Ye Li – Research Statement

My research seeks to understand the role of time in decision making. Time is ubiquitous, and as my research shows, an important factor in people's decisions, whether it is front and center or incidental to the decision. More specifically, one stream of research seeks to better understand the cognitive and affective determinants of what makes people more or less patient in intertemporal choices—choices involving tradeoffs between sooner and later outcomes. A second stream of research examines the incidental roles that time plays in decision making.

These streams of research illustrate my approach to using psychological principles to better understand everyday economic behaviors, using tools from both psychology and economics. My research has had a large and growing impact, with a total of 3166 citations, including 2704 in the last five years (Google Scholar). While many of these citations are for my 2015 review paper "Emotion and Decision Making" in the *Annual Review of Psychology*, all but a 2021 publication have at least 100 citations (see Table 1). Many of my papers have also generated considerable media attention in high impact places like New York Times, Wall Street Journal, Chicago Tribune, CNN, Forbes, Huffington Post, Inc, PBS, Salon, Scientific American, TIME, and U.S. News & World Report. Below, I describe specific studies in these research streams and my future research directions.

Determinants of Time Preference

Many decisions entail intertemporal tradeoffs—from the mundane (i.e., whether to order dessert or floss tonight) to the consequential (i.e., whether to start smoking or how much to save for retirement). Accordingly, most choice theories either assume or estimate people's *time preferences,* as captured by a temporal discount rate—that is, how much value an outcome loses as it is delayed—to describe or predict these behaviors. My primary stream of research seeks to understand when and why people behave more or less patiently when faced with intertemporal choices.

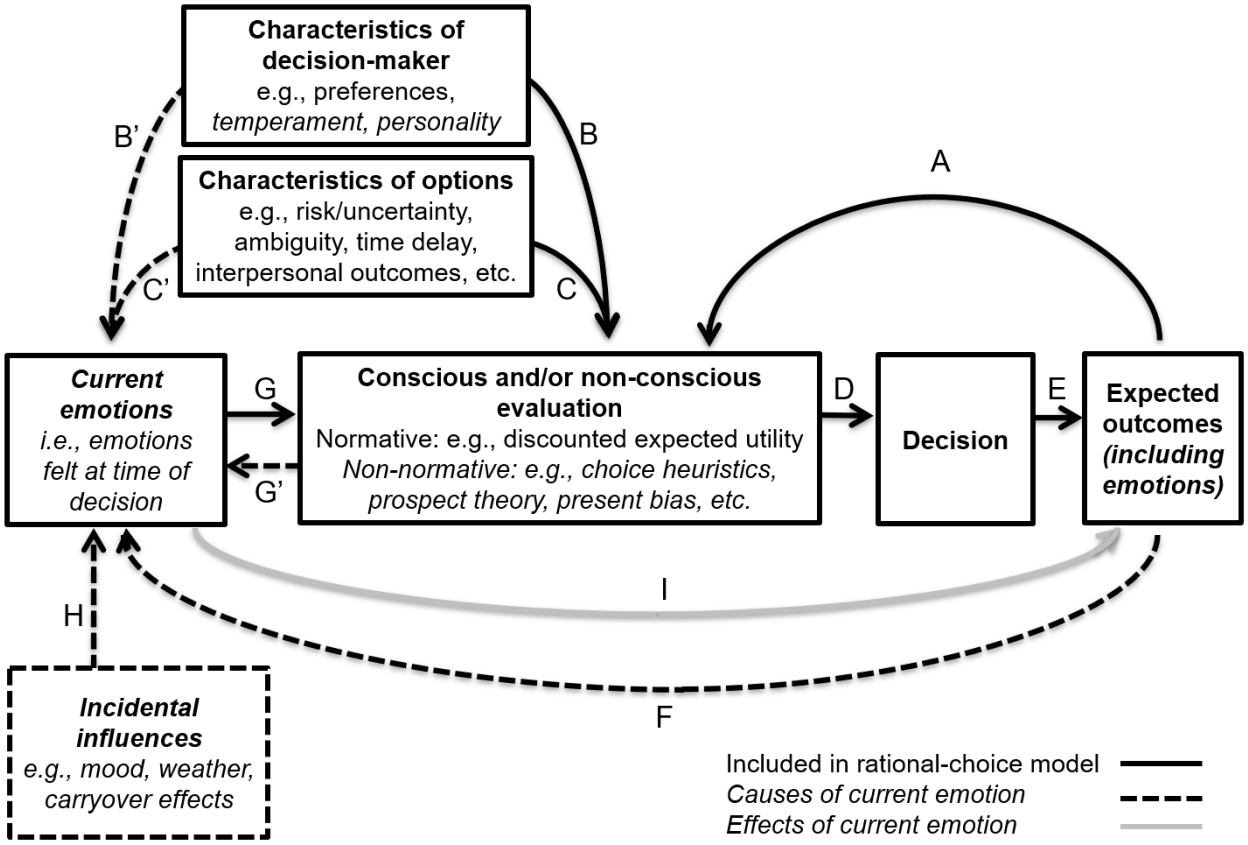
One set of papers has examined the impact of emotions on time preferences. In a 2013 paper published in *Psychological Science* (impact factor 4.902—top general psychology journal; 271 Google Scholar cites), my coauthors and I examined whether the devaluation of self that accompanies feelings of sadness can lead to an increased urgency to acquire things. We tested this by combining mood induction procedures with intertemporal choices. Sad participants were much more impatient than neutral participants. Furthermore, disgust, another negative emotion, did not have the same impact on intertemporal choices, suggesting negative emotions do not all make people more impatient. We also showed that sadness impacted cognitions by biasing thoughts towards ones that supported impatient choices. Finally, we found that sadness preferentially made people more impatient when immediate outcomes were available but was less impactful when the earliest possible outcome was at least 2 weeks away—it ramped up instant gratification. This paper received extensive press coverage (e.g., Boston Globe, Chicago Tribune, CNN, Consumerist, Daily Telegraph, Forbes, Fox News, Globe and Mail, Huffington

Post, Inc., LifeHacker, Psychology Today, Redbook, Salon, U.S. News & World Report, Wall Street Journal, Women's Health), particularly because of its implications for "retail therapy."

In a follow-up paper in 2014 (*Psychological Science*; 152 cites), my coauthors and I studied what might be considered a natural follow-up question: if sadness makes people impatient, does happiness make people patient? The answer was more nuanced that expected. Using similar mood induction procedures, we found that participants made to feel happier did not choose more patiently. Instead, a different positive emotion, gratitude, substantially increased patience in financial choices. This research was theoretically important as the first to find that a specific emotion can reduce impatience, whereas many theories suggest that emotions are detrimental to rational choice. Our findings also suggests valuable practical applications as gratitude can offer a route to combat excessive impatience in a relatively intuitive, less effortless way, in contrast to actively exercising limited willpower. This paper also generated considerable press interest (e.g., Bloomberg, Boston Globe, CBS, Fast Company, Forbes, Harvard Business Review, Huffington Post, Inc., MSN Money, New York Times, Today).

Building on this momentum, my coauthors and I published a review and theory paper on "Emotion and Decision Making" in *Annual Review of Psychology* (impact factor 18.156; 1751 cites)." In addition to organizing 35 years of research on emotion and decision making into eight major themes, we synthesized these themes into a general model of affective influences on decision making that combines traditional (rational-choice) and affective inputs, the *Affect Integrated Model of Decision-making*. Our efforts have been rewarded by significant attention from economics, psychology, management, and marketing scholars, as well as other fields ranging from artificial intelligence to medicine to tourism.

Figure 1. Affect Integrated Model of Decision-making (AIMD)



While emotions have short term influences on intertemporal choices, I am also interested in longer term influences such as the effects of cognitive aging. Both lay theory and past research suggest two conflicting views about aging: that age brings wisdom, and that age brings diminished cognitive ability. It turns out there is truth to both views: *fluid intelligence*—i.e., the ability to generate, transform and manipulate information—declines with age, but is it possible that older adults' greater *crystallized intelligence*—their knowledge, expertise, and life experience—can help offset declining fluid intelligence in terms of making good decisions? In a 2013 paper in *Psychology and Aging* (impact factor 2.107; 210 cites), my coauthors and I tested this hypothesis by testing whether older adults' higher levels of crystallized intelligence could help offset their lower levels of fluid intelligence. We collected a battery of standard cognitive measures and multiple measures of financial decision-making with a particular focus on time preference and financial literacy, confirming that greater experience and acquired knowledge from a lifetime of decision-making may provide older people with another way to make good decisions. Our 2015 paper published in *Proceedings of the National Academy of Sciences* (impact factor 9.412; 102 cites) extended this work by examining the relationship between cognitive aging and real-world financial decisions. This second paper was funded by 1) a $320k NIH grant that I lead the writing for as a postdoc but could not be PI on (due to not being faculty), and 2) a $165k *National Endowment for Financial Education* grant that I wrote and PI-

ed. This second paper further advanced our understanding by 1) using a real-world measure of financial decision making, credit scores, 2) distinguishing the roles of domain-specific crystallized intelligence, and 3) using a larger, more representative sample that includes the full adult age range. These papers have generated considerable academic and media interest (e.g., AARP, Chicago Tribune, Daily Mail, Men's Health, PBS, Psychology Today, TIME, U.S. News & World Report, USA Today).

In further work on aging and intertemporal choice, my coauthors and I have also examined whether older adults are better than younger adults at predicting how they will feel be about future experiences compared to the same experience today. People generally predict feeling less intensely about future experiences—i.e., they exhibit "future anhedonia." For example, I might expect to greatly enjoy a meal at my favorite restaurant tonight but might predict the same meal to be less exciting when scheduled for a month from now. However, we predict and find that older adults are less likely to have this bias. We show that this is because older adults are more psychologically connected to their future selves. This work has important implications for consumer purchase decisions and for time preferences since future anhedonia is one potential driver of impatient choices. We have presented this work at top marketing (*Association for Consumer Research*) and decision making (*Society for Judgment and Decision Making*) conferences and are currently revising it for submission to *Organizational Behavior and Human Decision Processes* (impact factor: 2.908).

Finally, I have two papers with broader points regarding the measurement of time preferences by researchers. First, in a paper published at *Journal of Marketing Research* (top marketing journal, impact factor: 5.000), my coauthors and I examine the elicitation methods commonly used to measure time preferences and other individual differences by marketers, managers, and policy makers. Researchers and practitioners in marketing, economics, and public policy often use preference elicitation tasks to forecast real-world behaviors. These tasks typically ask a series of similarly-structured questions. We posit that every time a respondent answers an additional elicitation question, two things happen: (1) We obtain information about some parameter(s) of interest, such as their time preference or the partworth for a product attribute, and (2) the respondent increasingly *adapts* to the task—i.e., using a task-specific decision process specialized for this task that may or may not apply to other tasks. Importantly, adaptation comes at the cost of potential *mismatch* between the task-specific decision process and real-world processes that generate the target behaviors, so that asking more questions can reduce external validity. We used mouse- and eye-tracking to trace decision processes in time preference measurement and conjoint choice tasks: Respondents increasingly relied on task-specific decision processes as more questions were asked, leading to reduced external validity for both related tasks and real-world behaviors. Importantly, the external validity of measured preferences peaked after less than seven questions in both types of tasks. When measuring preferences, less can be more.

Second, in a paper published at *Journal of Experimental Psychology: General*, my coauthors and I examine the increasing inclusion of time preferences as a predictor of a wide range of behaviors in many fields. Time preferences are assumed to predict behaviors and to that end, many papers report correlations of time preference with a few behaviors, and a few examine several behaviors. The current investigation offers a more comprehensive accounting of how well time preference predicts behavior—1) examining more behaviors, 2) controlling for more covariates, and 3) using a test-retest design to account for measurement error. We find correlations that are mostly modest and highly variable across behaviors. This is true even when controlling for 15 other demographic variables and psychologically-relevant scales and accounting for measurement error. We also asked time preference researchers ($N = 55$) to predict the variation in the relationship between time preference and behaviors, but they tend to overestimate the predictive power of time preference estimates. We has important implications for anyone hoping to invoking time preference as a predictor and/or determinant of behaviors with delayed consequences and we hope it offers a guide for future researchers considering whether to measure time preferences as part of their larger study.

Incidental Role of Time in Decision Making

Whereas my first stream of research directly examines intertemporal choices, where time is front and center, my second stream of research examines the influence that time has on decision making even when it is incidental or peripheral.

In a paper published in *Journal of Retailing* (impact factor: 5.873), my former student, Yun Jie, and I study the role of temporal cues on consumer decisions. Prior psychology and marketing research has examined preferences for new options as a function of whether they are unique, original, or novel. In contrast, the we study newness preferences arising solely from temporal cues associated with a product (e.g., production, on-shelf, or purchase dates). Temporal cues are ubiquitous; yet, there is little research on such cues aside from a few papers on expiration dates. We offer a first step in filling this gap by studying how temporal cues impact choices. In particular, we study whether people may prefer (and be willing to pay more) for chronologically newer options, above and beyond any substantive benefits to newness. We show that people prefer temporally newer options due to an implicit association between the concepts of "newer" and "better." We show that people prefer "merely" newer options for choices between headphones, posters, and even lottery tickets for options tagged with different temporal cues in ways that do not affect the products' substantive benefits. Consumers are even willing to pay more money (in incentive-compatible designs) for products that are not meaningfully newer.

Whereas the temporal cues paper examines the impact of explicit temporal cues in decision making, time passes whether we attend to it or not, and the passage of time may have unintended consequences on choice. In a paper published in *Journal of Behavioral Decision Making* (impact factor: 1.715, 102 cites), Nicholas Epley and I show that people's tendency to overweigh the vividness of temporally recent hedonic experiences leads to order effects when evaluating options sequentially. When choosing from generally good options, all else equal, the most recent

option is liked best because its hedonic experience is still "fresh" whereas earlier experiences have faded in memory toward seeming more average. For the same reason, when choosing from generally bad options, the most recent option is liked least, but now fading hedonic experience actually makes earlier options seem better in memory than they were in reality.

Finally, although global warming is a phenomenon that can only be detected over long periods of time, my coauthors and I show that people's judgments about global warming are influenced by temperature over much shorter time horizons. That is, people substitute a short-term judgment for the longer-term one. People who thought that today's weather was warmer than usual were more likely to believe in global warming and more likely to donate to a global warming charity, both in the United States and Australia, and in both winter and summer. We also used actual temperature deviation as an instrumental variable to rule out alternative explanations such as reverse causality and omitted variables. This paper, published in *Psychological Science*, generated considerable academic (345 citations) and media attention (e.g., Fast Company, Forbes, MSNBC, New York Times, Psychology Today, Scientific American, Sydney Morning Herald, TIME, Wall Street Journal). My coauthors and I recently published a follow-up in *Current Opinion in Behavioral Sciences* (IF 3.990) in which we reviewed a decade of studies replicating and extending the original finding and conducted a formal meta-analysis on the "local warming" phenomenon. We found that this effect seems to be robust, although with considerable heterogeneity in effect size.