain unchanged with unique negative information for the second option (Bruine de Bruin and Keren 2003). Similarly, research on belief updating finds a primacy effect when processing a series of consistent information and a recency effect when processing subsequent contradictory information (Hogarth and Einhorn 1992). Thus, primacy appears to be mitigated when secondary options provide positive and contradictory information.

Although the research above advances our understanding of sequential decision making, the studies examine a limited and similar choice set. Two or three options are presented, and differences are confined to attributes of these options. But what if options differ significantly such that later options provide new dimensions of unique and diverse information? Moreover, what if options differ not only on features or attributes but also in the fact that more are available to evaluate? Will individuals absorb, encode, and process the latter information as unique, or will this information be ignored because it appeared later?

We posit that diverse and unique information will be difficult to ignore. As the diversity of information increases, so too does its novelty compared with previously encoded information. Moreover, as information is obtained by experiencing diverse options, the novelty and unique features of the information obtained are apt to be amplified, thus drawing the attention of the individual decision maker and enabling him or her to fully process and encode the new stimuli. As a result, individuals with exposure to diverse experiences may be less reliant on early information when making decisions.

In contrast, if the type of information or options one is exposed to does not vary much over time, it is less likely to be encoded or attended to, consistent with primacy. Consequently, the effect of timing is apt to be mitigated when more diverse information is present. Thus, we predict the following.

*HYPOTHESIS 4 (H4). Diversity of experience with different options moderates the relationship between timing of experience and career selection decisions such that the diversity of options reduces the effect of timing of experience on career selection decisions.*

## Methods

### Research Context and Site

The medical context is ideal for examining temporal elements on career selection decisions. The strength of an archival study in this context is that a large sample of individuals can be investigated making actual career decisions in a field setting with natural controls. All individuals in this sample are selecting from the same choice set at the same point in time and have no discretion in the composition of their rotation schedules. The specific decisions examined in this study are subspecialty selection decisions of internal medicine residents at a large Midwestern medical center referred to as WFMC. An internal medicine residency consists of three years of training upon the completion of medical school. Training comprises rotations through different areas of internal medicine. Based on the 2012 National Residency Match data, internal medicine was selected by 23% of all graduating medical students, thus making it the most popular residency (National Resident Matching Program 2012). Internal medicine also provides the greatest number of specialty options. All residents select from 11 options (allergy, cardiology, endocrine, gastroenterology, general medicine, hematology, infectious diseases, nephrology, preventative medicine, pulmonary, and rheumatology). Thus, there are many advantages to investigating decision making in this context.

Selecting a subspecialty is arguably one of the most important decisions for a new physician. It is a decision with long-term consequences of tremendous magnitude because it dictates the type of medicine one practices, future opportunities, income, and lifestyle. It is a decision where all options are known, and attribute information for each is publicly available through professional associations and the American Medical Association website. But most importantly, physicians gain direct experience in each field when rotating through different subspecialties during residency training. It is a decision that individuals spend a great deal of time contemplating. Subspecialty training ranges from three to four years, resulting in high switching costs. Physicians are likely to invest the time to gather information

about subspecialties, research their merits, and determine which one best suits them. From a decision-making perspective, the context described above has all the elements to promote rational decision making (i.e., high-stakes irreversible decisions with known alternatives and access to information regarding alternatives; see Bazerman 1994) and provides control factors often only available in an experimental setting. Moreover, from a person–environment fit perspective, rotating through the different subspecialty options enables residents to experience and assess multiple levels of fit. Residents can assess person–job fit based on how well their skills align with the requirements of the subspecialty, person–organization fit with the subspecialty culture, and person–group fit based on their interactions with physicians in the subspecialties.

Although residency training is three years long, subspecialty selection decisions are made in the first 18 months because of the application deadlines imposed by the fellowship match process. The match process is a computerized sorting mechanism that serves as a centralized clearinghouse connecting firms (hospitals seeking fellows) and prospective applicants (residents seeking subspecialty fellowships). Hospitals rank order residents that they would like to admit to their program, and residents rank order hospitals they would like to attend for fellowship training. Residents have complete discretion when selecting a subspecialty, but the match process determines which institution they will attend for their subspecialty training. For example, all residents in our sample matched in their selected subspecialty but did not necessarily match in their first-choice institution for fellowship training. Moreover, although residents may have geographic preferences, our interviews with residents and program directors indicate that these are a secondary concern, as subspecialty positions are present in multiple institutions across all 50 states.

Residents must submit a fellowship application in the 18th month of their residency, and interviews begin soon after. Given the time intensity of interviewing and limited vacation time, residents can only select one subspecialty to pursue. Thus, although residency is three years long, subspecialty selection decisions must be made early in the process, when preferences may not be fully formed, and all 11 subspecialty options may not be experienced. Moreover, research on career selection decisions in medicine finds that two-thirds of first- and second-year residents are uncomfortable making an informed selection decision in this time frame (Smith et al. 1997), and 62% of residents change their career plans at least once prior to the application deadline (West et al. 2006).

Most importantly, residents have little or no discretion in choosing their schedule prior to the fellowship application deadline. Our interviews with the director of the residency program and individuals involved in the scheduling process indicated three steps to scheduling

that were conducted prior to the arrival of first-year residents at WPMC. First, each division was asked to provide a list of rotations it wanted filled and the number of slots allocated for residents. Next, a master schedule was created, compiling all requests and indicating how many residents were required for each rotation for each month. Last, a department secretary in the residency office assigned residents to rotations. The residency office was located in an administrative building separate from the hospital. The individual in charge of scheduling did not have information about residents' characteristics or preferences. The key objective in the scheduling process was to ensure that all spots were filled. Thus, rotation placements in the first year were based on clinical requests of different areas, not residents' preferences. Residents had no choice in the first 12 months of the program but could make rotation requests later in the program. Some residents may have strong preferences for a particular subspecialty; however, they are unable to make elective rotation requests until after their first year. Even so, not all requests are granted as a result of scheduling availability. In fact, only half of our sample was granted electives prior to their 18th month, and these individuals had, on average, only one elective choice. Based on our interviews, we know that each subspecialty preference request that was granted was clearly labeled as an "elective" in the rotation schedule. However, the actual subspecialty selected as an elective was not indicated in the schedule. Additionally, all rotations with a clear category label were those where residents had no choice. Moreover, schedule changes were also rare. Our interviews with residents confirmed the lack of control in their rotation schedule. Specifically, they often complained about not having elective opportunities. Thus, to avoid endogeneity concerns stemming from the ability to exercise preferences, we limit our analysis to residents who did not have any electives during the first 18 months of their rotation schedule.

Residents' schedules at WPMC are divided into monthly rotations, and each rotation can be coded into 1 of 11 categories (i.e., general medicine or 1 of 10 subspecialties). Resident demand is not consistent across all areas; thus, some subspecialty rotations are repeated, and some subspecialties may not appear at all. Subsequently, duration of experience varies across subspecialty, whereas diversity of experience in different subspecialties varies across residents. Thus, for each resident in our sample, we have a record of the rotation schedule for his or her entire residency. Although scheduling logistics differ across institutions, based on our interview with the residency director, the limited input in the first-year schedule is not unique to WPMC.

Overall, all alternatives are known, but experience with the choice set is based on a rotation schedule over which residents have no control. Thus, a resident's rotation schedule enables us to investigate the timing and



structure of information provided by the environment. Elements of interest in this study are timing, duration of subspecialty experience, and diversity of subspecialties appearing in the resident's schedule. *Timing* is defined as the order of a resident's first experience with each subspecialty. *Duration* is defined as the number of months of experience residents have with a given subspecialty. *Diversity* is defined as the number of different subspecialties residents experience in their rotation schedule. Each subspecialty rotation is distinct as they focus on different organs, systems, and patient problems. From a careers perspective, this context provides a unique opportunity to investigate temporal and structural elements on career selection decisions.

### Design and Data Collection

A three-stage data collection design triangulated our results. We conducted interviews and observations in the first two stages to gain a greater depth of understanding of residency training, rotation scheduling, and decision making in this context. Observations entailed shadowing residents on different rotations during their first months at WFMC. Residents were also interviewed about their career decision-making process. This information is presented above in our description of the research site. In the third stage, we capitalized on the benefits of conducting an archival study and analyzed the rotation schedules and subspecialty selection decisions of internal medicine residents in the graduating classes of 2000–2006 at WFMC, thus enabling us to investigate actual career decisions for a large sample of individuals.

### Sample

We analyzed rotation schedules for residents who did not have any electives prior to the fellowship application deadline at 18 months. Put differently, the residents in this subsample had no discretion in their rotation schedule prior to their selection decision. This allowed us to rule out any endogeneity concerns that might arise as a result of residents having discretion over their schedule. In addition, we excluded foreign residents from the sample, since many came with prior subspecialty training and were redoing a residency to practice in the United States, as well as residents on the clinical investigator track, since they entered the program with a subspecialty position. As a result, we excluded 37 foreign residents or clinical investigators and 159 residents with electives from our total sample of 344 residents. Our final sample consisted of 148 residents who had no elective options prior to the fellowship application deadline.

To ensure there were no differences between residents with and without electives, we ran a series of tests. We coded for resident gender and obtained residents' United States Medical Licensing Examination (USMLE) Step 1 and Step 2 exam scores. USMLE is a standardized board exam residents take during their second (Step 1) and

fourth (Step 2) years of medical school. These scores provide a performance metric and serve as a proxy for knowledge in the field of medicine. They are also often used as part of the evaluation criteria for admission into residency programs. Logit results indicate no significant differences across the two samples for gender or either USMLE score (Step 1 or Step 2). Additionally, we examined whether the first-year schedules of the two samples differed by including dummy variables for exposure to the different subspecialties in the first 12 months. Logit results indicate no significant differences across the two samples on subspecialty exposure during the first 12 months. The LRT for the joint significance of residents' exposure to different subspecialties reveals that the model is insignificant.

Next, an examination of the rotation schedules revealed that, on average, residents who had electives only had one elective appear in months 13–18. In sum, it appears the two samples are quite comparable. Thus, to avoid endogeneity concerns associated with exercising choice in the schedule, we opted to focus our analysis on only residents who had no elective options in their first 18 months.<sup>1</sup> Moreover, since electives did not appear, it is clear that preferences were not a basis for scheduling.

Finally, although our interviews with individuals responsible for the residency program and scheduling clearly indicate that residents' characteristics and preferences were not known or taken into account during the scheduling process, we ran additional tests to provide evidence of the exogeneity of rotation assignments. We regressed residents' gender and USMLE scores on subspecialty dummies that appeared across the 18-month schedule. Overall, the results do not reveal systematic differences in gender or either USMLE score between subspecialties across the schedule. The empirical evidence corroborates our interview data that rotation assignments were exogenous to residents' characteristics.

Residents in our sample selected the following subspecialties: allergy ( $N = 3$ ), cardiology ( $N = 29$ ), endocrine ( $N = 6$ ), gastroenterology ( $N = 17$ ), general medicine ( $N = 37$ ), hematology ( $N = 26$ ), infectious diseases ( $N = 5$ ), nephrology ( $N = 7$ ), preventative medicine ( $N = 0$ ), pulmonary ( $N = 11$ ), and rheumatology ( $N = 7$ ). General medicine and cardiology were the most popular subspecialties, representing 25% and 20% of our residents' choices, respectively.

### Measures

*Dependent Variable.* Our dependent variable is the subspecialty selection decision (*selection decision*). Records of subspecialty selection decisions were obtained through the department of medicine at WFMC. The selection decisions were coded 1 for the selected option and 0 for the remaining 10 nonselected options.

This measure is consistent with measures used in discrete choice models (McFadden 1974) where individuals face a choice set with nominal alternatives.

**Independent Variables.** Our independent variables of timing of subspecialty experience (*timing*), duration of subspecialty experience (*duration*), and diversity of subspecialty experience in the resident's schedule (*diversity*) were based on the first 18 months of the residents' rotation schedules. The rotation schedule is a monthly record of the subspecialties residents experienced during the three-year residency program. Timing of subspecialty experience was coded from 1 to 11 based on the order subspecialties first appeared in residents' rotation schedules.<sup>2</sup> Duration of subspecialty experience was calculated based on the number of months that residents rotated through a particular subspecialty. For example, if a subspecialty appeared in four different rotations during the first 18 months, it was coded as 4. If a subspecialty appeared only once during the first 18 months, it was coded as 1. As an additional test for duration, we included a no exposure variable (*no exposure*), since not all residents experienced all 11 options. This variable was coded 1 if residents did not have any exposure to the subspecialty in the first 18 months of their rotation schedule and 0 if they did have exposure to the subspecialty during this time frame. Diversity of experience was calculated based on the number of different subspecialties residents experienced in the first 18 months, since each subspecialty exposes residents to distinct organs, systems, and patient problems. For example, if seven different subspecialties appeared during the first 18 months, diversity was coded as 7. Whereas timing and duration of experience vary by subspecialty, diversity varies by resident. Put differently, timing and duration of experience are subspecialty-specific variables that capture when and how often residents were exposed to each subspecialty, whereas diversity of experience captures the number of subspecialties that residents are exposed to during the first 18 months of their rotation schedule and hence varies by individual.

**Control Variables.** To ensure that features of the schedule, and not other factors, influenced selection decisions, we controlled for subspecialty and individual differences. Fortunately, because all options in the choice set are known, we can control for subspecialty differences using subspecialty fixed effects. Subspecialty fixed effects control for idiosyncratic subspecialty differences that we are not able to measure. Examples of such unobservable differences between subspecialties include, but are not limited to, subspecialty size, prestige, popularity, salary, work hours, amount of competition in obtaining a fellowship position, abundance of positions, base rate for training exposure, and attractiveness of future job alternatives. It is also important to control for idiosyncratic individual differences that may influence

selection decisions such as gender, debt, personal preferences, or diversity of experience with subspecialties. Fortunately, the conditional logit estimator includes individual fixed effects and was used to test the hypotheses. The subspecialty and individual fixed effects are similar to using dummy variables to control for subspecialty and individual differences, respectively.

## Results

### Descriptive Statistics and Correlations

Descriptive statistics and correlations are listed in Tables 1 and 2. Residents had earlier and greater experience with selected subspecialties (means of 3.31 and 3.06 months, respectively) compared with those not selected (means of 5.21 and 1.29 months, respectively).

### Conditional (Fixed Effects) Logit Models of Selection Decisions

We used the conditional logit model (McFadden 1974) to test the hypotheses.<sup>3</sup> Suitable for data on selection decisions when we have data on the attributes of the entire choice set, this method estimates how changes in option attributes increase or decrease the probability that a resident will select a particular option. The conditional logit is also known as the fixed effects logit, where the fixed effects are used for the individual residents. This specification is equivalent to the inclusion of dummy variables to control for unobserved resident differences, and hence resident-level characteristics such as diversity are only estimable as interaction terms with subspecialty-specific attributes such as timing. Applying the conditional logit to career selection decisions is done as follows.

Let  $\Pi_{ij}$  be the expected preference  $i$  for selecting option  $j$  ( $J = 1, \dots, j$ ). Residents select the option with the greatest expected preference, which can be represented as follows:  $\Pi_{ij} = \beta' X_{ij} + \varepsilon_{ij}$ . The vector of

**Table 1 Descriptive Statistics and Correlations for Independent Variables**

	Mean	SD	1	2	3
1. <i>Timing</i>	5.04	2.18			
2. <i>Duration</i>	1.43	2.06	-0.4816*		
3. <i>Diversity</i>	7.16	1.09	0.1359	-0.0993	1

\* $p < 0.05$ .

**Table 2 Descriptive Statistics and Selected and Nonselected Subspecialties**

	Selected subspecialties		Nonselected subspecialties	
	Mean	SD	Mean	SD
<i>Timing</i>	3.31	1.81	5.21	2.15
<i>Duration</i>	3.06	2.46	1.29	2.04
<i>Diversity</i>	7.16	1.09	7.16	1.09

unknown parameters is  $\beta$ , and the vector of option attributes for observation  $n$  is  $X_{ij}$ ;  $\varepsilon_{ij}$  refers to random disturbances as a result of unobservable characteristics of the options. Finally, assuming  $\varepsilon$  is a distributed Type 1 extreme value, we can represent the probability that option  $j$  is the highest preference ( $Y_i$ ) using a logit model:

$$P_n(Y_i = j) = \frac{\exp(\beta' X_{ij})}{\sum_{t=1}^J \exp(\beta' X_{it})}$$

We begin by estimating the main effects of timing and duration of experience (Model 1). Next, we estimate the main effects and interactions to test the full model (Model 2). In our final model, we separate the effect of duration and the effect of no exposure (Model 3). All model specifications contain subspecialty fixed effects along with individual fixed effects. If a coefficient is positive and significant, as expected for the duration of experience prediction, then an increase in the value of the variable would increase the probability that a resident selects that particular subspecialty. If a coefficient is negative and significant, as expected for the timing of experience prediction, then an increase in the value of the variable would decrease the probability that a resident selects that particular subspecialty.

Conditional logit results are presented in Table 3. The main effects of timing and duration are significant, suggesting that early experience at a longer duration increases the probability of selecting a subspecialty, thus supporting Hypotheses 1 and 2, respectively ( $\beta_{\text{timing}} = -0.20$ ,  $p < 0.001$ ;  $\beta_{\text{duration}} = 0.17$ ,  $p < 0.001$ ; Model 1). Model 2 reveals the main effects and interaction of

timing by duration and diversity of experience on the probability of selection. The results continue to indicate strong support for Hypotheses 1 and 2 ( $\beta_{\text{timing}} = -1.01$ ,  $p < 0.001$ ;  $\beta_{\text{duration}} = 0.12$ ,  $p < 0.01$ ; Model 2). Both interaction hypotheses were also supported. Timing of experience interacted with duration of experience such that the negative effect of timing was reduced as duration of experience increased ( $\beta_{\text{duration} \times \text{timing}} = 0.02$ ,  $p < 0.05$ ; Model 2), thus providing support for Hypothesis 3. The results also indicated a significant interaction for timing and diversity of experience. Timing of experience interacted with diversity of experience such that the negative effect of timing was reduced as the diversity of experience increased ( $\beta_{\text{diversity} \times \text{timing}} = 0.10$ ,  $p < 0.01$ ; Model 2), thus providing significant support for Hypothesis 4.

Last, we ran an additional test for duration of experience (H2). Given that not all residents experience all 11 subspecialty options prior to the 18-month time frame when decisions are made, we wanted to be certain the duration effect was not due to a lack of exposure to certain options. Thus, we ran an additional analysis to separate the effect of no exposure from duration of experience (Model 3). The results indicate that both are significantly related to selection decisions, thus providing additional support and insight into the role of duration of experience. Specifically, the results indicate that whereas no exposure to a subspecialty significantly decreases its likelihood of selection, the incremental effect of having a longer experience in a subspecialty continues to significantly affect selection decisions ( $\beta_{\text{no exposure}} = -1.72$ ,  $p < 0.001$ ;  $\beta_{\text{duration}} = 0.14$ ,  $p < 0.05$ ; Model 3), thus indicating robust support for Hypothesis 2, because the result is not driven by the lack of exposure to options. Similarly, timing of experience continues to be significant when no exposure to subspecialties is accounted for, thus providing robust support for Hypothesis 1 ( $\beta_{\text{timing}} = -0.68$ ,  $p < 0.05$ ; Model 3). Inclusion of the *no exposure* variable does depress support for the timing by duration interaction, although the timing by diversity interaction remains significant ( $\beta_{\text{diversity} \times \text{timing}} = 0.08$ ,  $p < 0.05$ ; Model 3).<sup>4</sup> Moreover, the marginal probabilities indicate that if residents experience a subspecialty one month earlier, they are, on average, 9% more likely to select that subspecialty. Residents experiencing a subspecialty one month longer are, on average, 18% more likely to select that subspecialty.

To provide additional insight into the nature of the interaction, plots of the predicted interaction relationships between timing and duration and timing and diversity on the probability of selection are displayed in Figures 1 and 2, respectively. In each case, we expect the positive moderation to reveal a flattening of the logit curves or a decrease in the slope, suggesting that duration and diversity of experience attenuate the effect of

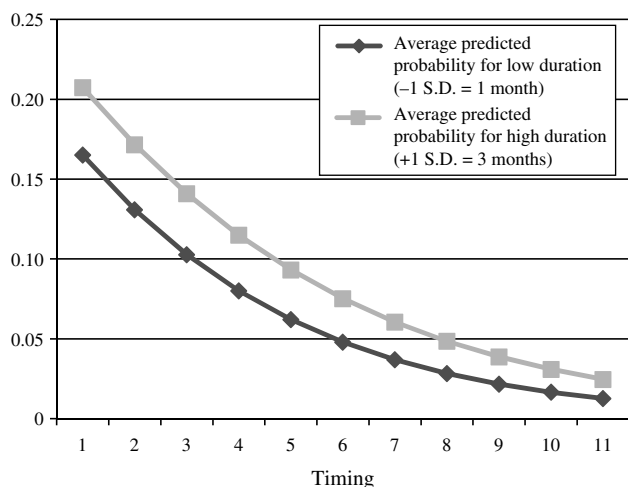
**Table 3 Results of Conditional (Fixed Effects) Logits for Selection Decisions**

	Model 1 selected	Model 2 selected	Model 3 selected
<i>Timing</i>	-0.20*** (0.06)	-1.01*** (0.31)	-0.68* (0.35)
<i>Duration</i>	0.17*** (0.05)	0.12** (0.06)	0.14* (0.07)
<i>Duration × Timing</i>		0.02* (0.01)	-0.00 (0.02)
<i>Diversity × Timing</i>		0.10** (0.04)	0.08* (0.04)
<i>No exposure</i>			-1.72*** (0.45)
Observations	1,628	1,628	1,628
Subspecialty FE	Yes	Yes	Yes
Individual FE	Yes	Yes	Yes
Individuals w/electives	No	No	No
Pseudo- $R^2$	0.163	0.175	0.198
LRT ( $\chi^2$ )	115.5	124.1	140.8
Prob > LRT ( $\chi^2$ )	0.000	0.000	0.000
ll	-297.1	-292.8	-284.5

Notes. Standard errors are given in parentheses. FE, fixed effects.

\* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$  (one-tailed tests).

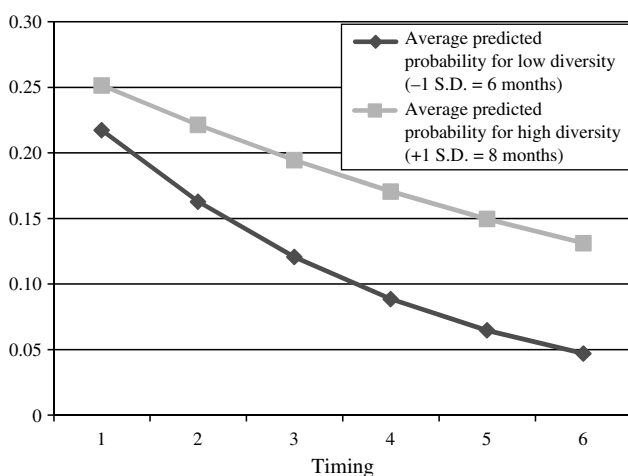
**Figure 1 Average Predicted Probability of Selection Across Subspecialties for Changes in Timing of Experience for Individuals with Subspecialties with Low or High Duration of Experience**



Note. Residents can experience 11 subspecialties during the 18-month period and may experience some for more than a month.

timing on the probability of selection. As expected, Figure 1 suggests that increasing duration of experience to a subspecialty increases the probability of selecting the subspecialty. Specifically, the upward shift of the logit curve is particularly pronounced for the first few subspecialties experienced. However, although Figure 1 indicates the probability of selecting a later-appearing subspecialty does increase at greater duration of experience, we did not observe the expected decrease in marginal change in the slope or the flattening of our logit

**Figure 2 Average Predicted Probability of Selection Across Subspecialties for Changes in Timing of Experience for Individuals with Low or High Diversity of Experience**



Note. Residents in the low diversity category will at most experience six different subspecialties; thus, we restricted timing to that range.

curve as a result of the magnitude of the duration by the timing of experience coefficient. In contrast, Figure 2 clearly illustrates the prediction in Hypothesis 4. As timing increases, the flattening of the logit curve reveals that an increase in the diversity of experience attenuates the effect of timing of experience on the probability of selection. Overall, the figures provide an additional account of the roles of duration and diversity in the effect of timing on selection decisions, providing robust support for Hypothesis 4 and some support for Hypothesis 3.

Finally, we examined whether our data violated the independence from irrelevant alternatives (IIA) assumption for the conditional logit. We used two approaches. First, we conducted the Hausman–McFadden (1984) test and the Small–Hsiao (1985) test; however, they provided inconsistent results. This is not surprising given that Cheng and Long (2007) have shown that such test have poor small sample size properties. They conclude that such tests are not useful for assessing any violation of the IIA assumption, and they suggest going back to McFadden’s (1974) suggestion that the conditional logit should be used only where the alternatives “can plausibly be assumed to be distinct and weighted independently in the eyes of each decision maker” (p. 113). Based on this suggestion and our qualitative data, we have no doubt that the distinctions between all options in the choice set are very significant even for nonphysicians.

Overall, the conditional logit analyses provide robust support for Hypotheses 1 and 2. Timing of experience (H1) and duration of experience (H2) were both influential factors in residents’ subspecialty selection decisions, even when controlling for unobserved option attributes. In addition, the timing and diversity of experience interact such that the likelihood of selecting a subspecialty appearing early in the rotation schedule is mitigated when a resident is exposed to a greater diversity of options (H4). Moreover, there was some support that timing of experience interacted with duration of experience, such that later-appearing options are more likely to be selected if they are experienced for a greater duration. Most importantly, the results are significant when controlling for unobserved individual and subspecialty attributes with individual and subspecialty fixed effects.

## Discussion

The findings of this study show that individuals making highly consequential decisions regarding future career paths are influenced by temporal elements in schedules over which they have no control. Timing and duration of experience with different subspecialties had a significant impact on selection decisions even when controlling for unobserved subspecialty and individual attributes. Specifically, residents selected subspecialties appearing

earlier and more often in their rotation schedule. Timing of experience also interacted with duration and diversity of experience such that subspecialties appearing later were more apt to be selected if they appeared more often and if residents experienced a greater diversity of options. The results indicate clear support for the importance of temporal elements on career selection decisions. These temporal elements determine the structure of information in the environment, which is known to play an important role in decision making (Simon 1956).

The results, though consistent with prior primacy findings, tackle key limitations of primacy research by providing insight into its boundary conditions and generalizability to field settings. Support for Hypothesis 4 illustrates that the influence of primacy is mitigated by the diversity of experience. The results for Hypothesis 3 indicate that the duration of experience increases the likelihood of selecting options appearing both early and late. Whereas past research suggests valence or exposure to contradictory information mitigates primacy, our findings indicate that diversity and duration of experience have the same effect (Bruine de Bruin and Keren 2003, Hogarth and Einhorn 1992). Last, this is the first study to illustrate primacy in decision making outside the confines of a laboratory setting. The robust support for Hypothesis 1 provides compelling evidence for the generalizability of primacy in a naturalistic field setting when making consequential decisions.

The mean differences between selected and nonselected options advance our understanding of the influence of time on career decision making by providing insight into the optimal time frame within which it occurs. On average, residents appear to be selecting one of the first three options they experience. Similar to life transition research (Stewart et al. 1986), we suggest that there is a limited window when individuals are most receptive to information during residency.

The results also support our duration of experience hypothesis (H2). Based on the rational learning model and P–E fit literature, greater experience with a subspecialty should increase the opportunity to gain knowledge, develop subspecialty-specific skills, and assess fit in that area. The results confirm earlier findings and more specifically suggest that not only is the mere exposure to a subspecialty critical to decision making but the incremental increase in experience with a subspecialty also has a significant effect. Although we do recognize that increased exposure to an option also has the potential to reveal a lack of fit, exposure in our context results in greater experience and as such may provide a developmental learning opportunity to improve skill fit. In sum, the results illustrate that residents are highly likely to select subspecialties that they have more experience with, which is consistent with the rational learning model and P–E fit research.

### Alternative Explanations

Although the research findings of this study are intriguing, it is important to rule out alternative explanations. First, the timing results may reflect the types of rotations residents experience early. Perhaps attributes of these subspecialties or the information communicated by placing them earlier make them more attractive rather than their timing in the schedule. Results of the subspecialty fixed effects model provide ample evidence against this possibility, since any time-invariant unobserved subspecialty differences are controlled. For example, the fixed effects model accounts for alternatives such as differences in base rate, demand, competition, job opportunities, prestige, or size across subspecialties, just to name a few. Thus, we are confident that our timing effects are independent of any idiosyncratic subspecialty attributes.

Second, although individuals in our study have no input in their rotation schedule, they do select a residency program. Perhaps they were interested in a specific subspecialty that was particularly strong at WFMC. It is likely that residents select an internal medicine residency at WFMC based on the strength of its overall program and perhaps because of the strength of its subspecialty programs; however, based on the *U.S. News and World Report* rankings, all subspecialties at WFMC are highly ranked. Thus, emphasis of certain subspecialties early in the rotation schedule did not appear to be related to the overall external rankings of the subspecialties.

Third, residents may have predetermined subspecialty preferences prior to residency. Although we expect students to enter the program with preferences, our analysis was conducted only on individuals who did not have an opportunity to exercise preferences. Specifically, they did not have an elective option in their first 18 months. Thus, we can be certain that their preferences did not influence the sequence or composition of their rotation schedule. Moreover, prior medical research finds that even when preferences exist, they may be altered (West et al. 2006).

Last, the results of the fixed effects logit estimator control for unobserved resident differences such as prior preferences, thus providing ample evidence that temporal elements influence career selection decisions even when controlling for individual differences.

### Theoretical Contributions

The limitations outlined earlier served as a catalyst for this project; thus, we will outline our theoretical contributions in light of these limitations. First, we noted that career research investigates a myriad of occupational and individual factors influencing career selection decisions (Dorsey et al. 2003, Holland 1997, Newton and Grayson 2003), but until now, we have ignored temporal elements. The novel contribution of this study is the use of time as a variable and its findings clearly illustrating

the impact of temporal elements on career selection decisions. This is the first study that examines how an individual's order of experience and duration of experience with career options influences their decision. Moreover, the results indicate that factors beyond an individual's control that influence the structure of available information may influence career selection decisions.

Second, although we do not have a direct test of strategies used when selecting a career in this study, the results do provide insight into strategies used by residents when selecting a subspecialty. Of all the different strategies that can be used when making career selection decisions, only one is subject to order effects: satisficing (Sauermaun 2005). Unlike other strategies, the focus of satisficing is not value maximization; instead, alternatives are examined sequentially until an option exceeding minimum standards is found. Although satisficing is often used by individuals as a result of extensive information-processing demands associated with other decision-making strategies and their own limited cognitive resources, it seems unlikely to be a dominant strategy for career selection. However, in our context there are multiple career decision points: the decision to become a doctor, the selection of a residency, and last, the subspecialty decision. The significant findings for timing in our study suggest satisficing is more indicative of subspecialty selection decisions, but perhaps other strategies were used prior to this stage.

Third, as noted earlier, the key deficits of primacy research are investigating only one temporal facet in isolation, providing limited information regarding options, and that it is limited to a laboratory setting. This study contributes to primacy research by addressing all of these issues. The results indicate that although early experiences are a significant factor in decision making, this influence may be mitigated when experience is diverse and there is greater experience with certain options. To the best of our knowledge, this is the first study to examine the role of primacy in conjunction with other elements and illustrate these boundary conditions. As such, it provides a more holistic perspective of the influence of information structure on decision making. Individuals attempting to influence the decisions of others will be wise to account for the placement, duration, and diversity of information when presenting options. Moreover, this is also the first test of primacy in a field setting; thus we provide evidence of this bias in an organizational setting on consequential decisions.

Fourth, the results provide an interesting twist for decision-making research investigating selection decisions among multiple options. When objective comparison metrics exist, they serve as the basis for selection decisions (Bazerman et al. 1994). In our study, objective, publicly available metrics exist, all alternatives are known, and option information is abundant, yet decisions are still influenced by the timing, duration, and

diversity of option experience. We posit that these findings result from the difference between information and experience. In studies investigating order effects, primacy, and preferences, subjects are passive recipients of information. In contrast, subjects in this study actively sample information in their environment, thus gaining experiential knowledge about their skills, their options, and the fit between the two. These findings may illustrate the difference between information and personal experiences.

Fifth, findings from this study suggest an extension for socialization literature. Although the focus of this body of work is on assimilation after organizational entry, our findings indicate that the process may begin prior to organizational entry and may even influence entry decisions. This is particularly prevalent in certain professions (i.e., medicine, law, or nursing) where professional education aims to socialize individuals by inculcating the occupational values and beliefs while providing academic and practical training (Abbott 1988, Carr-Saunders and Wilson 1933). The use of institutionalized tactics such as serial socialization to increase attachment and perceptions of fit is likely to influence organization choice in this context. As such, we may be underestimating the scope and reach of socialization tactics.

Finally, although we have no direct tests of the mechanism behind primacy or decision-making strategies in this study, the results do provide insight in this area. As mentioned earlier, residents experienced different subspecialties early and were aware of these scheduling differences; thus, primacy as a result of the weight or importance of early information is unlikely a viable mechanism. In contrast, the clear drop in interest in subspecialties later in the rotation schedule suggests support for the attention decrement theories behind primacy (Anderson 1971, Kashima and Kerekes 1994) and the view of decision making as a sequential process (Russo et al. 2000). Experiences from the first rotation may serve as an anchor or filter for subsequent experiences. Early susceptibility to external influence is consistent with life transitions research (Stewart et al. 1986). Moreover, the findings of this study are consistent with the prior work on preference formation and predecisional distortion (Jarvis and Petty 1996; Russo et al. 1998, 2000). If rotations appearing early in the schedule are more apt to be selected, there is likely a tendency to form preferences early and perhaps even distort information gained from subsequent experiences to support this initial preference. Last, the findings are also consistent with decision making research on temporal sequence, which indicates that in a series of outcomes spaced over time, initial experiences impact overall evaluations (Ariely and Zauberman 2000).

### Managerial Implications

This study has important career, decision-making, and policy implications. Job candidates in other fields are also subject to similar temporal and structural elements during their recruiting processes. As such, recruiters providing offers earlier or conducting longer on-site interviews or visits may elicit higher acceptance rates among potential job candidates. From a more general decision-making perspective, meetings and agendas are often scheduled with minimum attention to timing, duration, and diversity of topics. Given the powerful role of schedules, managers may want to attend to these issues. This study's findings also illustrate the role of temporal factors in a context where decision makers are expected to engage fully in information gathering and processing. Factors directly relevant to the decision should be most important in decision making. Although these factors are important, temporal factors outside of one's control prevail even in real decisions with life-altering consequences.

The findings of this study also have important policy implications regarding the composition of the physician workforce. Given the current developments in healthcare reform, more of our population will have access to basic healthcare. More specifically, the Congressional Budget Office estimates that the Affordable Care Act will decrease the number of uninsured by approximately 30 million by the year 2022 (Congressional Budget Office 2012). Yet the current physician shortage predictions by the American Medical Association, particularly in the areas of general medicine and geriatric care, lead to the following question: Who will care for the newly insured? In contrast to the traditional monetary incentives (i.e., scholarships, tuition reimbursements, loan remission, and signing bonuses; see Pathman et al. 2000, 2004), adjusting timing or duration of experience with underrepresented subspecialties may provide more cost-effective ways to change the composition of the physician workforce.

### Limitations and Future Directions

Limitations of this study suggest several avenues for future research. An archival study is able to test basic order effects; however, nuanced questions regarding experience quality or mechanisms behind temporal elements remain unanswered. Future research can investigate whether the valence of experience affects decision making. Strong evidence for order effects exists in marketing (Chen and Rao 2002, Scarpi 2004). Similarly, behavioral decision-making research on temporal sequence indicates that an inferior earlier experience creates a favorable contrast that enhances the perception of and preference for a favorable later experience (Ariely and Zauberman 2003, Lowenstein and Prelec 1993, Prelec and Lowenstein 1991). Integrating this body of work raises interesting questions: Will timing

effects exist regardless of whether the experience is positive or negative? Will the valence of experience, positive to negative (or vice versa), influence decision making? Future longitudinal research can provide insight into the unfolding role of time on decision making. Field studies surveying residents' preferences after each rotation can also contribute to predecisional distortion research and provide insight into order effects and preference formation mechanisms when options are experienced sequentially.

Second, the theories we focused on to support our hypotheses provided cognitive explanations; however, affective explanations also merit discussion. Early research on affect and cognition suggests that there are two separate systems that usually function in unison when formulating judgments (Zajonc 1980, 1984). In fact, both elements are exhibited in preference formation, as preferences form early and spontaneously, and are difficult to suppress, indicating an affective element, whereas the predecisional distortion of additional information to maintain consistency suggests a more cognitive element (Jarvis and Petty 1996; Russo et al. 2000, 2006). Research findings also indicate that the duration of experience alters affective perceptions of available options such that attraction to an option systematically increases with frequency of exposure (Brockner and Swap 1976, Reis et al. 2011, Saegert et al. 1973). Thus, although primacy is considered a cognitive bias, it does have an affective dimension that merits exploration.

Finally, generalizability is an issue when a study is conducted in a single and unique setting. Although the medical context provides us with an opportunity to conduct a field study with embedded controls, the temporal factors investigated are not unique to this setting. Temporal elements such as schedules and agendas are ubiquitous in all organizations. Future research can extend this study's findings to the broader context of decision making or other training programs with similarly staged exposure models. Concentration and career decisions of MBA students may be influenced by the timing, duration, and diversity of courses in their required core curriculum. Moreover, course order may broadly affect a student's decision-making schema such that early courses provide an enduring problem-solving schema that is applied to problems in other courses, disciplines, or contexts. Imagine how different the business community would be if ethics was a core course taught early and often in MBA programs.

In conclusion, this paper integrates the career and decision-making literatures to theorize and empirically illustrate the role of temporal elements on career selection decisions. We outline limitations in existing research and design an archival study addressing these limitations. Results contribute to career and decision-making research by illustrating the simultaneous influence of temporal and structural elements on career selection

decisions and by illustrating boundary conditions and generalizability for primacy. The findings indicate that time, a variable not examined in career selection, plays an important role in selection decisions, further illustrating the ubiquitous yet underresearched role of time in organizations research.

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### Endnotes

<sup>1</sup>We also ran our analysis using the full sample of residents (with and without electives), and the results were consistent with our results from the subsample of residents without electives.

<sup>2</sup>We also conducted the analysis by coding timing from 1 to 18 based on the first month the subspecialty appeared in residents' rotation schedules. Our results are robust to this new specification of our timing variable.

<sup>3</sup>An unconditional version of this estimator equivalent to a random effects logit indicated similar results; however, the asymptotic property of the conditional estimator is superior and was used for the analysis (see Katz 2001).

<sup>4</sup>We examined whether first or last experience had a distinct effect on the likelihood of selection by including a dummy variable for each. The results were not significant, revealing the importance of capturing early experience as a continuous variable.

### References

Abbott A (1988) *The System of Professions: An Essay on the Division of Expert Labor* (University of Chicago Press, Chicago).

Adelman L, Bresnick T (1992) Examining the effect of information sequence on patriot air defense officers' judgments. *Organ. Behav. Human Decision Processes* 53(2):204–228.

Albert S (1995) Towards a theory of timing: An archival study of timing decisions in the Persian Gulf War. Staw BM, Cummings LL, eds. *Research in Organizational Behavior*, Vol. 17 (JAI Press, Greenwich, CT), 251–284.

Allen NJ, Meyer JP (1990) Organizational socialization tactics: A longitudinal analysis of links to newcomers' commitment and role orientation. *Acad. Management J.* 33(4):847–858.

Anderson NH (1971) Integration theory and attitude change. *Psych. Rev.* 78(3):171–206.

Ariely D, Zauberman G (2000) On the making of an experience: The effects of breaking and combining experiences on their overall evaluation. *J. Behav. Decision Making* 13(2):219–232.

Ariely D, Zauberman G (2003) Differential partitioning of extended experiences. *Organ. Behav. Human Decision Processes* 9(2):128–139.

Ashforth BE (2012) The role of time in socialization dynamics. Wanberg CR, ed. *The Oxford Handbook of Socialization* (Oxford University Press, Oxford, UK), 161–186.

Ashforth BE, Saks AM (1996) Socialization tactics: Longitudinal effects of newcomer adjustment. *Acad. Management J.* 39(1):149–178.

Bacon FT (1979) Human learning and memory. *J. Experiment. Psych.* 5(3):241–252.

Bazerman MH (1994) *Judgment in Managerial Decision Making* (John Wiley & Sons, New York).

Bazerman MH, Schroth HA, Shah PP, Diekmann KA, Tenbrunsel AE (1994) The inconsistent role of comparison others and procedural justice in reactions to hypothetical job descriptions: Implications for job acceptance decisions. *Organ. Behav. Human Decision Processes* 60(3):326–352.

Bettman JR, Luce MF, Payne JW (1998) Constructive consumer choice processes. *J. Consumer Res.* 25(3):187–217.

Brockner J, Swap WC (1976) Effects of repeated exposure and attitudinal similarity on self-disclosure and interpersonal attraction. *J. Personality Soc. Psych.* 33(5):531–540.

Bruine de Bruin W, Keren G (2003) Order effects in sequentially judged options due to the direction of comparison. *Organ. Behav. Human Decision Processes* 92(1–2):91–101.

Cable DM, Judge TA (1996) Person-organization fit, job choice decisions, and organizational entry. *Organ. Behav. Human Decision Processes* 67(3):294–311.

Cable DM, Parsons CK (2011) Socialization tactics and person-organization fit. *Personnel Psych.* 54(1):1–23.

Campion MA, Cheraskin L, Stevens MJ (1994) Career-related antecedents and outcomes of job rotation. *Acad. Management J.* 37(6):1518–1542.

Carlson KA, Meloy MG, Russo JE (2006) Leader-driven primacy: Using attribute order to affect consumer choice. *J. Consumer Res.* 32(4):513–518.

Carr-Saunders AM, Wilson PA (1933) *The Professions* (Clarendon Press, Oxford, UK).

Chapman DS, Uggerslev KL, Carroll SA, Piasentin KA, Jones DA (2005) Applicant attraction to organizations and job choice: A meta-analytic review of correlates of recruiting outcomes. *J. Appl. Psych.* 90(5):928–944.

Chatman JA (1991) Matching people and organizations: Selection and socialization in public accounting firms. *Admin. Sci. Quart.* 36(3):459–484.

Chen HA, Rao AR (2002) Close encounters of two kinds: False alarms and dashed hopes. *Marketing Sci.* 21(2):178–196.

Cheng S, Long JS (2007) Testing for IIA in the multinomial logit model. *Sociol. Methods Res.* 35(4):583–600.



- Congressional Budget Office (2012) Estimates for the insurance coverage provisions of the Affordable Care Act updated for the recent Supreme Court decision. Report, Congressional Budget Office, Washington, DC. <http://www.cbo.gov/publication/43472>.
- Curley SP, Young MJ, Kingry MJ, Yates F (1988) Primacy effects in clinical judgments of contingency. *Medical Decision Making* 8(3):216–222.
- Dasgupta N, Rivera LM (2008) When social context matters: The influence of long-term contact and short-term exposure to admired outgroup members on implicit attitudes and behavioral intentions. *Soc. Cognition* 26:112–123.
- Dawes RW (1988) *Rational Choice in an Uncertain World* (Harcourt Brace Jovanovich, New York).
- Dorsey RE, Jarjoura D, Rutecki GW (2003) Influence of controllable lifestyle on recent trends in specialty choice by US medical students. *J. Amer. Medical Assoc.* 290(9):1173–1178.
- Hausman J, McFadden D (1984) Specification tests for the multinomial logit model. *Econometrica* 52(5):1219–1240.
- Hogarth RM, Einhorn H (1992) Order effects in belief updating: The belief-adjustment model. *Cognitive Psych.* 24(1):1–55.
- Holland JL (1997) *Making Vocational Choices: A Theory of Vocational Personalities and Work Environments* (Psychological Assessment Resources, Odessa, FL).
- Ibarra H (1999) Provisional selves: Experimenting with image and identity in professional adaptation. *Admin. Sci. Quart.* 44(4):764–791.
- Jarvis WBG, Petty RE (1996) The need to evaluate. *J. Personality Soc. Psych.* 70(1):172–194.
- Jones EE, Goethals GR (1972) Order effects in impression formation: Attribution context and the nature of the entity. Jones EE, Kanouse DE, Kelley RE, Vallins S, Weiner B, eds. *Attribution: Perceiving the Causes of Behavior* (General Learning Press, Morristown, NJ), 27–46.
- Kahneman D, Wakker P, Sarin R (1997) Back to Bentham: Explorations of experienced utility. *Quart. J. Econom.* 112(2):375–406.
- Kashima Y, Kerekes ARZ (1994) A distributed memory model of averaging phenomena in person impression information. *J. Experiment. Soc. Psych.* 30(5):407–455.
- Katz E (2001) Bias in conditional and unconditional fixed effects logit estimation. *Political Anal.* 9(4):379–384.
- Le Mens G, Denrell J (2011) Rational learning and information sampling: On the “naivety” assumption in sampling explanations of judgment biases. *Psych. Rev.* 118(2):379–392.
- Lipshitz R, Strauss O (1997) Coping with uncertainty: A naturalistic decision-making analysis. *Organ. Behav. Human Decision Processes* 69(2):149–163.
- Loewenstein GF, Prelec D (1993) Preferences for sequences of outcomes. *Psych. Rev.* 100(1):91–108.
- McFadden D (1974) Conditional logit analysis of quantitative choice behavior. Zarembka P, ed. *Frontiers in Econometrics* (Academic Press, New York), 105–142.
- National Resident Matching Program (2012) Results and data: 2012 main residency match. Report, National Resident Matching Program, Washington, DC.
- Newton DA, Grayson MS (2003) Trends in career choice by US medical school graduates. *J. Amer. Medical Assoc.* 290(9):1179–1182.
- Niedrich RW, Swain SD (2008) The effects of exposure-order and market entry-information on brand preference: A dual process model. *J. Academic Marketing Sci.* 36(3):309–321.
- Osipow SH (1999) Assessing career indecision. *J. Vocational Behav.* 55(1):147–154.
- Pathman DE, Konrad TR, King TS, Taylor DH, Koch GG (2004) Outcomes of states’ scholarship, loan repayment, and related programs for physicians. *Medical Care* 42(6):560–568.
- Pathman DE, Taylor DH, Konrad TR, King TS, Harris T, Henderson TM, Bernstein JD, et al. (2000) State scholarship, loan forgiveness, and related programs: The unheralded safety net. *J. Amer. Medical Assoc.* 284(16):2082–2094.
- Pennington N, Hastie R (1986) Evidence evaluation in complex decision making. *J. Personality Soc. Psych.* 51(2):242–258.
- Pettigrew TF, Tropp LR (2006) A meta-analysis test of intergroup contact theory. *J. Personality Soc. Psych.* 90(5):751–783.
- Pratt MG, Rockmann KW, Kaufmann JB (2006) Constructing professional identity: The role of work and identity learning cycles in the customization of identity among medical residents. *Acad. Management J.* 49(2):235–262.
- Prelec D, Lowenstein G (1991) Decision making over time and under uncertainty: A common approach. *Management Sci.* 37(7):770–786.
- Reis HT, Maniaci MR, Caprariello PA, Eastwick PW, Finkel EJ (2011) Familiarity does indeed promote attraction in live interaction. *J. Personality Soc. Psych.* 101(3):557–570.
- Russo JE, Carlson KA, Meloy M (2006) Choosing an inferior alternative. *Psych. Sci.* 17(10):899–904.
- Russo JE, Meloy MG, Medvec VH (1998) Predecisional distortion of product information. *J. Marketing Res.* 35(4):438–452.
- Russo JE, Meloy MG, Wilks TJ (2000) Predecisional distortion of information by auditors and salespersons. *Management Sci.* 46(1):13–27.
- Saegert S, Swap W, Zajonc RB (1973) Exposure, context, and interpersonal attraction. *J. Personality Soc. Psych.* 25(2):234–242.
- Sauermann H (2005) Vocational choice: A decision making perspective. *J. Vocational Behav.* 66(2):73–303.
- Scarpi D (2004) Effects of presentation order on product evaluation: An empirical analysis. *Internat. Rev. Retail Distribution Consumer Res.* 14(3):309–319.
- Simon H (1956) Rational choice and the structure of the environment. *Psych. Rev.* 63(2):129–138.
- Small KA, Hsiao C (1985) Multinomial logit specification tests. *Internat. Econom. Rev.* 26(3):619–627.
- Smith LG, Feit E, Mueller D (1997) Internal medicine residents’ assessment of the subspecialty fellowship application process. *Academic Medicine* 72(2):152–154.
- Soll JB, Larrick RP (2009) Strategies for revising judgment: How (and how well) people use others’ opinions. *J. Experiment. Psych.* 35(3):780–805.
- Stewart AJ, Sokol M, Healy JM Jr, Chester NL (1986) Longitudinal studies of psychological consequences of life changes in children and adults. *J. Personality Soc. Psych.* 50(1):143–151.
- Thompson JD (1967) *Organizations in Action* (McGraw-Hill, New York).
- Tsai CI, Klayman J, Hastie R (2008) Effects of amount of information on judgment accuracy and confidence. *Organ. Behav. Human Decision Processes* 107(2):97–105.

- Tversky A, Kahneman D (1974) Judgment under certainty: Heuristics and biases. *Science* 185(4157):1123–1131.
- Unkelbach C (2007) Reversing the truth effect: Learning the interpretation of processing fluency in judgments of truth. *J. Experiment. Psych.* 33(1):219–230.
- Van Maanen J, Schein EH (1979) Towards a theory of organizational socialization. Staw BM, ed. *Research in Organizational Behavior*, Vol. 1 (JAI Press, Greenwich, CT), 209–264.
- West CP, Popkave MA, Schultz HJ, Weinberger SE, Kolars JC (2006) Changes in career decisions of internal medicine residents during training. *Ann. Internal Medicine* 145(10):774–849.
- Zajonc RB (1968) Attitudinal effects of mere exposure. *J. Personality Soc. Psych.* 9(2):1–27.
- Zajonc RB (1980) Feeling and thinking. *Amer. Psychologist* 35(2):151–175.
- Zajonc RB (1984) On the primacy of affect. *Amer. Psychologist* 39(2):117–123.

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