

Boston University School of Law

Scholarly Commons at Boston University School of Law

Faculty Scholarship

7-2018

Mistaken About Mistakes

Kathryn Zeiler

Boston University School of Law

Follow this and additional works at: https://scholarship.law.bu.edu/faculty_scholarship



Part of the [Law and Economics Commons](#)

Recommended Citation

Kathryn Zeiler, *Mistaken About Mistakes*, 17-43 Boston University School of Law, Law and Economics Research Paper Series (2018).

Available at: https://scholarship.law.bu.edu/faculty_scholarship/285

This Article is brought to you for free and open access by Scholarly Commons at Boston University School of Law. It has been accepted for inclusion in Faculty Scholarship by an authorized administrator of Scholarly Commons at Boston University School of Law. For more information, please contact lawlessa@bu.edu.



Kathryn Zeiler

Mistaken about Mistakes

Boston University School of Law

765 Commonwealth Ave.

Boston, MA 02215

USA

kzeiler@bu.edu

phone: 001-617-353-4702

fax: 001-617-353-3077

JEL codes: D01, D15, D81, D91, K10

This is a post-peer-review, pre-copyedit version of an article published in the *European Journal of Law and Economics*. The final authenticated version is available online at: <https://doi.org/10.1007/s10657-018-9596-5>

Mistaken about Mistakes

Kathryn Zeiler¹

kzeiler@bu.edu

ORCID: 0000-0001-5775-1321

July 2018

Abstract

Theoretical work in behavioral economics aims to modify assumptions of standard neoclassical models of individual decision-making to better comport with observed behavior. The alternative assumptions fall into at least two categories: non-standard preferences and psychological mistakes. Applications of behavioral economics models in law, however, tend to assume that deviations from standard neoclassical models are meant to build in psychological mistakes that produce regrettable choices. Often follow-on policy prescriptions suggest interventions that either help individuals choose correctly or go further to substitute the “correct” choices for those that mistake-prone individuals might choose in error. Such policy prescriptions are ill suited in cases where the applied behavioral economics model assumes non-standard preferences as opposed to psychological mistakes. This essay provides examples of models in each category and examples of mistaken applications of models that assume non-standard preferences rather than psychological mistakes. It also suggests ways to avoid errors when applying behavioral economics theories in law.

Keywords: behavioral economics, legal scholarship, rationality, psychological mistakes

Acknowledgements

¹ Nancy Barton Scholar and Professor of Law, Boston University School of Law, Boston, MA, USA

Thanks to Eyal Zamir and all conference participants for helpful comments and suggestions. Special thanks go to my colleague Wendy Gordon for insightful comments and for suggesting the title. Thanks also to Megan Smith-Mady and Erica Puccetti for excellent research assistance.

1 Introduction

The subfield of behavioral economics has gained substantial traction. Motivated in large part by observed behavior that does not comport with predictions derived from neoclassical economic models of individual decision-making,² behavioral economists have employed insights from the field of psychology to modify assumptions to sharpen the models' predictive power. Behavioral economics has taken root, so much so that publishers now sell textbooks dedicated solely to it (see, e.g., Wilkinson and Klaes 2018; Cartwright 2014; Angner 2012), and students are offered semester-long courses on the subject.³

Modifications of neoclassical model assumptions can be organized into at least two categories. The first category is a collection of assumptions that recognizes human fallibility grounded in psychological influences.⁴ While neoclassical models assume that humans are able to ignore irrelevant alternatives, accurately weight the likelihood of uncertain outcomes, and interpret information in an unbiased fashion, behavior observed both in experimental laboratories and in the field supports alternative assumptions that humans sometimes err in systematic ways. For example, clearly irrelevant alternatives appear to sometimes impact choices (see, e.g., Huber et al. 1982). Some evidence suggests we tend to overweight relatively small probability events and underweight relatively large probability events (Kahneman and Tversky 1979; Pidgeon et al. 1992). We sometimes underweight the likelihood of negative outcomes (Scheier et al. 1994; Weinstein 1980). We tend to attach excessively high probabilities to ex ante uncertain

² I use the terms “neoclassical economics models,” “rational choice theory,” and “standard economics models” interchangeably.

³ The rise of behavioral economics in law is an example of what Guido Calabresi (2016: 2-5) refers to as “Law and Economics,” the altering of economic theory to fit the reality of legal environments. He contrasts this with “Economic Analysis of Law,” which labels reality as irrational if it does not comport with predictions from theories built up from first principles. For another view on the distinction between “law and economics” and “economic analysis of law,” see Harnay and Marciano (2009).

⁴ I use the term “psychological mistakes” to distinguish mistakes caused by psychological influences from those caused by, for example, a lack of perfect information and inability to perfectly predict uncertain future events. Standard economic theory sometimes predicts such non-psychological mistakes or inefficiencies.

outcomes if we know the outcome occurred (see, e.g., Walster 1967; Fischhoff 1975). We sometimes incorrectly interpret information about uncertain events in ways that serve our own interests (see, e.g., Arkin et al. 1980). These psychological tendencies lead to choices we might regret if, in fact, judgment errors cause them.

The second category of assumption modifications relates to preferences. This set of revised theories assumes deviations from a set of standard preferences built into neoclassical models of individual choice. For example, under conditions of uncertainty, standard expected utility theory assumes that individuals consider the expected value of possible outcomes⁵ and tend to be averse to risk (i.e., we tend to strictly prefer \$5 to a coin flip that will pay \$0 for heads and \$10 for tails) (Pratt 1964). The standard model also assumes that utility (or happiness) is derived from potential final states of the world (i.e., the piles of stuff I might end up with after uncertainty is resolved). Models of intertemporal choice assume that individual preferences over waiting are constant over time. In other words, we assume that individuals have constant discount rates across time (Samuelson 1937).⁶ Standard models also tend to assume that individuals are wholly self-interested, which implies that they ignore potential changes in others' utility.

Again, observed behavior often fails to support these assumptions. For example, in addition to final states of the world, evidence suggests that one's happiness sometimes depends on outcomes relative to some starting point⁷ or relative to one's expectations over outcomes (Kőszegi and Rabin 2006). In addition to reflecting risk aversion, some observed choices suggest an aversion to perceived expected losses (Kahneman and Tversky 1979). When it comes to patience, some observed behavior suggests discount rates are systematically inconsistent over time (Strotz 1955). A substantial collection of evidence supports theories assuming "bounded self-interest" or social preferences (Preston 1961). As opposed to psychological mistakes, these non-standard preferences, conditional on what explains them, lead to choices that do not necessarily generate regret.

⁵ Standard models alternatively assume that individuals assign either objective or subjective probabilities to uncertain outcomes (Schoemaker 1982).

⁶ For example, if one prefers \$110 in one month to \$100 today, then \$110 in 1 year and 1 month is preferred to \$100 in one year.

⁷ The starting point is often referred to as a reference point (Kahneman and Tversky 1979).

In other words, the tendencies might simply reflect preferences that differ from those built into standard economics models.

Despite the important distinctions between these two categories, scholars who import behavioral economics models into legal analyses sometimes mistakenly assume that deviations from the standard model reflect psychological mistakes or some level of irrationality. Behavioral economics as applied in law has morphed into a theory of mistakes (see generally Wright and Stone 2012; Levinson 2012).⁸ The purpose of this essay is to provide examples of mischaracterizations by scholars of deviations from standard economics model assumptions, to argue that such mischaracterizations might have important implications, and to suggest ways scholars can avoid mischaracterizing non-standard preferences as mistakes.⁹ Unfortunately, the final objective is sometimes surprisingly difficult, often due to the ambiguity around the notion of rationality in economics and the lack of clarity about the nature of assumptions in work that offers new theories to explain observed behavior. I do not aim to resolve the ambiguity here, but only to offer pointers scholars might consider when navigating the muddy waters to draw normative implications from applications of behavioral economics to law.

Part II reviews some of the standard assumptions employed in economics models and summarizes a (necessarily oversimplified) version of the concept of rationality. Part III briefly describes a handful of examples of behavioral economics assumptions that fall into the first category, psychological mistakes. Part IV lists other behavioral economics assumptions that imply non-standard preferences as opposed to mistakes. It also provides examples of mistaken applications in legal scholarship and argues that such mistakes

⁸ Wright and Stone (2012: 860-861) explain, “Behavioral economics examines ways in which economic actors deviate from predicted conduct under rational choice assumptions—in other words, how and why actors behave irrationally. Behavioral law and economics attempts to apply these insights through policy measures designed to systematically ‘debias’ firms and individuals.” Levinson (2012: n.1) similarly states, “Behavioral law and economics is the study of how cognitive biases or limitations predictably affect decision-makers’ behavior in ways that cause the behavior to deviate from what is economically beneficial.”

⁹ Thanks to Eyal Zamir for reminding me that scholars might also make the opposite mistake—mistaking theories grounded in psychological mistakes for theories grounded in non-standard preferences. These errors are equally as concerning as those I focus on here. In the same vein, economics and psychologists, in addition to legal scholars, sometimes make mistakes when characterizing assumptions.

have important implications, especially when it comes to normative conclusions.¹⁰ Part V offers some rules of thumb for avoiding faulty applications. Part VI concludes.

2 The Standard Model and the Concept of Rationality

Joseph Stiglitz (1993: 28), in his best-selling economics textbook, characterizes rational choice as being grounded in the assumption that “people weigh the costs and benefits of each possibility.” He goes on to explain that this assumption is “based on the expectation that individuals...will act in a consistent manner, with a reasonably well-defined notion of what they like and what their objectives are, and with a reasonable understanding of how to attain those objectives” (Stiglitz 1993: 29). The basic steps of rational choice, according to Stiglitz (1993: 42-47), are first to identify all possible choices, second to define the tradeoffs triggered by each choice, and third to choose after correctly calculating opportunity costs and marginal costs, while ignoring sunk costs.¹¹ Each choice results in an outcome (or expected outcome), and rational choice theory assumes one is able to rank the outcomes based on how each impacts one’s utility.¹²

¹⁰ It is important to note here that I did not canvas the entire literature to collect sufficient evidence to make claims about the prevalence of mistakes about mistakes. Examples were relatively easy to find, however. In addition, overly narrow definitions and characterizations of the field are quite common (e.g., “Behavioral economics is one of the most significant developments in economics over the past thirty-six years. The field combines economics and psychology to produce a body of evidence that individual choice behavior departs from that predicted by neoclassical economics in a number of decisionmaking situations. These departures from rational choice behavior are said to be the result of the individual’s “cognitive biases,” that is, systematic failures to act in one’s own interest because of defects in one’s decisionmaking process. The documentation of these cognitive biases in laboratory experiments has been behavioral economics’ primary contribution to microeconomics. These biases, behavioral economists assert, demonstrate systematically irrational choice behavior by individuals and firms. This irrational behavior, in turn, breaks the link between revealed preference and individual welfare upon which neoclassical economic theory depends.” (Wright and Ginsberg, 2012, p. 1034); “...B[ehavioral] L[aw and] E[conomics] relies, at its core, on the concept that people make predictable errors in judgment.” (Rachlinski, 2011, p. 1682)

¹¹ Opportunity cost is the lost opportunity from forgoing the next best alternative. Marginal cost is the cost incurred when one decides to engage in the next increment of the chosen activity (e.g., the cost of increasing the size of one’s army by one additional soldier). Sunk costs are past expenditures that cannot be undone.

¹² Standard models are framed in terms of decision utility, as described in the text. Behavioral models sometimes employ the notion of experienced utility, which refers to one’s hedonic experience associated with an outcome. Inability to predict how different outcomes might impact

Extreme versions of rational choice theory assume that individuals are wholly self-interested.¹³ In other words, we understand how different choices that result in various outcomes impact our utility, and we choose the option that produces the utility-maximizing outcome. Under conditions of uncertainty, where several known states of the world are possible, rational choice theory assumes that individuals operate under the assumptions of expected utility theory (von Neumann and Morgenstern 1944). Expected values are calculated using known probabilities of possible states of the world, expected values are translated into expected utilities and the choice resulting in the largest expected utility is selected. In line with observed behavior, expected utility models often assume some level of risk aversion. When new information is learned, individuals update their beliefs about the likelihood of potential outcomes using, say, Bayes' Rule (Bayes and Price 1763). Rational choice theory models generally assume consistent preferences over time, while standard discounted utility models assume exponential discounting functions (Meyer 1976).

More technical conceptualizations of rationality assume that attitudes and preferences follow basic principles of logic and probability theory, are coherent, and are independent of immaterial or irrelevant factors (Shafir and Le Boeuf 2002). The standard model assumes that individuals are able to formulate preference relations, which specify how each possible choice compares with all other possible choices (Mas-Colell et al. 1995: 6).¹⁴ Preference relations are often characterized as rational (or well-behaved) if they are complete (all choices are compared to every other possible choice), transitive (if A is preferred to B, and B is preferred to C, then A is preferred to C), and reflexive (each choice is equally as good as itself) (Mas-Colell et al. 1995: 6-7 n.30). Other rational preference relation characteristics include cancellation and invariance (Wilkinson and

our experienced happiness is the basis for some behavioral economics models (see, e.g. Kahneman and Thaler 2006). Behavioral economics has introduced a variety of utilities (e.g., anticipatory utility, diagnostic utility, remembered utility, real-time utility, and residual utility) (see Wilkinson and Klaes 2018: 93-100). These distinctions, while generally important, are outside this essay's scope.

¹³ Less extreme versions are flexible about the nature of the preferences driving choices. For one view of the assumptions' history and development, see Jeffrey Harrison (1985).

¹⁴ If A and B are the only choices, an individual might prefer A to B, or prefer B to A, or be indifferent between them.

Klaes 2018: 68). A preference relation satisfies cancellation if immaterial or irrelevant factors do not change preference orderings (Wilkinson and Klaes 2018: 68). Invariance is satisfied if different representations of the choice problem yield the same preference relation.

Behavioral economics characterizes deviations from these assumptions as either psychological mistakes or non-standard preferences. The next Part provides examples of deviations that belong in the mistake category. Part 4 focuses on deviations related to non-standard preferences.

3 Psychological Mistakes

Standard economic theory generally assumes that observed choices reveal a chooser's preferences (Samuelson 1937). This is not to say, though, that standard theories do not predict choices that individuals might later regret. Imperfect information, costly information, and uncertainty over outcomes, for example, might lead to ex post regrettable choices. Neoclassical economics assumes, however, that, under such conditions, individual choices maximize ex ante expected utility. This implies that interventions beyond the provision of information cannot improve choices.

Much of behavioral economics theory aims to infuse standard economic models with realistic assumptions that better reflect human fallibility. Starting with a list of observed phenomena derived from the field of psychology, behavioral economists update standard models to account for mistake-making in an effort to improve the models' predictive power. The mistakes behavioralists focus on often cannot be avoided simply by providing information.

Psychological mistakes seem to arise from a number of phenomena. Evidence suggests psychological hurdles in assessing the likelihood of possible, unknown states of the world. Tversky and Kahneman (1974), for example, report evidence of the anchoring-and-adjustment heuristic, which triggers disproportionate influence of irrelevant information initially presented (e.g., one's social security number) over guesses about facts unknown to the guesser, such as the population of New Guinea. In addition, Kahneman et al. (1982) summarize abundant evidence suggesting that individuals often

overweight low-likelihood events, like winning the lottery. Croson and Sundali (2005) summarize evidence of individual susceptibility to the gambler's fallacy—for example, believing tails is “due” after a fair coin flipped a number of times produces a string of heads. Seemingly countless other such biases and heuristics have found support in reported data (Wilkinson and Klaes 2018: 120-137).

In addition, some behavioral economics models predict regrettable choices in cases in which individuals experience strong emotions before or during decision-making. Lowenstein (2000) observes that “visceral factors often drive people to behave in ways that they view as contrary to their own self-interest.” Fenton-O’Creedy et al. (2010: 1056) report evidence suggesting that “[e]ffective emotion regulation seems to be a critical success factor in [investment] trading.” Elster (1996: 1391) argues that emotions play several different roles in human decision-making, including but not limited to “interfere[ing] with belief formation, by inducing self-serving or overly optimistic beliefs.”

Although behavioral economics has contributed greatly to our understanding of psychological mistakes, it is not focused solely on mistake-making. A second class of behavioral economics theories, which focuses on non-standard preferences, attempts to explain anomalous choices by assuming a set of preferences that deviate from the set commonly embedded in rational choice theory models. The key difference is that the anomalous choices predicted by this second class of models are not mistakes. Instead they merely reflect preferences not accounted for in standard economic models (e.g., preferences over inequality of distributions and preferences over loss avoidance).

The following Part provides examples from two vast literatures, one attempting to explain observed reluctance to trade and another focusing on inconsistent preferences for patience over time.

4 Non-Standard Preferences

A number of assumptions related to the nature of preferences are baked into rational choice theory models. Observed behavior that does not comport with rational choice theory predictions has prompted behavioral economists to posit various features of

preferences that diverge from standard assumptions. Despite the divergence, the theories assume that such preferences are rational in the sense that they do not lead to regrettable mistakes. This part summarizes two sets of behavioral economics theories that assume non-standard, rational preferences.¹⁵

4.1 Reluctance to Trade Endowed Items

One of the most well known anomalies economists study is the observed difference between willingness to pay and willingness to accept.¹⁶ Standard economic models generally assume that valuations of items are independent of one's endowment (or ownership) status. In contrast to this assumption, in both laboratory and field experiments, researchers have observed valuation gaps—reported valuations for an endowed item that exceed those for the same item when it is not endowed. In some experiments subjects are asked whether they want to trade an endowed item for an alternative item of similar market value. In these experimental environments, we commonly observe exchange asymmetries—subjects seem reluctant to give up their endowed items in exchange for the alternative.¹⁷

¹⁵ Others exist. The discussion here is meant only to provide examples. Furthermore, it's important to reiterate that the theoretical and empirical literatures related to each of the examples provided in this Part are vast. Each contains multiple theories, some assuming non-standard preferences and some assuming psychological mistakes. Some theories have found more support in the data than others, but each literature contains multiple theories that are able to explain substantial portions of existing data. Those who import behavioral economics theories into legal scholarship sometimes mistake theories of non-standard preferences for theories of mistakes, and they also fail to acknowledge theories other than the one (or few) they apply and draw normative claims from. Both oversights lead to confusion in legal scholarship.

¹⁶ Willingness to pay is measured by the most amount of money one is willing to exchange to obtain some item. Willingness to accept is measured by the least amount of money one is willing to accept in exchange for giving up an endowed item.

¹⁷ This general phenomenon is commonly known as the “endowment effect.” This term causes confusion, however, because it connotes a particular explanation, that the endowment somehow causes the observed effect. While some theories focus on the endowed nature of the good, several competing theories that focus on other features of the contexts are able to explain large swaths of observed choices. Thus, neutral labels such as “valuation gap” and “exchange asymmetry” are less likely to confuse the reader or compel placing excessive weight on one theory over others.

Economists have posited several theories to explain observed reluctance to trade one's endowment for some other item or for money.¹⁸ Endowment theory, recently replaced by theories with better predictive power, was a leading contender for over a decade. This theory is an application of Kahneman and Tversky's (1979) prospect theory to contexts of riskless choice (Tversky and Kahneman 1991). The model deviates from the assumptions of rational choice theory in three ways.¹⁹ First, the model assumes that preferences are reference point dependent: choices depend on where one begins, "usually correspond[ing] to [one's] current position, ...[but one's reference point] can also be influenced by aspirations, expectations, norms, and social comparisons" (Tversky and Kahneman 1991: 1046-1047).²⁰ This differs from the rational choice theory assumption that individuals consider only the impact final outcomes have on utility. Second, the model assumes that individuals are averse to losses in the sense that "losses loom larger than corresponding gains" (Tversky and Kahneman 1991: 1039). Third, the authors posit that sensitivity to marginal gains and marginal losses diminishes with distance from one's starting point.

Despite these deviations from rational choice theory, the theory's authors do not assume that preferences of the type they posit are irrational per se (Tversky and Kahneman 1991: 1057-1058). They argue that the normative status of the assumptions must be judged by "a prediction of the quality of the experience of [a] consequence" in the relevant decision context. Tversky and Kahneman further argue that "a bias in favor of the status quo *can be justified* if the disadvantages of any change will be experienced more keenly than its advantages." (p. 1057; emphasis added) They then provide examples of circumstances that might not trigger reluctance to trade:

¹⁸ For a comprehensive review of the literature, see Zeiler (2018). In addition to summarizing the numerous theories that might explain observed reluctance to trade, the review critiques techniques used by empiricist to elicit choices. Such controversies exist in most if not all economics literatures. Unfortunately, scholars who import theories from economics and psychology into legal analyses often gloss over such inherent messiness.

¹⁹ The authors employ an additional set of technical assumptions that are irrelevant for our purposes.

²⁰ Much evidence suggests that one's endowment does not impact valuation and thus does not support endowment theory. A substantial portion of existing data, however, supports alternative theories (e.g., Köszegi and Rabin 2006) that assume that reference points are set by expectations and not endowments (see Zeiler 2018).

“[S]ome reference levels that are naturally adopted in the context of decision are irrelevant to the subsequent experience of outcomes, and the impact of such reference levels on decision is normatively dubious. In evaluating a decision that has long-term consequences, for example, the initial response to these consequences may be relatively unimportant, if adaptation eventually induces a shift of reference. Another case involves principal-agent relations: the principal may not wish the agent’s decision to reflect the agent’s aversion to losses, because the agent’s reference level has no bearing on the principal’s experience of outcomes.” (p. 1057-58)

Despite these important and explicit nuances, a number of scholars have argued that observed reluctance to trade violates rationality. Jolls et al. (1998: 1545) point to prospect theory as an example of “bounded rationality” despite the fact that the theory’s authors have explicitly claimed that at least some of the theory’s posited deviations from standard theory are not per se irrational (Tversky and Kahneman, 1991). Fried (2013: 1255) infers that behavioral economics scholars have concluded that reluctance to trade is irrational because such reluctance suggests that valuation depends on something other than the actual utility of the endowed item.²¹ Similarly, Levinson (2012: 593-594), in an article titled “Superbias,” describes observed reluctance to trade as “irrational” behavior. He also claims that valuations of owned goods are excessively high and reluctance to trade is “considered economically irrational because the inflation of perceived worth inhibits the transfer of goods at what might otherwise be a desirable price.” (p. 607) Levinson cites to several experimental studies and literature reviews, but not to the primary source of endowment theory, Tversky and Kahneman’s 1991 article, which makes clear that aversion to loss is not per se irrational. Buccafusco and Sprigman (2010: 42-43) discuss results from an experiment designed to study the impact of ownership of intellectual property on valuation, claiming that an owner “might demand, in part due to

²¹ None of the works Fried cites to support the claim of irrationality actually claim that reluctance to trade is irrational. In fact, two cited articles (Korobkin 2003: 1280; Korobkin 1998: 666-667) claim that the endowment effect is not per se irrational. Fried (2013: 1260) also refers to loss aversion and reference dependence as “cognitive biases.”

an endowment effect, an irrational amount of money to license her song to another user who wants to use part of the song as a sample in a new work.”

Some descriptions are more nuanced. For example, Jones and Brosnan (2008), in an important article explaining the usefulness of bringing cognitive science to bear on behavioral economics theories, describe experiments related to reluctance to trade. They claim that the “propensity to value an item not solely on the characteristics of the item itself, but also according to abstract notions of ownership, suggests that people are often pricing goods and rights irrationally.” Jones and Brosnan (2008: f.12) recognize that some have questioned whether reluctance to trade signals irrational preferences²² but conclude that “[r]egardless of terminology, the key point is that the change in preference seems irrational, and if it is so, then even ‘rational’ pursuit of an irrational preference can make problems for law.” Jones and Brosnan (2008: 1951) also refer to loss aversion as a “seemingly irrational predisposition.”

Assuming that reluctance to trade is irrational when the cited theory is not grounded in such an assumption has important implications when it comes to forwarding normative legal claims. Generally, if reference dependence and loss aversion are rational characteristics of individual preferences, then, from a normative standpoint, regulators should lean towards avoiding interfering with individuals’ expression of them.²³ A useful analogy is our regulatory response to risk aversion. We have long understood that individuals tend to be willing to pay more than the expected loss to shift risk of a potential loss to another party, at least in some domains. The regulatory response has not been to work to “debias” individuals or to somehow work around aversion to risk. Instead, regulators expend resources to ensure that insurance markets are robust so that

²² “There have been some interesting semantic discussions of whether or not, even if it exists, the endowment effect is formally irrational. One can argue, for example, that once a person's preference for the item has increased, then acting consistent with that preference is rational. Similarly, one could argue (perhaps tautologically) that seemingly irrational behavior simply reflects rational, utility-maximizing behavior among people who share an unexpectedly odd utility function. Alternatively, one could simply say that observed disparities challenge expected utility theory as a good model for decision making under uncertainty.”

²³ Alternatively, preferences that compel acts that infringe on others’ rights (e.g., A prefers to steal B’s possessions) should be regulated in ways that protect recognized rights. The main point here is that regulatory tactics will differ depending on how we interpret the problems that give rise to the need for intervention.

individuals can efficiently transfer risk to insurance companies. We do not try to convince consumers that they should not be willing to pay more than the expected loss for insurance, but we do work to bolster competitive insurance markets so that consumers can enjoy maximum surplus from trades given preferences characterized by risk aversion. In the same way, regulators should acknowledge the possibility that at least some are loss averse and consider regulatory approaches that allow individuals to efficiently express these non-standard preferences.

While some researchers are appropriately cautious about the leap to the normative (see, e.g., Jones and Brosnan 2008: 1988), others assume that the law is well positioned to remedy irrationality signaled by observed choices that deviate from rational choice theory predictions. Fried (2013: 1266, fn. 52), for example, claims that “if...refusal to make obviously superior trades results from the endowment effect..., then...sensible policy interventions would look to debiasing consumers' irrational attachment to what they happen to have...”²⁴ Korobkin (2003) suggests that the government, when compensating owners for takings, can avoid the inefficiencies caused by endowment effect by paying fair market value rather than the owner's valuation (Korobkin 2003).²⁵ Buccafusco and Sprigman (2010: 43-44) suggest that intellectual property policy should be designed to address reluctance to trade in an effort to avoid “market failure.”

²⁴ In support of this normative claim, Fried cites to Jennifer Arlen and Stephan Tontrup (2015). Arlen and Tontrup, in their normative discussion, however, assume that reluctance to trade is caused by a preference to avoid feelings of regret and not by loss aversion. Although Arlen and Tontrup (2015: 175-178) do not have loss aversion in mind, they seem to mistakenly characterize regret avoidance as a mistake, describing regret avoidance as a bias in need of a remedy. They (2015: 153) describe actions in the absence of regret aversion as “rational.” They do this despite the fact that the authors of regret theory (Loomes and Sugden 1982: 822), which Arlen and Tontrup cite early on, explicitly characterize the model of regret avoidance as a model of rational choice.

²⁵ Korobkin (2003: 1265) explains “If the government wishes to promote the efficient use of resources by redistributing rights if and only if the valuation of those rights by the winners exceeds the valuation of the losers, but WTA is considered an illegitimate measure of value, then permitting the community to condemn landowners' rights and requiring it to pay a fixed price determined by the state might be an appropriate policy.” Korobkin (2003: 1280), however, does recognize the possibility that reluctance to trade might not be irrational, stating that “the endowment effect is not obviously ‘irrational’ behavior: a preference for what one has over what one does not have...is no more troublesome than a preference for chocolate ice cream over vanilla.”

Regardless of whether we should consider reluctance to trade as a signal of irrational preferences, it is important to at least acknowledge the nuances spelled out by the theories' authors. The same goes for other observations studied by behavioral economists. The next subsection summarizes similar problems with the importation of theories related to preferences over delay across time.

4.2 Inconsistent Time Preferences

Another much discussed behavioral departure from rational choice theory is observed inconsistency in preferences related to delays that occur at different points in time (e.g., delays in the near future versus delays in the distant future).²⁶ Rational choice theory models generally assume an exponential discounting function, which implies that future consumption impacts current utility less than present consumption. More specifically, the current value we get for consumption decreases as the delay to consumption increases. The standard model also assumes consistent levels of patience for delay over time. For example, if one prefers \$100 today over \$110 a week from now, the theory predicts that the individual will prefer \$100 in a month over \$110 a month and one week from now.

The empirical literature is replete with documented evidence of observed behavior that deviates from the standard model's predictions. One in a long list of anomalies is sometimes referred to as present bias. Evidence suggests that individual levels of patience for delay over time are inconsistent.²⁷ In particular, individuals seem more sensitive to delays closer in time to the present as opposed to delays further out into the future (Cohen et al. 2016).²⁸ While researchers have observed several other anomalies relative to the

²⁶ See Mas-Colell et al. (1995: 733-736) for a general description of the standard discounting model.

²⁷ As with most observations studied in economics, disagreement exists over interpretation and causal mechanisms. Stahl (2013) lists studies that have posed challenges to the validity of experiments reporting evidence of present bias and offering a rational choice theory explanation for observed inconsistent time preference.

²⁸ This excellent review catalogs difficulties with measuring individual time preferences.

standard discounted utility model,²⁹ legal scholars seem especially interested in present bias.

In light of such observed behavior, behavioral economics theorists have offered alternatives to the standard discounting model with the goal of increasing the theory's predictive power. Interestingly, the theoretical literature got its start with models of animal behavior (see, e.g., Chung and Herrnstein 1967). Using similar concepts, Thaler and Shefrin (1981) developed a theory of self-control to explain the use of commitment devices (e.g., Christmas club savings accounts). Thaler and Shefrin (1981: 393, 404) explicitly assume that the use of such devices is rational, and they characterize their theory as a theory of rational behavior.³⁰ Loewenstein and Prelec (1992: 574-578) followed with one of the first non-standard economics models that assumes inconsistent time preferences, modeled using a hyperbolic discounting function, and the ability to employ commitment devices. The authors do not directly discuss whether the features of preferences assumed by the model are rational, but they do characterize the deviations from standard theory in preference terms as opposed to mistakes.³¹ Building on Thaler and Shefrin's theory of self-control, Fudenberg and Levine (2006) lay out a dual-self

²⁹ Loewenstein and Prelec (1992) provide one of the earliest lists of anomalies.

³⁰ The model assumes two selves: a myopic doer, who derives utility only from current consumption, and a planner, who is concerned with lifetime utility. The planner rationally chooses to impose constraints on the doer when the costs of doing so are relatively low.

³¹ For example, Loewenstein and Prelec (1992: 595) state, "Our model by no means incorporates all important psychological factors that influence intertemporal choice. For example, like any model with nonconstant discounting, it yields time-inconsistent behavior or 'myopia'.... However, it cannot explain the high levels of conflict that such myopic behavior often evokes. Intertemporal choice often seems to involve an internal struggle for self-command.... At the very moment of succumbing to the impulse to consume, individuals often recognize at a cognitive level that they are making a decision that is contrary to their long-term self-interest. Mathematical models of choice do not shed much light on such patterns of cognition and behavior." They (1992: 592) do, however, recognize potential conditions for suboptimal choice: "Relative to normative theory, our model suggests that people may tend to prefer plans that sacrifice the medium-range future for the sake of the short and the long term. There is nothing clearly wrong with this, provided that one can commit to an entire plan at the moment of decision. However, if the optimal plan can be recalculated at later points in time, then the planned sacrifice in midrange consumption will not take effect.... As a result, a bias in favor of the long and short runs may in practice yield behavior that is oriented only to the short run." Furthermore, Loewenstein and Prelec (1992: 581) observe, "The shape and reference point assumption reflects basic psychophysical considerations: extra attention to negative aspects of the environment, decreasing sensitivity to increments in stimuli of increasing magnitude, and *cognitive limitations*" (emphasis added).

model of impulse control. They (2006: 1451) explicitly characterize the preference assumptions as rational. According to these models, choices that seem irrational might in fact be rational, reflecting high costs of delayed gratification. Importantly, assuming a hyperbolic discounting function does not necessarily imply irrational preferences.

Others have modeled inconsistent time discounting as leading to choices that individuals might regret. This family of models makes various assumptions about the level of individual awareness about the potential for mistakes. For example, O'Donoghue and Rabin (2001) posit that individuals are partially naïve. Specially, individuals understand their future self-control problems, but they underestimate the problems' magnitude. Some point to these models to explain the “underutilization” of available commitment devices (e.g., investing one's savings in illiquid assets). Alternatively, Laibson (1997) constructs a model to explain behavior in contexts where individuals cannot access a perfect commitment device. Laibson (1997) argues that preferences characterized by hyperbolic discounting lead individuals to suboptimal decisions.³²

These two models illustrate the diversity in the literature—some models suggest non-standard preferences and make no claims about mistakes, while others assume that individuals adopt techniques to avoid mistakes, and still others claim that behavior that does not comport the predictions of standard theory reflects errors in judgment. Despite the perspective of many who apply these various theories to law, reviewers (Frederick et al. 2002) of the discounting literature have explicitly noted that “it is unclear whether *any* of the [discounted utility model] ‘anomalies’ should be regarded as mistakes.” Further complicating the picture, researchers have generated a large literature critiquing the methods used to measure time preferences (see, e.g., Cohen et al. 2016).

Despite the diversity of model types in the economics literature, scholars who apply behavioral economics to law often claim that inconsistent time preferences are irrational. Wright and Stone (2012: 1530), for example, refer generally to hyperbolic discounting as a “willpower error.” Similarly, in an article published by a law review, Rizzo and Whitman (2009), both economists, characterize inconsistent time preferences

³² For example, if I cannot use a commitment device to start saving for the future, I might plan to start saving in a year, but when the time comes I chose to consume and not save and make another plan to start saving in the future. And, so on. I never save, which puts my future self in a bind.

as evidence of irrationality despite the diverse characterizations in the economics literature.³³ Gandhi (2008: 140) likewise labels hyperbolic discounters as irrational. Bowers (2008: 815) describes hyperbolic discounting as “the product of the inability to think and to act rationally in the face of pain.” Viscusi (2007: 239) describes experimental findings of hyperbolic discounting as documenting “intertemporal irrationality.” Yahya (2006: 73) claims that “psychologists and economists have long held the idea that people irrationally prefer small present gains to larger future gains.” Hanson and Yosifon (2004: 43-44) describe hyperbolic discounting as a “choice bias,” which they define as a “mental contamination” that we wish to avoid but that is difficult to eliminate. Farber (2003: 328) describes inconsistent time preferences as seemingly irrational. Ainslie and Monterosso (2003: 831) claim that “most people would call irrational” preferences characterized by a hyperbolic discounting function.³⁴

Characterizing inconsistent time preferences as irrational leads some researchers to jump too easily to regulatory methods designed to correct mistakes or to ignore preferences in policy making. If models that assume rationality are accurate explanations of observed choices, then policies might be best geared toward reducing the costs of commitment devices and lowering the costs of delayed gratification. This might require getting a good handle on factors that increase such costs to be able to best fashion policies to reduce them. Regulators might also consider methods to increase individual awareness of the best available commitment devices.

If, on the other hand, we mistakenly assume inconsistent time preferences are mistakes, policy prescriptions might tilt unnecessarily in the direction of costly information dissemination aimed at increasing awareness of inconsistent time preferences or, perhaps worse, limiting choices perceived by regulators to satisfy irrational desires for

³³ While Rizzo and Whitman (2009: 913-914) state, “People who engage in hyperbolic discounting may exhibit *time inconsistency*: they will make decisions about future trade-offs and then reverse those decisions later.... Behavioral economists take this sort of inconsistency as evidence of irrationality,” the authors do not cite to any authority for this claim. They point the reader, however, to Frederick et al. (2002) to support their definition of hyperbolic discounting. Recall that these authors express doubts over whether inconsistent time preferences should be considered mistakes.

³⁴ They state, “This curve gives preference a property that most people would call irrational—an innate tendency to switch from better-later goods to poorer-earlier goods simply as the earlier goods become imminently available.” (p. 831)

instant gratification. The literature contains various sorts of potentially misguided normative claims grounded in the characterization of inconsistent time preferences as irrational. Gandhi (2008: 142), for example, argues that government can aid irrational students plagued by inconsistent time preferences by providing upfront tuition subsidies. Ainslie and Monterosso (2003) recognize potential benefits of using law to correct mistakes made by hyperbolic discounters but list reasons why achieving this goal might be impossible. Perhaps most troubling, Viscusi (2007: 239-240) assumes that present bias is irrational and argues that environmental policy makers should ignore their constituents' preferences.³⁵ These sorts of normative claims fail to recognize the lack of consensus in the literature related to whether present bias leads to regrettable mistakes (Frederick et al. 2002).

Importantly, characterizing a behavioral model's assumptions as either grounded in mistakes or in non-standard preferences does not necessarily lead us to particular policy prescriptions. Mitchell (2005) lays out a number of reasons why policies designed to correct mistakes are not necessarily normatively appealing. Similarly, the absence of potential mistakes does not automatically trigger a hands-off approach. If our aim is to maximize total social welfare, we sometimes do best by allowing individuals to make choices in line with their preferences. In others cases, we can justify regulation in the absence of mistakes if, for example, markets are hampered by imperfections such as externalities and imperfect information. Furthermore, we might collectively decide that some preferences are socially unacceptable and that choices driven by them should be punished. The main point is that optimal regulation depends heavily on the factors that drive choices; if we are wrong about what drives behavior, regulation might do more harm than good.

This Part provided examples of mistakes about mistakes from two behavioral economics literatures that are commonly imported into legal scholarship. Although these

³⁵ Specifically, Viscusi (2007: 239-240, fn. 85) states, "Given that people's revealed intertemporal preferences display hyperbolic discounting, should policy prescriptions for discounting practices reflect these preferences? My view is that this form of intertemporal irrationality should not be incorporated into official discounting practices, which instead should be based on the opportunity cost of capital rather than the irrational, myopic concerns embodied in hyperbolic discounting."

sorts of mistaken applications appear quite frequently, they are avoidable. The next Part offers steps scholars can take to avoid such mistakes.

5 Avoiding Mistaken Applications

To reduce the risk of mistakenly claiming that assumed preferences are irrational or that an applied theory assumes individual choices reflect psychological mistakes, scholars should always carefully consult the primary source of the applied theory, resist resolving ambiguity by assuming that the applied theory assumes mistake-making, and gain an understanding of the full scope of the relevant economics literature. Given the field's young age, behavioral economics literatures generally posit a number of possible theories for the same observed behavior, only some of which assume psychological mistakes as opposed to non-standard preferences or other sorts of behavioral drivers.

Consult and cite to primary sources. To avoid confusion, best practice requires directly consulting and citing to the primary source, keeping in mind the distinction between non-standard preferences and mistakes, and other sorts of theoretical drivers of behavior. Unfortunately, misinterpretation is quite common; thus, avoid relying on others' descriptions and interpretations. If a theory author is not explicit about the nature of the theory's assumptions, determine whether the author makes any implicit assumptions along these lines. In addition, avoid "applying" observed behavior. Instead, apply theories about what drives observed behavior.³⁶

Resist generalizing behavioral economics as a theory of errors. In the face of uncertainty about the nature of theoretical assumptions, avoid concluding that assumed features of preferences, beliefs, and choices signal irrationality. That a theory's assumptions differ in some way from those built into standard economic theories does not necessarily imply irrationality. At a minimum, defend claims of irrationality or mistaken choices. Explain why we might assume that individuals acting under the applied model's assumptions might regret their choices.

Apply literatures, not single theories. Given the field's young age, very few, if any, research questions have definitive answers. All behavioral economics literatures

³⁶ For more on this, see Zeiler (2010).

contain multiple theories designed to explain what drives a single observed behavior. Some assume non-standard but rational preferences. Some predict that individuals will commit psychological errors. Some suggest other sorts of behavioral drivers. Unless a literature has reached a consensus around what explains the relevant observed behavior, it is important to describe variations in theories that find support in reported data. In some cases, this is best accomplished by pointing the reader to a recent literature review, after, of course, verifying that the review accurately describes each theory. Reviewers sometimes get it wrong.

Additional difficulty is introduced by the fact that definitions of “rational preference” and “rationality” offered in the literature lack consistency. No hard and fast rules exist for identifying irrationality. Importers of behavioral economic theories might rely on the theorists’ characterizations of posited preference features as rational or irrational, but these claims are, of course, not binding on importers, at least in the sense that importers are free to disagree with the author’s characterizations. Thus, perhaps at a minimum, importers should make it a practice to disclose all relevant theories along with the theorists’ characterizations of preferences as rational or irrational, and argue for or against those characterizations. Given that many literatures contain collections of theories that, taken together, recognize the possibility of both mistakes and non-standard preferences, applicators should strive to accurately summarize the state of the literature. Once the reader has a basic understanding of the flavors of different theories, importers are free to offer normative claims based on hypotheticals that assume that one or more of the posited theories actually explain the observed behavior.

6 Conclusion

The field of behavioral economics, while relatively new, has come a long way in its efforts to improve the predictive power of economic theory. Improvements are achieved, in some cases, by modifying assumptions of the standard model. Although these modifications take a variety of forms, behavioral economics mistakenly has come to be known as the theory of irrationality. This mischaracterization misses the fact that many behavioral theories assume perfect rationality. For at least some of these rational

behavioral models, assumption modifications focus on the introduction of non-standard preferences, such as loss aversion, hyperbolic discounting, and other-regarding preferences.

What might explain overgeneralizations of behavioral economics as a set of theories rooted in mistake making? Although this difficult question is not taken up in this Essay, a couple conjectures might act as useful starting points. First, the earliest importers of behavioral economics into law did not always recognize the theories' nuances. For example, although Jolls, Sunstein and Thaler (1998) distinguished between mistakes (e.g., bounded rationality) and non-standard preferences (e.g., bounded self-interest), they imprecisely characterized the endowment effect at an example of bounded rationality even though Tversky and Kahneman (1991) were agnostic. Unfortunately, scholars often cite to imprecise characterizations of original work rather than to the original work itself (Klass and Zeiler 2013). Second, as Klass and Zeiler (2013, pp. 55-59) suggest, behavioral economics theories were “the right theor[ies] at the right time.”³⁷ For many years, legal scholars resisted general claims that neoclassical economics models predicted optimal outcomes in the absence of heavy-handed regulation. Theories of mistakes arising from behavioral economics reinvigorated the need for regulation. Law was once again a vital component in the quest for optimal outcomes. This outlook might have compelled the generalizations and imprecision that arose as behavioral economics was voraciously imported into legal analyses. Again though, much work is required to test these ad hoc conjectures.

Mistakes about psychological mistakes have important implications when it comes to normative claims importers draw from descriptive theories. When those who generate policy prescriptions fail to recognize that deviations from behavioral predictions of standard theory might be due to non-standard, rational preferences as opposed to mistakes, they risk proposing “fixes” that do more harm than good. Interventions designed to help individuals correct mistakes might waste limited government resources, lead to confusion and steer individuals away from their preferred choices. Careful application of behavioral economics theories requires consulting and citing to primary

³⁷ Klass and Zeiler (2013) focus on endowment theory, but the same argument can be generalized to behavioral economics theory.

sources, resisting generalizing behavioral theories as theories of mistakes and applying literatures rather than individual theories. By distinguishing between psychological mistakes and non-standard preferences, importers can make more effective use of behavioral economics insights.

Calabresi (2016: 16) reminds us that “the world as it is often ...represents worthy relationships and behaviors that the theory...does not explain. And it is essential...that such data from the world as it is be used to reform the theory...because what the empiricist describes is often not irrational but highly worthy and should not only be retained by also explained.” Calabresi focuses here on rational choice theorists’ mistakes relating to labeling behavior that does not comport with rational choice theory predictions as irrational and then offering prescriptions for better aligning behavior with such predictions. Calabresi’s advice, however, applies equally well to those who import behavioral economics into legal scholarship and policy. Valid normative claims require a clear understanding of the factors that drive choices.

References

- Ainslie, G., & Monterosso, J. (2003). Will as intertemporal bargaining: Implications for rationality. *University of Pennsylvania Law Review*, 151(3), 825-862.
- Angner, E. (2012). *A Course in Behavioral Economics*. Basingstoke, UK: Palgrave Macmillan.
- Arien, J. & Tontrup, S. (2015). Does the endowment effect justify legal intervention? The debiasing effect of institutions. *Journal of Legal Studies*, 44(1), 143-182.
- Arkin, R. M., Appelman, A. J., & Burger, J. M. (1980). Social anxiety, self-presentation, and the self-serving bias in causal attribution. *Journal of Personality and Social Psychology*, 38(1), 23-35.
- Bayes, T., & Price (1763). An essay towards solving a problem in the doctrine of chances. *Philosophical Transactions*, 53, 370–418.
- Bowers, J. (2008). Contraindicated drug courts. *UCLA Law Review*, 55(4), 783-836.
- Buccafusco, C., & Sprigman, C. (2010). Valuing intellectual property: An experiment. *Cornell Law Review*, 96(1), 1-46.
- Calabresi, G. (2016). *The Future of Law and Economics*. New Haven: Yale University Press.
- Cartwright, E. (2014). *Behavioral Economics*. London: Routledge.
- Chung, S., & Herrnstein, R. J. (1967). Choice and delay of reinforcement. *Journal of Experimental Analysis of Behavior*, 10(1), 67-74.
- Cohen, J. D., Ericson, K. M., Laibson, D., & White, J. M. (2016). Measuring time preferences, NBER working paper no. 22455. National Bureau of Economic Research, doi: 10.3386/w22455.
- Crosan, R., & Sundali, J. (2005). The gambler's fallacy and the hot hand: Empirical data from casinos. *Journal of Risk and Uncertainty*, 30(3), 195-209.
- Elster, J. (1996). Rationality and the emotions. *Economic Journal*, 106(438), 1386-1397.
- Farber, D. A. (2003). From here to eternity: Environmental law and future generations. *University of Illinois Law Review*, 2003(2), 289-336.
- Fenton-O'Creavy, M., Soane, E., Nicholson, N., & Willman, P. (2010). Thinking, feeling and deciding: The influence of emotions on the decision making and performance of traders. *Journal of Organizational Behavior*, 32(8), 1044-1061.

Fischhoff, B. (1975). Hindsight \neq foresight: The effect of outcome knowledge on judgment under uncertainty. *Journal of Experimental Psychology: Human Perception and Performance*, 1(3), 288-299.

Frederick, S., Loewenstein, G., & O'Donoghue, T. (2002). Time Discounting and Time Preference: A Critical Review. *Journal of Economic Literature*, 40, 351-401.

Fried, B. H. (2013). But seriously, folks, what do people want? *Stanford Law Review*, 65(6), 1249-1268.

Fudenberg, D., & Levine, D. K. (2006). A dual-self model of impulse control. *American Economic Review*, 96(5), 1449-1476.

Gandhi, S. J. (2008). Understanding students from a behavioral economics perspective: How accelerating student loan subsidies generates more bang for the buck. *Kansas Journal of Law and Public Policy*, 17(2), 130-167.

Hanson, J., & Yosifon, D. (2004). The situational character: A critical realist perspective on the human animal. *Georgetown Law Review*, 93(1), 1-180.

Harrison, J. L. (1985). Egoism, altruism, and market illusions: The limits of law and economics. *UCLA Law Review*, 33(5), 1309-1363.

Harnay, S. & Marciano, A. (2009). Posner, Economics and the Law: From "Law and Economics" to an Economic Analysis of Law. *Journal of the History of Economic Thought*, 31(2), 215-232.

Huber, J., Payne, J. W., & Puto, C. (1982). Adding asymmetrically dominated alternatives: Violations of regularity and the similarity hypothesis. *Journal of Consumer Research*, 9(1), 90-98.

Jolls, C., Sunstein, C. R., & Thaler, R. (1998). A behavioral approach to law and economics. *Stanford Law Review*, 50(5), 1471-1550.

Jones, O. D., & Brosnan, S. F. (2008). Law, biology, and property: A new theory of the endowment. *William and Mary Law Review*, 49(6), 1935-1990.

Kahneman, D., & Thaler, R. H. (2006). Utility maximization and experienced utility. *Journal of Economic Perspectives*, 20(1), 221-234.

Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica*, 47(2), 263-292.

Kahneman, D., Slovic, P., & Tversky, A. (1982). *Judgment Under Uncertainty: Heuristics and Biases*. Cambridge, UK: Cambridge University Press.

- Klass, G. and Zeiler, K. (2013). Against Endowment Theory: Experimental Economics and Legal Scholarship. *UCLA Law Review*, 61, 2-64
- Korobkin, R. (1998). The status quo bias and contract default rules. *Cornell Law Review*, 83(3), 608-687.
- Korobkin, R. (2003). The endowment effect and legal analysis, *Northwestern University Law Review*, 97(3), 1227-1294.
- Kőszegi, B., & Rabin, M. (2006). A model of reference-dependent preferences. *Quarterly Journal of Economics*, 121(4), 1133–1165.
- Laibson, D. (1997). Golden eggs and hyperbolic discounting. *Quarterly Journal of Economics*, 112(2), 443-477.
- Levinson, J. D. (2012). Superbias: The collision of behavioral economics and implicit social cognition. *Akron Law Review*, 45(3), 591-646.
- Loewenstein, G. (2000). Emotions in economic theory and economic behavior. *American Economic Review*, 90(2), 426-432.
- Loewenstein, G., & Prelec, D. (1992). Anomalies in intertemporal choice: Evidence and an interpretation. *Quarterly Journal of Economics*, 107(2), 573-597.
- Loomes, G., & Sugden, R. (1982). Regret theory: An alternative theory of rational choice under uncertainty. *Economic Journal*, 92(368), 805-824.
- Mas-Colell, A., Whinston, M. D., & Green, J. R. (1995). *Microeconomic Theory*. New York: Oxford University Press.
- Meyer, R. F. (1976). Preferences over time. In R. Keeney & H. Raiffa (Eds.), *Decisions with Multiple Objectives: Preferences and Value Tradeoffs* (pp. 473-514). New York: Wiley.
- Mitchell, G. (2005) Libertarian Paternalism is an Oxymoron. *Northwestern University Law Review*, 99(3), 1245-1277.
- O'Donoghue, T., & Rabin, M. (2001). Choice and procrastination. *Quarterly Journal of Economics*, 116(1), 121-160.
- Pidgeon, N., Hood, C., Jones, D., Turner, B., & Gibson, R. (1992). Risk perception. In *Risk: Analysis, Perception and Management* (pp. 89-134). The Royal Society.
- Pratt, J.W. (1964). Risk aversion in the small and in the large. *Econometrica*, 32(1-2), 122-136.

Preston, L. E. (1961). Utility interactions in a two-person world. *Journal of Conflict Resolution*, 5(4), 354-365.

Rachlinski, J. (2011). The Psychological Foundations of Behavioral Law and Economics. 2011 *University of Illinois Law Review*, 1675-1696.

Rizzo, M. J., & Whitman, D. G. (2009). The knowledge problem of new paternalism. *Brigham Young University Law Review*, 2009(4), 905-968.

Samuelson, P. A. (1937). A note on measurement of utility. *Review of Economic Studies*, 4(2), 155-161.

Scheier, M. F., Carver, C. S., & Bridges, M. W. (1994). Distinguishing optimism from neuroticism (and trait anxiety, self-mastery, and self-esteem): A re-evaluation of the life orientation test. *Journal of Personality and Social Psychology*, 67(6), 1063-1078.

Schoemaker, P. (1982). The expected utility model: Its variants, purposes, evidence and limitations. *Journal of Economic Literature*, 20(2), 529-563.

Shafir, E., & Le Boeuf, R. A. (2002). Rationality. *Annual Review of Psychology*, 53, 491-517.

Stahl, D. O. (2013). Intertemporal choice with liquidity constraints: Theory and experiment. *Economic Letters*, 118(1), 101-103.

Stiglitz, J. (1993). *Economics*. New York: W.W. Norton & Co.

Strotz, R. H. (1955). Myopia and inconsistency in dynamic utility maximization. *Review of Economic Studies*, 23(3), 165-180.

Thaler, R. H., & Shefrin H. M. (1981). An economic theory of self-control, *Journal of Political Economy*, 89(2), 392-406.

Tversky, A., & Kahneman, D. (1974). Judgment under uncertainty: Heuristics and biases, *Science*, 185(4147), 1124-1131.

Tversky, A., & Kahneman, D. (1991). Loss aversion in riskless choice: A reference-dependent model. *Quarterly Journal of Economics*, 106(4), 1039-1061.

Viscusi, W. K. (2007). Rational discounting for regulatory analysis. *University of Chicago Law Review*, 74(1), 209-246.

von Neumann, J., & Morgenstern, O. (1944). *Theory of Games and Economic Behavior*. Princeton University Press.

Walster, E. (1967). 'Second guessing' important events. *Human Relations*, 20(3), 239-249.

Weinstein, N. D. (1980). Unrealistic optimism about future life events. *Journal of Personality and Social Psychology*, 39(5), 806–820.

Wilkinson, N., & Klaes, M. (2018). *An Introduction to Behavioral Economics*. Basingstoke, UK: Palgrave Macmillan.

Wright, J. D. & Ginsberg, D.H. (2012). Behavioral Law and Economics: Its Origins, Fatal Flaws, and Implications for Liberty. *Northwestern University Law Review*, 106(3), 1033-1088.

Wright, J. D., & Stone, J. E. (2012). Misbehavioral economics: The case against behavioral antitrust. *Cardozo Law Review*, 33(4), 1517-1554.

Wright, J. D., & Stone, J. E. (2012). Still rare like a unicorn? The case of behavioral predatory pricing. *Journal of Law, Economics, and Policy*, 8(4), 859-882

Yahya, M. A. (2006). Deterring *Roper*'s juveniles: Using a law and economics approach to show that the logic of *Roper* implies that juveniles require the death penalty more than adults. *Penn State Law Review*, 111(1), 53-106.

Zeiler, K. (2010). Cautions on the use of economics experiments in law. *Journal of Institutional and Theoretical Economics*. 166(1), 178-193.

Zeiler, K. (2018). What explains observed reluctance to trade?: A comprehensive literature review. In J. Teitelbaum & K. Zeiler (Eds.), *Research Handbook on Behavioral Law and Economics*. Edward Elgar.